TRANSACTIONS

OF THE

NEW ZEALAND INSTITUTE, 1891.

I.—ZOOLOGY.

ART. I.—*Further Coccid Notes: with Descriptions of New Species, and Remarks on Coccids from New Zealand, Australia, and elsewhere.*

By W. M. MASKELL, Corr. Mem. Royal Society of South Australia, Registrar of the University of New Zealand.

[*Read before the Wellington Philosophical Society, 21st October, 1891.*]

Plates I.–XIII.

THE following pages contain notes and descriptions of a large number of Coccids, including thirty-nine new species from New Zealand, Australia, and India. I make no apology for publishing in our Transactions descriptions of exotic species, for independently of their own special interest there is no certainty that any of them may not at any time make their appearance in this country, as so many others have done before them.

The majority of my Australian species have been furnished to me by Mr. French. One—*Carteria acaciæ*—comes from Mr. Tepper, of Adelaide, as collected by the entomologist attached to the Elder Expedition which, as I understand, is or has been lately exploring the central regions of the continent. The remainder, until a few months ago, formed part of the collection of my late friend Mr. Frazer S. Crawford, of Adelaide. These include, amongst others, two very interest-

ing forms named in this paper *Lecanium baccatum* and *Cœlostoma immane*. I was always in hopes that Mr. Crawford would himself describe these species; but I suppose time did not permit him to do so. He was not greatly inclined to systematize: his chief work lay more in the direction of the economical part of science—entomological or fungological. In his treatment of that lies his principal claim to the remembrance of the world, and it would be difficult to exaggerate the importance of his labours and the debt of gratitude which agriculturists in every country really owe to him. If Crawford had not persistently and eagerly followed out the study of parasitic entomology, if he had not discovered and made known the existence and value of the fly *Lestophonus iceryæ*, the United States Government would not have despatched Mr. Koebele to collect the parasites of *Icerya* in Australia, and the clearance of California from that pest by means of *Vedalia cardinalis* would not have been effected. Whether, later on, the work of *Vedalia* in New Zealand would have been noticed and made use of, is uncertain. But the introduction of that splendid enemy to *Icerya* into America in 1889 was due primarily to the work of F. S. Crawford, and I think there is no harm in emphasizing here this fact, because it is a natural tendency of people nowadays to forget their benefactors unless pointedly reminded of them. For my own part, I am glad to express here, as a systematist who has not been greatly devoted to the purely "economic" side of entomology, preferring rather the scientific side, my admiration for one who dedicated himself so thoroughly to studies more near to the immediate needs of the agriculturists than my own may have been.

The species herein recorded from India have been sent to me at various times by Mr. Cotes, of the Indian Museum, Calcutta, and by the late Mr. T. W. Atkinson, Accountant-General of Bengal, who was an enthusiastic student of the *Rhynchota*, and whose loss last year is much to be deplored. The descriptions and figures which I have sent in return to these gentlemen are, as I understand, awaiting publication in the "Indian Museum Notes." I have included the species in this paper because I am not at all able to feel certain of my power to publish any more of these systematic notes on Coccids, which have now appeared, either in New Zealand or Australia, pretty constantly during the last fourteen years; and it seemed desirable to gather up, so to speak, all *disjecta membra*.

My New Zealand species are again mostly due to Messrs. Raithby and Cavell, and I think that they are not deficient in interest. The curious species *Ripersia formicicola* I owe to the kindness of Mr. W. W. Smith, of Ashburton.

The notes which are herein included, as to "parthenogenesis" and to the power of "gall-"making, will not, it is hoped, be considered either trivial or unnecessary. In both cases remarks of a vague and general character may be found in various works dealing with Coccids: but my intention has been to bring the subjects forward more particularly and definitely. It is to be hoped that in time the problems connected with these matters may be attacked systematically; and that European entomologists, when they get tired of the already dreadfully-worn grooves of the Lepidoptera and Coleoptera, will find the Coccids worthy of their best attention.

It has occurred to me that a few words may usefully be said about the mode of investigating systematically the species and varieties of Coccids. In common with everything else, of course, the outward appearance and habits of these insects, their position on bark or leaves, their colour and size and general form, must be carefully noted. But this exterior study, of itself, would be of extremely little use to the student, and indeed would lead him to utter confusion in a very short time: not only could he seldom distinguish between species and genera, but he would frequently confound Coccids with Lecanids, and I have seen species of Australian Psyllids which in outward appearance in the pupal stage very closely indeed resemble Diaspids. Close examination of the anatomical characters of the insects is therefore necessary: but here again the student will find himself in a difficulty unless proceeding in the proper way. The female insects, which are in most cases the most important, are frequently so covered with cotton or meal that the organs cannot be made out without treatment with reagents: moreover, at gestation they almost always shrivel up into such small, shapeless masses that their true form is often entirely lost. A student must therefore examine them, and preserve them for comparison, in two ways:—the specimen cabinet should contain as many, in their natural position if possible on portions of their food-plant, as form a typical collection; and, besides, others should be mounted for microscopical study, either whole or as dissected parts. The plan which I have found best adapted for these mounted specimens is as follows: it involves several operations, which, however, do not occupy as much time as might be thought from their description.

First, after thoroughly investigating the natural exterior form, colour, position, &c., of the insect, select as many individuals as may be required for dissection and mounting, and, if they are encased in thick cottony sacs, or in thick wax, or under puparia, carefully extract them therefrom—a proceeding which will become less difficult with practice. Secondly, boil

them in *strong liquor potassæ*. For this purpose I use a small shallow dish placed on a flat tin plate over a spirit-lamp. The duration of this boiling should vary with the size of the insect: a small *Aspidiotus* or a moderate *Eriococcus* will require much less time than one of the large *Cœlostomas*. Practice again will show when to remove the lamp. The action of the potash is exercised mostly on the soft internal organs. If the boiling were continued long enough, the chitinous epidermis and the feet and antennæ would be destroyed also, but it will soon be ascertained when the internal portion is sufficiently softened, leaving the epidermis unharmed. In the case of a large insect it is usually better to prick it with a needle in two or three places so as to allow the internal substance to wash out. Thirdly, pour away the superfluous liquid, and replace by cold water. One thing is specially to be avoided—namely, any touching of the insect which can possibly be done without, as long as any potash remains to soften it. Fourthly, *float* the insect carefully from the dish on a glass slide, with plenty of water; place a thin cover-glass on it, and very gently press it down: this very slight pressure will usually suffice to expel the greater part of the internal substance without materially injuring the specimen. If now the insect be looked at with a lens it will be found that the boiling in potash has not only rendered it sufficiently transparent to show all the organs, but has at least nearly restored it to its proper shape—taken out, as it were, all the creases. Fifthly, *float* the specimen from the glass slide, cover and all, into a wine-glass of clean water: the cover will float away, the specimen will leave the slide; and now wash it thoroughly in the water, taking care not to touch it with anything hard. Sixthly, when well washed, with all the potash out of it, *float* it again on a slide, pour off the water, and replace it with strong alcohol: let the insect soak thoroughly in the spirit, and after a few minutes it will be found sufficiently hard to be gently moved with a camel's-hair brush into the centre of the slide where it is to remain permanently. Seventhly, put on the required thin cover-glass properly centred; run in more alcohol so as to keep the specimen well soaked; and now it can be examined under the microscope, the various organs noted, and its characters thoroughly ascertained. In general, it is best to place the specimens on the slide with the ventral surface uppermost, as most of the organs are on that surface; but sometimes the reverse is required. Now put away the slide to dry; and it will be well to leave it for several hours with this object, so that every particle of the alcohol may evaporate. The cover-glass will prevent the specimen from shrivelling up or becoming dusty. Lastly, and preferably next day, when it is quite dry, *run in* under the cover-glass a drop or two of

Canada balsam dissolved in benzine. Put it away again to dry (any length of time required), and except the final cleaning and ornamenting of the slide it is complete, and the specimen ought to show every organ necessary for examination with full clearness.

The foregoing process may at first sight seem to be long and complicated. It is not so in reality. I have frequently gone through the whole (except, of course, the final dryings) in a quarter of an hour, and mounted several specimens in an afternoon. The two things which must not be neglected, at the risk of entirely spoiling the specimen, are—first, carefully avoid touching the insect with a needle or a brush, as far as is possible, all through the process, at least until it has been well hardened by the alcohol: secondly, take every care that all the potash is washed out and that all the alcohol has evaporated before the balsam is run in. Mr. Raithby has sent me some very fine specimens which, in addition to the above treatment, he has stained with carmine. I have not practised any staining.

It must be noted that the foregoing applies only to the female insects. The males of most species are so small and so delicate that it is best to mount them untouched. I have many specimens quite sufficiently clear which have simply been first placed in position in a drop of alcohol, covered with thin glass, left to soak in alcohol for some time, and when dry had the balsam run in as usual. I have even treated in this way large males such as *Leachia* or *Icerya:* successfully enough for purposes of study, but of course not "show" slides. The larvæ, again, will not require the potash. But the adult females in almost all cases will require the process just given.

It will usually be found advisable to mount, in addition to the slides showing the entire insect, various portions—antennæ, or feet, or spiracles, &c., separately dissected. When it is considered that a Coccid which attains a length of $\frac{1}{2}$in. is almost a monster, one of $\frac{1}{5}$in. a large one, and one of $\frac{1}{15}$in. probably above the average, the necessity for clear microscopic preparations for any thorough study will be apparent.

It will perhaps have been observed that in this and in all my former papers I have continued to speak of the grouped organs noticeable in the abdominal segment of the Diaspidinæ as "spinnerets." The word has been so used by writers on Coccids for a long time. Targioni-Tozzetti, in his elaborate essay on the anatomy of Coccids ("Studii sulle Coccineglie," 1867), speaks of them as "filiere agglomerate." Signoret terms them "groupes de filières agglomérées." Other authors have used similar phrases. Mr. Morgan (Ent. Mo. Mag., Jan., 1889, p. 190) draws attention to the fact that these groups are

at least nearer to the ventral surface of the segment than to the dorsal; that several species of Diaspids are without them altogether, and yet form scales or puparia; and that somewhat similar organs are found in certain insects close to the oral setæ: he concludes therefore that they are not "spinnerets," but "salivary glands." I am not prepared to deny altogether the force of these reasons. Yet it should be noted that at least these little organs, whilst they differ to some extent from the dorsal "spinnerets" of Diaspids, resemble very closely the dorsal organs which have been by common consent considered as "spinnerets" in the other groups. On the dorsal surface of, say, *Aspidiotus*, the tubular organs noticeable are different from those in the "groups;" and in several Lecanid or Coccid insects there are also more or less tubular organs. But there are also in these nearly always a number of circular ones which are quite similar to the "grouped orifices" of *Aspidiotus*. For example, they are very numerous in *Cœlostoma;* and again in *Planchonia*, where their double form is merely a variation. Close examination of a "group of orifices" in a Diaspid will show that they are "multilocular"—that is, composed of several openings all enclosed in an outer circle; and Targioni, in plate ii., fig. 23, of his "Studii," correctly delineates them as such. In this character they exactly resemble the dorsal organs of *Cœlostoma:* it would seem therefore probable that they fulfil the same function. The figure-of-eight orifices of *Planchonia* exhibit only one small circle within each outer one: this appears to be an unimportant variation: but undoubtedly these double organs lie at the base of the double long tubes forming the fringe of the insect, and must be taken as the orifices of excretion of the tubes. On the whole, therefore, it would seem to be clear that the "grouped orifices" of a Diaspid are similar to the "spinnerets" of a Coccid or a Monophlebid; and as, so far, no actual *proof* has been adduced that these organs are not engaged in the excretion of some substance, I have thought it best to retain the word "spinnerets" for the Diaspidinæ.*

It may happen that I may be unable to continue in future years these "Notes on Coccids:" I therefore take this opportunity of giving here a short list of the works which will probably be most useful to anybody who may take up the study of these insects.

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* I find that "grouped orifices" are present, close to the thoracic spiracles, in *Aspidiotus aurantii* (very small), *Diaspis rosæ* (very large and conspicuous), *Mytilaspis pomorum*, *Myt. leptospermi*, *Myt. intermedia*, *Myt. metrosideri*. In all probability they occur in every species of the Diaspidinæ.

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The following list contains only a fraction of the large number of authors who, in the last two centuries, have written on the subject of Coccids: any one curious to know all their names may consult Signoret's first paper in the Annals of the Entomological Society of France, 1867–68. But, with rare exceptions, these writings contain little of practical importance nowadays, and the student will probably find in the list here given nearly all that is required for complete investigation of this family of insects. As most of the works included are in the form of papers extending over several years, I have thought it best to make the list alphabetical.

Atkinson, T. W.:
Insect Pests belonging to the Homopterous Family Coccidæ (in the Journ. of the Asiatic Society of Bengal, 1886).
Notes on Rhynchota (same Journal, 1889–90).
A New Species and Genus of Coccidæ (same Journal, 1889).
Carter, H.:
On the Lac Insect (Ann. and Mag. of Nat. Hist., 1861).
Comstock, Prof. J. H.:
Report of the Entomologist, U.S. Department of Agriculture, for the Year 1880 (Washington, 1881).
Report on Insects for the Year 1881 (Washington, 1882).
Second Report of the Department of Entomology of the Cornell University Experiment Station (Ithaca, N.Y., 1883).
An Introduction to Entomology (Ithaca, N.Y., 1888).
Coquillett, D. W.:
Mealy Bugs of the United States (West American Scientist, Oct., 1889).
New Coccids from California (same journal, Sept., 1890).
Cotes, E. C.:
Indian Insect Pests (Indian Museum Notes, Calcutta, 1889–91).
Douglas, J. W.:
Notes on British and Exotic Coccidæ (Entomol. Monthly Magazine, 1885 to 1891).
French, C.:
Handbook to the Destructive Insects of Victoria (Melbourne, 1891: only Part I. yet issued).
Goethe, R.:
On Coccidæ in the Rhine District (Jahrb. des Nass. Vereins für Naturkunde, 1884).
Howard, L. O.:
Three New Parasites of *Icerya* (Insect Life, March, 1889).
A Newly-imported Elm Insect, *Gossyparia ulmi* (ditto, Aug., 1889).
"Indian Museum Notes:" Calcutta, 1889–91.
"Insect Life:" Various notes, 1888–91 (Washington).
Kew Gardens, Bulletin:
The Fluted Scale-Insect (Aug., 1889).
The Orange Scale in Cyprus (Sept., 1891).
Koebele, A.:
Report on Experiments on Cottony-cushion Scale and Red Scale (U.S. Dep. of Agric., Rep. 1886).
Report of a Trip to Australia to investigate the Natural Enemies of the Fluted Scale (U.S. Dep. of Agric., Rep. 1890).

Lewis, R. T.:
Note on the Larval Forms of *Ortonia* and *Icerya* (Journ. of the Quekett Micros. Club., April, 1889).
Note on the Male of *Icerya purchasi* (same publication, July, 1889).
Lintner, J. A.:
Reports on Injurious and other Insects of the State of New York, 1882–1890.
Löw, F.:
Papers on Coccids (Verhand. der K. K. Zoologisch-botanischen Gesellsch. in Wien, 1882).
A New Coccid, *Xylococcus filiferus* (same publication, 1882).
Maskell, W. M.:
Notes on Coccids (Trans. New Zealand Inst., 1878 to 1891).
On the Honeydew of Coccidæ and the Fungus accompanying it (same publication, 1886).
An Account of the Scale-Insects of New Zealand, 1887.
On some South Australian Coccids (Trans. of the Royal Society of South Australia, 1888).
On the Distinctions between Lecanidinæ, Hemi-coccidinæ, and Coccidinæ (Entom. Monthly Mag., Oct., 1889).
On *Icerya purchasi* and its Enemies in New Zealand (same publication, Jan., 1890).
On a New Australian Coccid, *Cœlostoma australe* (Proc. of the Linnean Soc. of New South Wales, May, 1890).
How do Coccids produce Cavities in Plants? (Entom. Monthly Mag., Nov., 1890).
On a New Coccid on Grass in Australia (Agricultural Gazette of New South Wales, June, 1891).
Morgan, A.:
Observations on Coccidæ (Entom. Monthly Mag., 1888 to 1890).
Newstead, R.:
Notes on Coccids (Entom. Monthly Mag., 1891, in papers by Mr. J. W. Douglas).
On New Coccids in England (same publication, June, 1891).
On Alteration in the Form of the Scales of Lecania by Parasites (same publication, Oct., 1891).
Ormerod, Miss E.:
Notes on the "Australian Bug" in South Africa, 1887.
Riley, Prof. C. V.:
On *Kermes galliformis* (American Naturalist, vol. xv., p. 482).
Some new Iceryas ("Insect Life," Nov., 1890).
Various notes in "Insect Life," *passim*.
Schrader, H. L.:
On Gall-making Insects in Australia: the Brachyscelidæ (Verh. der Zoolog.-bot. Gesellsch. in Wien, 1863).
Signoret, Dr. V.:
Essai sur les Cochenilles (papers in the Annales de la Société Entomologique de France, 1868–1876). Copies of this most valuable work, in complete book-form, with 21 plates, may, I believe, be procured, but are somewhat rare.
Smith, Miss E.:
On the Maple-tree Bark-louse (American Naturalist, Oct.–Dec., 1878).
On *Pseudococcus aceris* (North American Entomologist, April, 1880).
Targioni-Tozzetti, Prof.:
Studii sulle Coccineglie (Milan, 1867). A very valuable essay on the anatomy of Coccids.
United States Department of Agriculture, Reports and Publications, 1876 to 1891. Various useful notes may also be found in official and departmental Reports of the States of California, Nebraska, Iowa, &c.

W.M.M. delt ad nat. COCCIDIDÆ. C.H.P. lith.


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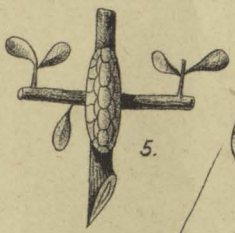
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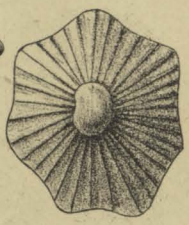
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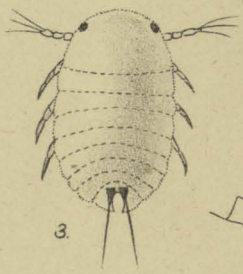
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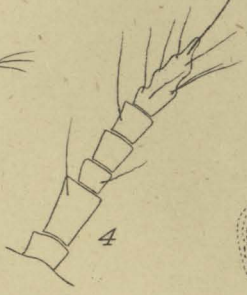
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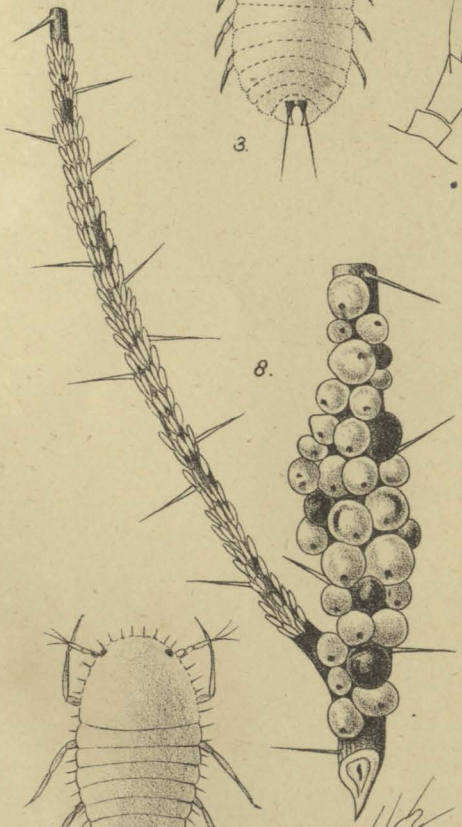
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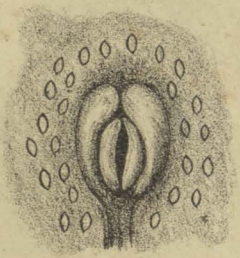
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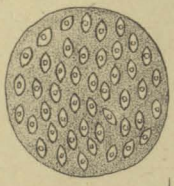
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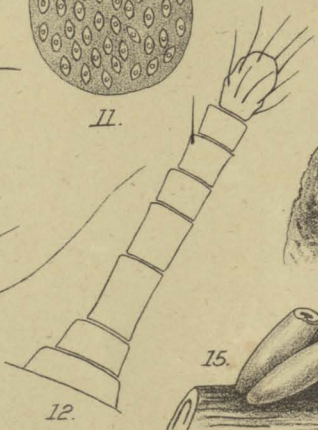
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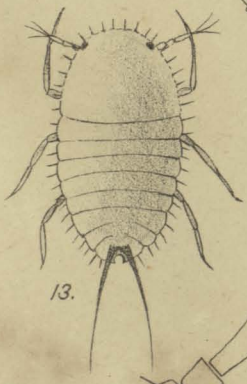
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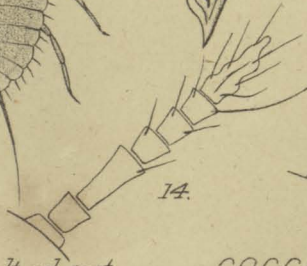
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WMM. del^t ad nat. COCCIDIDÆ. C.H.P. lith.

The foregoing list contains the greater part of *modern* Coccid literature. Earlier writers, such as Réaumur, Geoffroy, Curtis, Bouché, Westwood, Fitch, Nietner, &c., may be sometimes consulted.

Finally, I think it advisable to say just a word or two as to the nomenclature which I have adopted regarding this family of the Homoptera. A few writers have taken exception to my use of such terms as "groups" and "subdivisions": they tell me I ought to say "sub-family," "tribe," and such-like. Again, I am taken to task for my words "Coccididæ," "Lecanidinæ," and so on. They say that the declension of Greek and Latin words should be strictly observed, and that the reduplication of syllables adopted by me in such words as those just given is a grave scientific error. It is to be feared that I am an incorrigible offender. Fully admitting the excellence of grammar and its rules, I cannot help thinking that in the matter of systematic nomenclature clearness and convenience are still more excellent. Huxley, I think, somewhere says the same thing. The classification which I have used is, to me, the simplest, the best, and the most convenient. Others are perfectly free to adopt it or not, as they please: I claim that it puts the family Coccididæ before the student in the clearest and completest way, and, so thinking, I propose to adhere to it.

NOTE.—All the insects originally collected by the late Mr. Crawford, whether determined by me or not, are marked in this paper "Crawford Coll."

Group DIASPIDINÆ.

Genus ASPIDIOTUS, Bouché.

Aspidiotus subrubescens, sp. nov. Plate I., figs. 1, 2.

Female puparium reddish-brown, sub-circular, flat, and smooth; the pellicles in the centre, small, forming a small slightly elevated boss, which is rather yellower than the rest. Diameter of puparium variable: specimens reach from $\frac{1}{23}$in. to $\frac{1}{8}$in.

Male puparium white, slightly elongated, not carinated. Length, about $\frac{1}{20}$in.

Adult female of the usual peg-top form of the genus, the terminal segment shrinking up at gestation; colour, brown. Abdomen ending in six rounded lobes with a number of scaly serrated hairs between them: these hairs extend also a short way along the margin, and where they end is another lobe, which is denticulate and pointed. Spinneret-groups four: the upper pair with 16 to 18 orifices, the lower pair with 10 to 12. Many single spinnerets.

Adult male unknown.

Hab. In Australia, on *Eucalyptus*, var. sp. My specimens are from Mr. French.

This insect seems to be not far removed from *A. ficûs*, Riley, the "Red Scale of Florida;" but, apart from its lighter colour, the puparium is flatter, and the spinneret orifices in the groups are much less numerous. In *A. ficûs* also there appears to be no denticulate lobule on the abdominal margin.

Aspidiotus fodiens, sp. nov. Plate I., figs. 3, 4.

Female puparium circular, slightly convex, greyish or reddish-brown; the pellicles in the centre rather more convex, forming a slight boss and bright orange, but often covered with a thin, greyish, scaly coating. Diameter of puparium averaging about $\frac{1}{25}$in. The puparia occupy depressions in the leaf which have the appearance of being caused by the insect.

Male puparium slightly elongated, similar in colour to that of the female, but smaller; not carinated.

Adult female of the normal pegtop form, orange-coloured, the abdomen somewhat acuminate. Abdomen ending in six rather narrow floriated lobes, set rather close together, with many scaly serrated hairs between them: at a little distance away on the margin is another lobule on each side, which is denticulate as in the last species. Spinnerets in four groups: upper groups with 3 to 5 orifices, lower groups with 1 or 2. Many single spinnerets.

Adult male unknown.

Hab. In Australia, on *Acacia* sp. Specimens from Mr. French.

This species, in the form and colours of the puparium, approaches to *A. uvæ*, Comstock, an insect infesting vines in Indiana, U.S.; but in *A. uvæ* the abdomen ends in only two lobes, and there is no denticulate lobule on the margin. *A. cladii*, mihi (Trans., vol. xxiii., p. 3), is much nearer, and is also Australian. The colours of the puparia in that species are indeed darker and richer, but that is not of great importance; and perhaps, considering the very small number of spinneret orifices in *A. fodiens*, the two insects may be only varieties of the same. *A. cladii* is indeed a good deal larger; but size, again, is not very important.

Aspidiotus bossieæ, sp. nov. Plate I., figs. 5, 6.

Female puparium circular, convex; colour varying from dirty-white to yellow, and sometimes to dark-brown; texture soft and woolly-looking: pellicles central, very small and inconspicuous, yellow. Diameter of puparium averaging about $\frac{1}{18}$in.

Male puparium whitish, slightly elongated, smaller than that of the female; not carinated.

Adult female dark-brown, of normal peg-top form. Abdomen ending in two not large rounded lobes, and perhaps after a small interval another inconspicuous lobule on each side. Margin slightly serratulate. No groups of spinnerets.

Adult male unknown.

Hab. In Australia, on *Bossiea procumbens:* sent by Mr. French.

It is possible that *A. caldesii*, Targioni, may be very near to this species; but the description of it is very vague, and I see nothing in it indicating a soft woolly puparium such as the Australian insect exhibits.

Aspidiotus theæ, Maskell, sp. nov.

The late Mr. Atkinson, of Calcutta, sent me in 1889 a packet of specimens of a Diaspid on the tea-plant in the Kangra Valley, Assam, India. I returned to him a description and figures early in 1890, under the name *A. theæ*, sp. nov. I suppose that his lamented death, which took place in that year, prevented him from publishing this paper: I understand that it will appear shortly in "Indian Museum Notes." The insect has a convex puparium, and its most striking character is the presence on the dorsal abdominal region of the adult female of a large and distinct patch of lattice-work pattern, similar to that exhibited in *Ischnaspis filiformis*, Douglas (Ent. Mo. Mag., 1887, p. 21).

Aspidiotus eucalypti, Maskell. Trans. Roy. Soc. South Australia, 1887–88, p. 102.

I have had specimens of this insect from New South Wales, also on various species of *Eucalyptus*. I regret that the figure 1*d*, of plate xii. in the South Australian Transactions, does not sufficiently exhibit the deep transverse groove in the adult female, which is so marked a feature of it.

Aspidiotus rossi, sp. nov. Crawford Coll. Plate I., figs. 7–9.

Female puparium normally circular, very slightly convex; colour a dull deep brown, almost black, sometimes fading into a lighter shade at the edge: pellicles central, small, forming a little boss which is sometimes yellowish. Diameter of puparium averaging about $\frac{1}{16}$in., but varying a good deal. When on narrow leaves the form is sometimes irregular, oblong or elliptical.

Male puparium slightly elongate, smaller and lighter in colour than that of the female.

Adult female of the normal peg-top form, dark-orange or

often dark-brown in colour. Abdomen somewhat acuminate, the margin having a rather deeply serrate appearance, with six floriated terminal lobes, beyond which are three very small denticulate lobules: a few serrated scaly hairs. Four groups of spinnerets: upper groups with 8 orifices, lower groups with 4. Several single spinnerets.

Adult male unknown.

Hab. In Australia, on a large number of plants. It appears to be very common about Melbourne, Sydney, and Adelaide on *Nerium oleander*, but I have seen it on various *Eucalypti*, on *Ricinocarpus*, and on several other plants.

This is one of the insects in the collection of my lamented friend Mr. F. S. Crawford, and I have adopted the name which he attached without description to it: I do not know the origin of the specific designation. The species does not seem to resemble any of those known hitherto. Mr. Crawford, in his early letters to me, named it *Asp. niger*, but I pointed out to him that this name was already appropriated by Signoret for a species living on willows in Europe, and differing from the Australian form in several particulars. In outward appearance *A. rossi* might be mistaken for *A. ficus*, Riley; but the colour of the puparium and of the female is much darker, and the abdominal extremity of the female differs considerably from that species.

Aspidiotus destructor, Signoret. Signoret, Essai sur les Cochenilles, p. 94.

Specimens of cocoanut leaves *(Cocos nucifera)* were sent to me some time ago by Mr. Cotes, of the Indian Museum, Calcutta. They came from the Laccadive Islands, and were thickly covered with very small Diaspid scales, which I have identified certainly as *A. destructor*. The characteristic feature of the species is the presence of six terminal abdominal lobes, of which the two median are plainly shorter than the others. This insect is very destructive to cocoanuts, and has done great damage in various parts of the Indian Ocean. In the present instance it was accompanied by a variety of *Dactylopius cocotis*, Mask., which I described from Fiji in 1889. I understand that my description and figures of *A. destructor* are to appear in the "Indian Museum Notes."

Aspidiotus aurantii, Maskell. N.Z. Trans., vol. xi., 1878, p. 199; Scale-Ins. of N.Z., p. 42.

On the authority of Dr. Signoret, in a letter from him received in 1883, I referred this insect to *A. coccineus*, a species which appears to have been originally described in Greece: and in my "Scale-Insects of New Zealand," 1887, I definitely placed my name for it as only a synonym. Since then, in a

letter from Professor Riley, I have been informed that Dr. Targioni-Tozzetti considered that, after all, my species was distinct from *A. coccineus*. I should be always very loth to depart from the authority of Signoret, whose work on the Homoptera is incontestably the best hitherto produced. At the same time, in every report, book, paper, or newspaper paragraph which happens to mention the insect it is invariably under the name of *A. aurantii*. Custom, right or wrong, must be to some extent obeyed; and, though I am by no means satisfied as to its correctness, the name of *A. aurantii* may now be best adhered to for the future. There is confusion enough, in all conscience, in the nomenclature of Coccids; and, if that confusion can be at all lessened by conforming to the general custom, a little evil may be done to secure a greater good.

In the number of "Insect Life" for June, 1891, p. 417, there is a notice of this insect as occurring in Syria, and I find it referred to therein as "*Aonidia aurantii*, Mask." I have no idea when, why, or by whom this somewhat important change has been made: whoever referred the insect to the genus *Aonidia* did not communicate with me. However, I am unable to accept this correction. *Aonidia* stands, in relation to those species of Diaspids which have circular puparia, in a similar position to that of *Fiorinia* as regards the elongated species: it is characterized by the excessive proportionate size of the second pellicle. In both these genera the second pellicle forms almost the whole puparium, and the adult female is therefore much smaller than the second, or pupal, stage. This very definite character is not found in *A. aurantii*. I have re-examined a large number of specimens, some mounted, many *in situ*, and the second pellicle is quite clearly visible in all, and is considerably smaller than the adult female insect. Moreover, in Dr. Signoret's original description of *Aonidia* he distinctly states that it presents the appearance of two puparia, one superimposed on the other: no such appearance is noticeable in *A. aurantii*. I am thus unable to accept the suggested generic change, and prefer to leave the species in the genus *Aspidiotus*.

Aspidiotus cydoniæ. Comstock, U.S. Dep. of Agric. Report, 1880, p. 295.

While this paper is in the press my friend Mr. A. Koebele, who is on his second journey to Australia in search of Coccid parasites, has brought to me a scale on oranges which he collected on his way at Samoa, in the South Pacific. After careful examination I conclude that this insect is identical with *A. cydoniæ*, a species recently reported as on quinces in Florida. The occurrence of it on citrus in the Pacific is an interesting fact. I received about the same time a letter from Mr. D. W.

Coquillett, of Los Angeles, in which that gentleman tells me that in California there are two *Aspidioti* on citrus: the one is *A. aurantii*, the other is different in a few respects. After seeing the Samoan insect I incline to the belief that *A. cydoniæ* may be this other species, and in consequence that the orange may be as much its food-plant as the quince, if not indeed the principal one.

Genus Chionaspis, Signoret.

Chionaspis eugeniæ, sp. nov. Plate I., figs. 10–12.

Female puparium white, or sometimes yellow, elongated, pyriform, flattish; length about $\frac{1}{10}$in. Pellicles terminal, yellow, not large.

Male puparium white, elongated, soft and cottony; often appearing like a small irregular mass of cotton, but in individuals of normal form a distinct carination is visible.

Adult female elongated, yellow or brown: abdomen ending with a shallow median depression, the two median terminal lobes being represented by thickenings of the margin at the depression with serrulated edges: four very small lobes can be in most cases detected at each side, but this depends on the position of the specimen: a short spiny hair at each side of the depression; one, longer, between the four small lobes, and two others at equal distances on each margin: four altogether on each side: and on each of the anterior abdominal segments of the body three or four spines. Spinneret-groups five; upper group, 6–8 orifices; upper laterals, 16–18; lower laterals, 18–20. Several large single spinnerets.

Adult male unknown.

Hab. In Australia, on *Eugenia elliptica*, *Viburnum* sp., *Leptospermum lævigatum*, *Melaleuca ericifolia*, &c. Specimens sent by Mr. French. The female puparia seem identical on all these plants, excepting a slight variation in colour: the male puparia on *Melaleuca* are frequently very loose and fluffy, and Mr. French tells me that the plants look "as if covered with snow."

In the abdominal margin this species approaches to *C. nyssæ*, Comstock; but differs in other characters.

Chionaspis theæ, Maskell.

On tea-plants in the Kangra Valley, Assam, occurs an insect of which specimens have been sent to me by Mr. Cotes, of the Indian Museum: their description is to appear in the "Indian Museum Notes." The female puparium is pyriform, flat, light-brown: the female insect shows no very striking characters, but the abdominal segments are somewhat conspicuous. The male puparium is very small, white, and so markedly carinated that it has quite a *fluffy* appearance, as if

formed of loose parallel threads. On the twigs and leaves sent to me the male puparia far outnumbered those of the females.

Chionaspis aspidistræ, Signoret (Essai, p. 125).

This insect occurs on *Areca catechu* in India, and has been sent to me by Mr. Cotes, who states that it has been doing much damage to those trees. The species is a little peculiar, firstly from the thin yellow puparium (rather unusual in the genus), and secondly from the excessive prominence of the segments in the adult female. Signoret, indeed, speaks of this last feature as giving an extraordinarily quaint appearance to the insect; but I have seen a similar peculiarity (though less strongly accentuated) in some specimens of *Mytilaspis pyriformis*.

Chionaspis nitida, sp. nov. Plate I., figs. 13, 14.

Female puparium silvery-white and shining, elongated, smooth, slightly convex, the sides in a normal specimen somewhat parallel, the puparium being thus not as pyriform as is usual in the genus; pellicles terminal, the larval pellicle bright-yellow, the second greyish. Length of puparium about $\frac{1}{11}$in.

Male puparium silvery-white, elongated, with parallel sides, slightly convex, with an inconspicuous longitudinal median groove. Pellicle bright-yellow. Length of puparium about $\frac{1}{20}$in.

The pellicles and the white secretion in the puparia of both the male and the female are particularly clean and bright-looking.

Adult female golden-brown, elongated, of the normal shape of the genus, the abdominal segments not prominent; abdomen ending in two small floriated lobes with a median depression, the margin crenulated, with a few small spines. Spinneret-groups five: upper group with 4 to 6 orifices; upper laterals 12 to 14, lower laterals 20. Many single spinnerets. On each of the thoracic and the anterior abdominal segments, near the margins, is at each side a group of small spiny hairs. Length of insect about $\frac{1}{18}$in.

Adult male unknown.

Hab. In Australia, on *Daviesia corymbosa*. Sent by Mr. French from Melbourne, and by Mr. Tepper from Adelaide.

The very clean bright puparia of this insect readily distinguish it in outward appearance. In the abdominal extremity it is somewhat near to *C. eugeniæ* and *C. nyssæ*, but it wants the strong spines visible on the segments of those species, and differs also in the spinneret-groups. The snowy-white puparia and golden pellicles are pretty objects under a

low power or a lens. The male puparia are frequently placed transversely, not, as usual, longitudinally, on the leaf.

Genus Fiorinia, Targioni-Tozzetti.

Fiorinia acaciæ, sp. nov. Plate I., figs. 15–17.

Female puparium really yellowish and thin, but seeming thick and intensely black from the black second pellicle, which, as is usual in the genus, almost entirely occupies it, and is larger than the enclosed female; elongated, narrow, convex, the sides roughly parallel. The larval pellicle is terminal and dark-brown, and as it is apparently the only one visible the puparium might be mistaken for that of some male Coccid until the large black second pellicle is noted. Length of puparium about $\frac{1}{22}$in.

Male puparium white, cottony, elongated, narrow, with parallel sides, and with a distinct median longitudinal carination. Pellicle terminal, brown. Length of puparium averaging $\frac{1}{25}$in.

Adult female dark-brown, elongated; abdominal extremity truncate, with a single median floriated lobe; margin crenulated, and having on each side two deepish curvilinear incisions; four or five longish fine spiny hairs on the lateral margin. Spinneret-groups five; upper group with 3 to 6 orifices, laterals with 6 to 8. A few single spinnerets.

Adult male unknown. In a large number of puparia examined there were dead pupæ which appeared to offer no special characters.

Hab. In Australia, on *Acacia pycnantha*. My specimens were sent to me in 1890 by the late Mr. Crawford, of Adelaide. The pieces of bark forwarded were covered with numerous male and female puparia. Specimens also lately from Mr. French, on the same plant.

This species seems to be clearly and markedly distinct. The very black second female puparium and the form of the female abdominal region are differentiating characters, especially (in regard to the last) the single median lobe. The puparia, as in *C. nitida*, are frequently placed transversely on the twig.

Fiorinia camelliæ, Comstock.

I have specimens which I believe to be certainly of this species from Australia, on *Livistonia* and other palms, sent to me by Mr. French. The puparia are dark-yellow, with a longitudinal ridge sloping on each side to the margin, and the abdominal extremity agrees nearly with Comstock's description. The type of the species occurred, as Professor Comstock states, not only on camellias but also on palms in the conservatories at Washington.

W.M.M. delt ad nat. COCCIDIDÆ. C.H.P. lith


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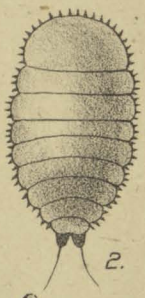
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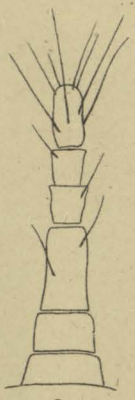
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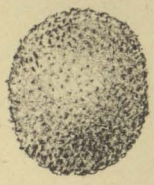
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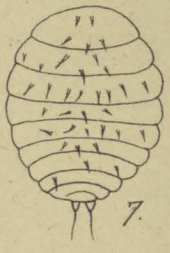
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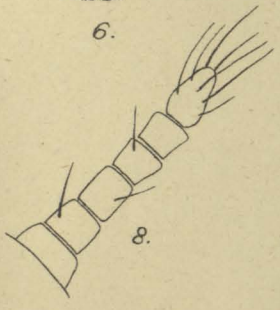
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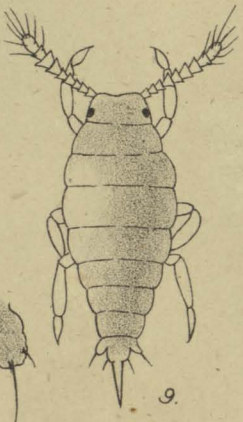
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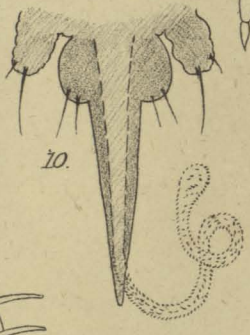
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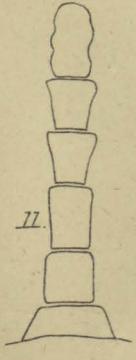
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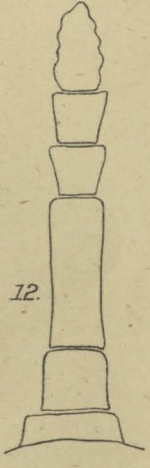
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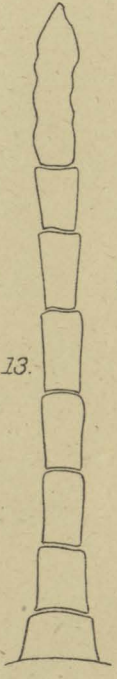
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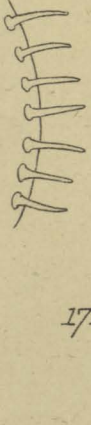
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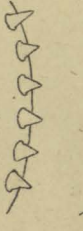
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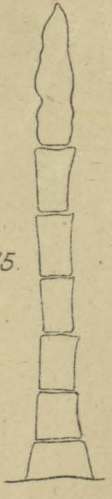
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W.M.M. delt. ad nat. COCCIDIDÆ. C.H.P. lith.

Genus POLIASPIS, Maskell.

In my paper of last year I offered certain reasons for the retention of this as a separate genus, and I see no reason now to alter the opinion therein expressed. At that time only two species were known—*P. media*, in New Zealand, and *P. cycadis*, in America. I have now to record an Australian insect so clearly belonging to this genus that at least one of the objections brought against my classification can exist no longer.

Poliaspis exocarpi, sp. nov.

Female puparium white, elongated, usually nearly straight, slightly dilated posteriorly: pellicles yellow. Length about $\frac{1}{12}$in.

Male puparium white, similar to that of the female but smaller; very obscurely carinated, if at all. Length about $\frac{1}{25}$in.

Adult female brown, darkening with age: elongated, segmented: length about $\frac{1}{16}$in. Abdomen ending in two very minute and scarcely perceptible median lobes; the margin irregular and bearing at each side only four or five spiny hairs set rather far apart. Pygidium exhibiting a double set of spinneret-groups: the lower set composed of five groups, the median having one orifice, upper laterals 18–21, lower laterals 25–35: the upper set forms an arch over the other, sometimes almost continuous, but usually separated into four groups, of which the two outer ones have 8–12 orifices, the two inner ones one or two. Many single dorsal spinnerets.

Adult male unknown.

Hab. In Australia, on *Exocarpus cupressiformis:* sent by Mr. French, who informs me that he has only found it in one locality—Mordialloc, near Melbourne—and that the plant seems usually to be free from scale.

I am unable to add more plates to my paper of this year, and defer a figure of this insect to a future occasion.

Group LECANIDINÆ.

Subdivision LECANODIASPIDÆ.

Genus CTENOCHITON, Maskell.

Ctenochiton elæocarpi, Maskell. N.Z. Trans., vol. xvii., p. 26; Scale-Ins. of N.Z., p. 67.

The test of the male pupa of this insect is white and glassy. It resembles somewhat that of the second stage female, but is rather larger and has a longer fringe, and the dorsal portion is more solid, with the waxy plates almost

agglomerated. There is a good deal of difficulty in distinguishing between the two.

The adult male has the thorax and abdomen brownish-yellow, the feet and antennæ lighter in colour: the wings iridescent with a red nervure, which in some specimens is rather conspicuous. The abdominal spike seems to vary in length, but is usually about half as long as the abdomen: from the two small tubercles at its base spring two setæ, which bear rather long cottony "tails." Antennæ of ten joints, nearly all long and subequal, the three last and the second rather shorter than the rest, the first very short: on the last joint three slender knobbed hairs, and numerous fine hairs on each joint. Feet normal. Dorsal eyes, four; ventral eyes, four: ocelli, two. Length of insect about $\frac{1}{23}$in.

The colours of the body of this male and the red nervures of the wings render it rather a pretty little object.

Ctenochiton dacrydii, sp. nov. Plate II., figs. 1–4.

Test of adult female white, or with a slight yellowish tinge, moderately thick, formed of a number of subcircular segments, which seem to be very brittle, and apt to break off: the edge of each segment is irregular, and the surface marked with irregular subconcentrical lines, and also radiating lines, so that it has somewhat the appearance of a fish-scale: the circular lines are rather deeply indented. Fringe in the specimens seen fragmentary. The segments of the test are sometimes convex, sometimes flattish.

Test of male unknown.

Adult female dark-brown or reddish-brown, very convex or semi-globular, hollow beneath; diameter about $\frac{1}{4}$in. Antennæ of (probably) seven joints. Feet normal. Abdominal cleft inconspicuous and short; anogenital ring with numerous hairs. Mentum dimerous. The female fills the test, and does not shrivel at gestation, and the dark body showing through the test gives the whole a brownish appearance.

Female of second stage brown, elongated, flattish, but becoming more convex latterly. Average length about $\frac{1}{17}$in. Antennæ of six rather confused joints, the last bearing some hairs. Feet slender; digitules fine hairs. Abdominal cleft and lobes normal, The margin of the body, all round, is minutely crenulated.

Larva yellow, elongated, flattish. Length about $\frac{1}{60}$in. Antennæ of six joints. Feet normal. Mentum dimerous. Abdominal cleft and lobes distinctly Lecanid. The margin of the body, all round, is minutely crenulated.

Hab. In New Zealand, under the bark of *Dacrydium cupressinum* (rimu) in the Reefton district.

This is a fine species, and, although I am departing from

my usual rule in describing it from only three specimens of the adult female, I believe that I have correctly assigned it to the genus *Ctenochiton*, from the character of the test and its segments. It appears to be by no means common. Mr. Raithby found the first specimens under thick moss on the roots just above the ground; later finds were under the bark of the trunk; and he thinks that the species may sometimes be subterranean.

Ctenochiton depressus, Maskell. N.Z. Trans., vol. xvi., 1883, p. 132; Scale-Ins. of N.Z., p. 66.

An insect occurs in the Reefton district which I believe, after very careful examination, to be a small form of this species. It is found on a very small-leaved *Coprosma*, and the slight differences observable are, I think, due to the character of the food-plant. These differences are: a somewhat smaller size, averaging about $\frac{1}{11}$in. as against $\frac{1}{7}$in. for the type; a more convex and elongated form of test, and a generally very smooth appearance: none of these things is sufficient to require specific distinction. The antennæ might be considered as having six or seven joints according as one attaches importance to the division in the third, which I have called a "false joint": a similar character is noticeable in most species of the genus. The smooth segments of the test remove the insect from *C. hymenantheræ*, the only other resembling it; and on the whole I leave it as a small form of *C. depressus*.

Genus INGLISIA, Maskell.

Inglisia inconspicua, sp. nov. Plate II., figs. 5–7.

Test of adult female white, elongated, narrow, convex, not conical, with fringe either absent or very small; texture glassy, very thin and delicate and brittle: segments polygonal, marked with very delicate radiating striæ of air cells, and still finer concentric lines. Length of test averaging about $\frac{1}{5}$in.; height about $\frac{1}{30}$in. Although the test itself is white, the general appearance of the insect on a twig is brown, the colour of the insect showing through the translucent segments.

Test of male white, elongated, slightly convex, segmented, with a posterior hinged portion for egress of the insect. Length about $\frac{1}{15}$in.

Adult female brown or reddish-brown, filling the test but shrivelling at gestation. Margin bearing conical spines. Antennæ of six joints. Feet normal.

Female of second stage light-brown or yellowish, flat, covered with a thin test and with a short fringe. Length about $\frac{1}{20}$in.

Larva yellowish, flat, elliptical, active; length about $\frac{1}{50}$in. Form Lecanid; abdominal cleft and lobes conspicuous. Margin minutely serrulate. Antennæ rather large, with six subequal joints. Mentum large, dimerous.

Adult male yellowish-brown; wings iridescent. Length of body about $\frac{1}{30}$in. Antennæ of ten joints, all long and slender except the first two, and all bearing several hairs, of which some on the last joint are knobbed. Abdominal spike long, slightly curved, and a little dilated near the end. Dorsal eyes, four; ventral eyes, four: ocelli, two. Feet normal.

Hab. In New Zealand, on *Corokia cotoneaster*, in the Reefton district. It seems to be rather uncommon.

I think that this insect must be separated from those of the genus hitherto described. It is quite distinct from the conical *I. patella*, *I. ornata*, or *I. fagi*, and the delicately-marked and very thin translucent segments of the test differ from those of *I. leptospermi*. The specific name has been adopted on account of the difficulty there is in detecting the female on the twig, owing to the similarity of its general colouring to that of the bark: in fact, even with a lens it is not always easy to make out the contours with clearness.

Subdivision LECANIDÆ.

Genus LECANIUM, Illiger.

Lecanium baccatum, sp. nov. Crawford Coll. Plate II., figs. 8–16.

Adult female dull-yellow, with sometimes a few brown patches, often wholly dark-brown; globular, with only a small orifice beneath for attachment to the plant; average diameter about $\frac{1}{5}$in., but some specimens are larger. Epidermis almost smooth, not speckled with black, but after treatment with potash a great number of small, oval, light marks are visible, each with a central clear spot. On the dorsum, near one side, is visible a black spot, and on close examination this is found to contain a small orifice and two very minute tubercular lobules: the spot contains therefore the anogenital ring, which appears to be quite hairless, and the abdominal cleft is represented by an exceedingly shallow and often quite indistinct depression between the spot and the opening on the twig. The interior of the globular mass is hollow, and the organs are only to be made out by maceration and dissection. Rostrum rather large: mentum short, monomerous. Antennæ of eight joints, of which the third is the longest, the fourth next, the rest shorter and subequal; the last is subglobular, and bears some short hairs. Feet rather slender (of what use are they?): upper digitules fine hairs; lower pair slightly dilated.

Female of the second stage dull-yellow, convex or subglobular, slightly elongated. Length about $\frac{1}{11}$in.

Larva yellowish, flat, active; length about $\frac{1}{45}$in. Form distinctly Lecanid, the abdominal cleft clearly noticeable, and the lobes not extending beyond it: the lobes bear long setæ. Margin of body minutely serrulate, and bearing several fine hairs. Antennæ of seven joints, of which the third is the longest. Feet normal; digitules fine hairs. The anal ring bears several hairs.

Male pupa enclosed in a small greyish-white subcylindrical very closely felted sac, one end of which is closed by a thin glassy plate or operculum in which there is a small orifice simulating the abdominal cleft of a female; length of sac averaging about $\frac{1}{11}$in. These sacs are frequently clustered in great numbers on a twig quite apart from the females.

Adult male unknown. A single male pupa was observed which had died just on the point of emergence: as far as could be made out the antennæ would have ten joints.

Hab. In Australia, on *Acacia armata* (from the late Mr. Crawford); on *Acacia calamifolia* and *Acacia longifolia* (from Mr. French). The specimens from Melbourne are darker in colour than those from Adelaide. Mr. Crawford, in a memorandum attached to one of his drawings, says that the species is very rare about Adelaide: but I imagine that it must be fairly plentiful elsewhere, from the number of specimens which I have seen.

This is another of the insects in the collection of Mr. Crawford, who, at the time of his finding it, not being then well acquainted with Coccid classification, attached to it the name of *Cryptes baccata*. The females, at first sight, have very much the appearance of *Kermes;* and when I so informed my friend he changed the name to *Kermes maskelli*, under which, I believe, it has since remained in the Adelaide Museum. But the specimens received last year from Mr. French enabled me to examine a large number of larvæ, and these are so evidently Lecanid that it is impossible to include the insect among the *Kermitidæ*. It is therefore here attached to *Lecanium*, and the original specific (and very apt) name given to it by Mr. Crawford has been restored. It will belong to that series of the genus, Signoret's sixth, which includes *L. emerici*, Planchon, and *L. racemosus*, Ratzeburg, from both of which it differs sufficiently.

There is an American insect, *Kermes galliformis*, Riley ("American Naturalist," vol. xv., p. 482) which, to the naked eye, resembles *L. baccatum*. But, apart from the fact that *K. galliformis* is seen under a lens to be speckled with black, and has also usually distinct rows of black spots, it must be assumed (although no description of the larva is given) that in

the larval stage it has not the Lecanid form, and therefore cannot belong to the same group as our species: the larva of any *Kermes* has prominent anal tubercles.

Lecanium ribis, Fitch. (New York Agric. Soc. 1856). N.Z. Trans., vol. xxiii., 1890, p. 16.

I reported this insect as occurring in New Zealand, at Ashburton, in my paper of last year. Since then I have received specimens from Oamaru (through Dr. de Lautour) and from various places in Canterbury. The pest is a new arrival in the colony within the last three or four years, and seems to be spreading rapidly. Owners of gardens should take every pains to get rid of it, for, although its proper food-plants are gooseberries and currants, and whilst even on them alone it may cause great loss and expense, yet I doubt if it will strictly confine itself to those plants: the *Lecania* are not at all particular as to their food. Whilst this paper is in the press I have received from Mr. Smith, of Ashburton, insects on grape-vines from that place which seem to me to be only a redder-coloured variety of *L. ribis:* it is possible that they may be the species next about to be mentioned, *L. rosarum,* which as yet I have with certainty only from Australia. But, indeed, the distinctions between several species of *Lecanium*—e.g., *L. ribis, L. persicæ, L. rosarum, L. rugosum, L. rotundum,* &c.—are so slight that possibly all of them may be really only varieties of the same, merely somewhat altered by the food-plant. I have no doubt about the insect on the gooseberries—it is clearly *L. ribis;* whether that on the vine is a variety, or is *L. rosarum,* is not yet certain. But in any case fruit-growers should do their best to eradicate both of them. A warning such as this is unfortunately only too likely to be neglected by the careless colonial horticulturist; but it is right to give it, nevertheless.

Lecanium rosarum, Snellen van Vollenhoven.

Adult female dark-red, or reddish-brown; semi-globular; sometimes slightly elongated: diameter from $\frac{1}{10}$in. to $\frac{1}{5}$in. The epidermis is at first smooth, but later exhibits some minute transverse wrinkles.

Hab. In Australia, on gooseberry-twigs at Melbourne: my specimens are from Mr. French.

This is a European insect, of which the original food-plant is the rose, in both England and Holland. But, as I have already stated under the last species, the *Lecania* do not seem to restrict themselves to any one food-plant, and my Australian specimens are so nearly similar to some of *L. rosarum* which were sent to me from England by Mr. Newstead that I cannot well separate them. I have already observed that

some insects on grape-vines at Ashburton, New Zealand, may perhaps also be this species, if they are not a variety of *L. ribis*.

Subdivision LECANOCOCCIDÆ.

Insects covering themselves with cottony or felted matter: exhibiting in all stages Lecanid characters.

The genera forming this subsection may be distinguished partly by the character of the sacs which they form. None of them appear solid or waxy; but in some—*e.g.*, *Eriochiton*—they are scarcely visible in the adult stage, while in *Signoretia* the sac is apparent and conspicuous at the time of gestation. More definite characters are in the antennæ and feet—*e.g.*, in *Eriochiton* the former have seven joints, and in the feet the tarsus is usually longer than the tibia.

Genus SIGNORETIA, Targioni-Tozzetti.

Female insects forming a felted sac at gestation. Antennæ of eight joints. Characters Lecanid in all stages.

Only one species of this genus has hitherto been reported—*S. luzulæ*, Dufour, in southern France.

Signoretia atriplicis, sp. nov. Plate III., figs. 1–9.

Sac of female felted; white or with a slight yellowish tinge; elliptical, convex: length about $\frac{1}{9}$in.

Test of male white, thin, waxy, elliptical, convex, with a posterior hinged plate: length about $\frac{1}{16}$in.

Adult female brown, slightly elongated, convex, shrivelling at gestation: length about $\frac{1}{11}$in. Antennæ of eight joints, the second the longest, the rest subequal. Feet normal, the tibia longer than the tarsus, but the digitules seem to be absent. Mentum monomerous. Epidermis bearing a number of small, circular spinneret-orifices; on the margin a row of spines. Abdominal cleft and lobes present; anogenital ring bearing several hairs, of which six are rather large.

Female of the second stage light-brown, flattish, active: length about $\frac{1}{20}$in. Form distinctly Lecanid. It appears to be naked, but there is a very thin and fragmentary waxy test sometimes visible, of which the feather-like fringe corresponds with a row of strong spines all round the margin. Antennæ of six joints. Feet slender; upper digitules fine hairs, lower pair slightly dilated. Abdominal cleft normal; the lobes bear two or three spines; anal ring with numerous hairs.

Larva yellow, flattish, elliptical, active: length about $\frac{1}{45}$in.: form normal of *Lecanidinæ*.

Adult male dark-red: length about $\frac{1}{25}$in. Form Lecanid, with rather long, straight anal spike. Wings rather thick, with conspicuous red nervures. Antennæ of nine joints, all

long and subequal except the first two, which are short and thick: numerous hairs on all the joints. Dorsal eyes, four; ventral eyes, four: ocelli, two.

Hab. In Australia, on *Atriplex* sp. (*A. halimus ?*): specimens from Mr. French.

This insect differs from *S. luzulæ*, Dufour, in the form of its sac, in its scarcely-elongated form, in the character of the dermal spines, fringe, and spinnerets, and a few other particulars. The male of the European species does not seem to have been observed.

Genus Eriochiton, Maskell.

Eriochiton cajani, sp. nov.

This is an insect infesting *Cajanus indicus* (pigeon-pea) in India. The late Mr. Atkinson sent me specimens, of which I returned descriptions and figures not yet published. The species has a more permanent sac than others of the genus, but I placed it therein rather than in the allied genus *Signoretia*, on account of the seven-jointed antenna. An abnormal feature is that in the larva the tibia is longer than the tarsus.

Group COCCIDINÆ.

Subdivision ACANTHOCOCCIDÆ.

Genus Planchonia, Signoret.

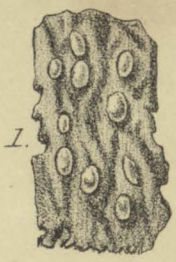
Planchonia stypheliæ, sp. nov. Plate III., figs. 10–18.

Test of adult female very closely felted, so as to appear almost waxy; convex above, flat beneath; elongated oval, slightly tapering posteriorly; colour whitish, or with a very faint greenish tinge: length about $\frac{1}{17}$in. At the posterior extremity the upper portion is slightly elevated, so as to leave a small orifice. All round the margin there is a double fringe of longish, white, glassy, slender tubes, one row above the other, the lower row being rather the longer and in pairs.

Test of male glassy; colour white, with a faint yellowish or greenish tinge; elongated, slightly convex: length about $\frac{1}{26}$in.: round the margin there is a single fringe of glassy tubes in pairs.

Adult female at first filling the test; elongated, convex; colour brown: shrivelling at gestation towards the cephalic extremity. Antennæ and feet entirely absent. Mentum dimerous. Anal tubercles present, but very small and inconspicuous; anogenital ring small, compound, with apparently six short hairs. All round the margin is a row of figure-of-8 spinnerets, and within it a row of single circular orifices.

Larva yellowish-brown, active, flattish; elongated, tapering slightly posteriorly: length about $\frac{1}{60}$in. Anal tubercles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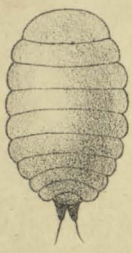
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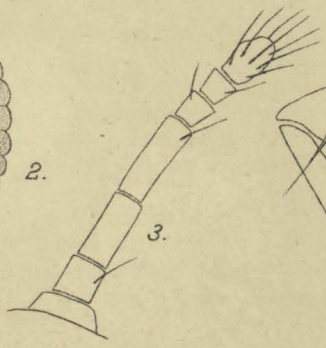
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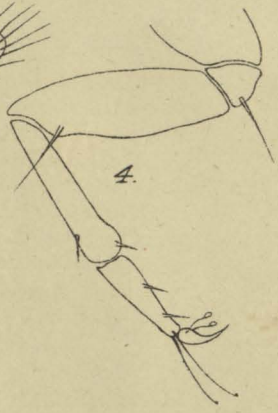
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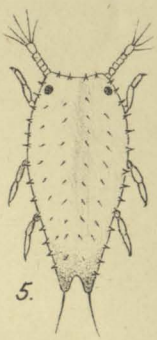
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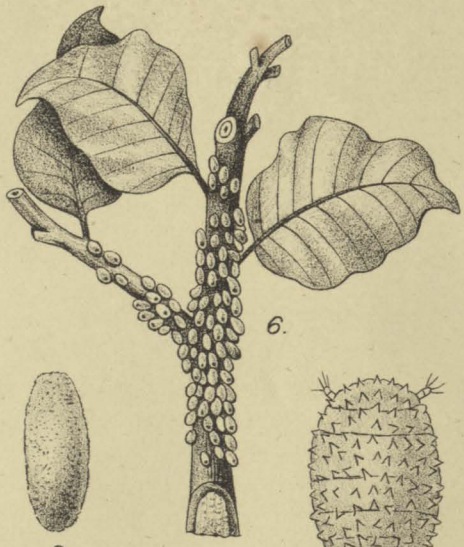
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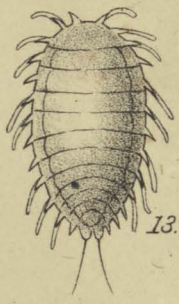
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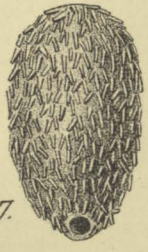
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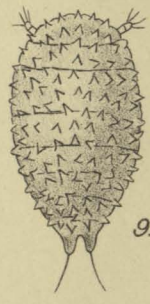
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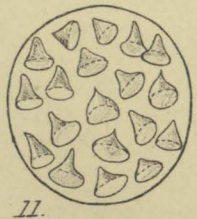
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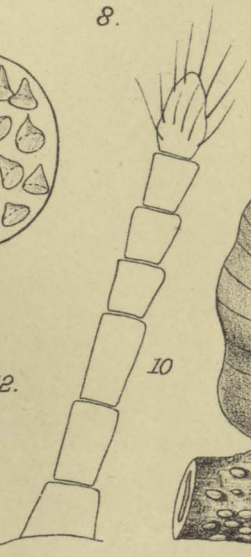
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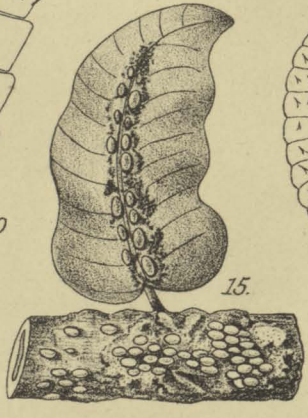
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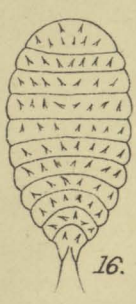
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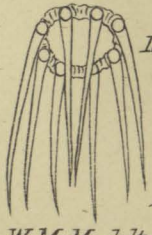
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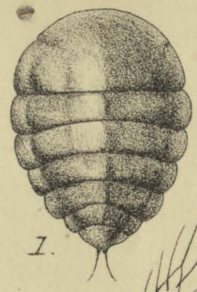
W.M.M. delt ad nat. COCCIDIDÆ. C.H.P. lith.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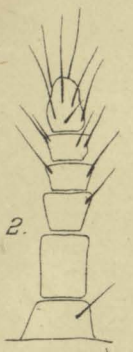
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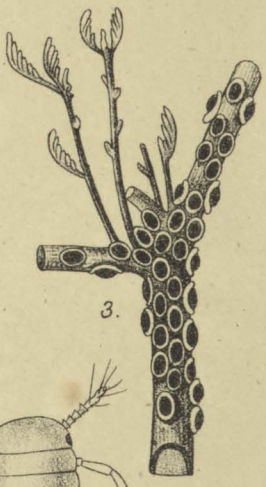
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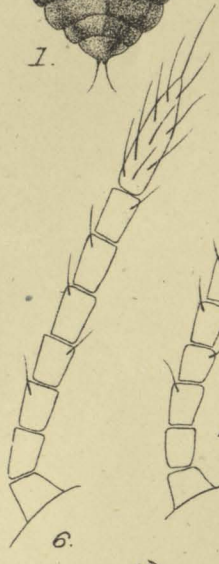
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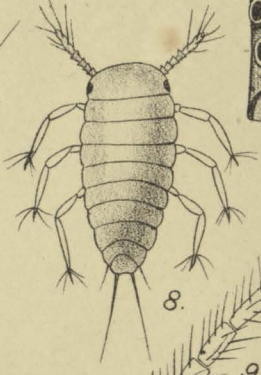
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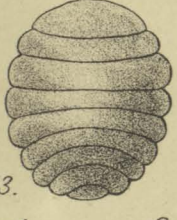
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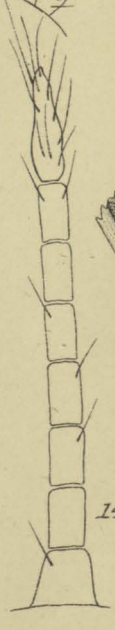
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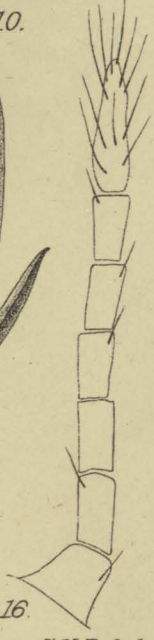
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W.M.M del. ad nat. COCCIDIDÆ. C.H.P. lith.

visible, setiferous, very small. Antennæ of six subequal joints: feet normal. On the margin is a row of figure-of-8 spinnerets, from which spring curling, white, glassy tubes.

Adult male very small, yellow: length about $\frac{1}{50}$in. The thorax is rather thick, the abdomen tapering to the spike, which is slightly curved, and about as long as the abdomen. Antennæ of ten joints, of which the first two are short and thick, the rest long, slender, and hairy: on the last joint are four knobbed hairs. Dorsal eyes, four; ventral eyes, two: ocelli, two. Wings delicate, iridescent.

Hab. In Australia, on *Styphelia richei* and *Leptospermum juniperinum*: specimens from Mr. French.

This insect is closely allied to the New Zealand species *P. epacridis*, and it is noticeable that both affect plants of the Epacrid order—*Styphelia* and *Leucopogon*. The differences between them are microscopic; perhaps the most noticeable is the extreme smallness of the anal tubercles in the Australian species. But the dark though translucent test of *P. epacridis* is not likely to be mistaken for that of *P. styphelicæ*. The male just described is the only one yet observed in the genus: it does not seem to present any very peculiar characters, but is remarkable for its extremely small size.

Genus ERIOCOCCUS, Targioni-Tozzetti.

Eriococcus phyllocladi, sp. nov. Plate IV., figs. 1–4.

Sac of female dark-yellow, elliptical, convex, closely felted: length about $\frac{1}{15}$in.

Sac of male dark-yellow, whitish at the posterior extremity; elongated, very slightly convex, sides parallel; closely felted; length about $\frac{1}{20}$in.

Adult female reddish-brown or with a greenish tinge: filling the sac, but shrivelling at gestation. Antennæ of six joints, of which the third is the longest, the fourth and fifth the shortest. Feet rather strong: the tibia is at least as long as the tarsus; on the trochanter a long hair; digitules fine hairs. Mentum dimerous. All round the margin is a row of strong conical spines, and on each segment is a transverse row of minute spiny hairs.

Female of the second stage greenish, or with a tinge of red; flattish, elliptical, active. Antennæ of six joints. On the margin a fringe of curling, white, glassy tubes springing from conical spines.

Larva presenting no special features.

Adult male unknown.

Hab. In New Zealand, on *Phyllocladus trichomanoides* (tanekaha), in the Reefton district.

This species is allied to *E. raithbyi* (Trans., vol. xxii.,

p. 145), but differs in the six-jointed antennæ and the presence of the marginal row of strong conical spines.

Eriococcus confusus, sp. nov. Plate IV., figs. 5–8.

Sac of adult female dirty-white or grey, aggregated in rough irregular masses on the twigs of the plant; loosely felted: the normal form is globular, slightly elongated: length about $\frac{1}{20}$in.

Sac of male not observed.

Adult female dull brownish-yellow, subglobular, shrivelling at gestation to a shapeless mass. Antennæ of six subequal joints, the fourth and fifth a little the shortest. Feet normal. Epidermis bearing great numbers of simple circular spinneret-orifices and many rather long slender spines, which are most noticeable on the median dorsal region; also some minute spiny hairs. Anogenital ring large, compound, with eight hairs.

Larva and male not observed.

Hab. In Australia, on bark of *Eucalyptus viminalis:* specimens from Mr. French.

Eriococcus hoheriæ, Maskell. N.Z. Trans., vol. xii., p. 298; vol. xxiii., p. 20. Plate IV., figs. 9, 10.

In my paper of last year I was unable to include a figure of the apterous form of the male in this species. I give one now on account of several peculiarities observable. The specimen copied is one of two which emerged in May, 1890, from their sacs. Both were very lively; and, although at first I thought that perhaps they might be only pupæ which somehow managed to escape prematurely and incomplete, yet, as they lived for a couple of days and did not appear to change, this notion was not tenable. It will be observed that the head, thorax, and abdomen show no divisions; that there are only two eyes, which are lateral; and that the antennal joints are compressed: the whole form, indeed, seems to be intermediate. Yet I cannot exactly consider it as equivalent to a half-developed pupa. Dr. Löw, in a paper on *Eriococcus* (*Acanthococcus*) *aceris* (Wiener Ent. Zeit., 1882), refers to an intermediate pupal stage in that species which, he says, probably answers to the "pseudonymph" of *Hymenoptera* (von Siebold); but, as far as I can understand his expressions, this stage occurs altogether within the sac, and is neither active nor procreative. Had only one abnormal form appeared, I should probably not have considered it as anything but a monstrosity; but the occurrence of two similar forms nearly on the same day, and seemingly quite sufficiently apt for generation (as my figure 10 shows), pointed to something

more. I have therefore thought it worth while to figure this curious form.

Eriococcus fagicorticis, sp. nov. Plate V., figs. 1–5.

Sac of adult female white, placed in the crevices of the bark of the tree, accompanied by much black fungus; normal form elliptical, convex, but often irregular; rather loosely felted: average length about $\frac{1}{11}$in.

Sac of male white, elongated, narrow, slightly convex: length about $\frac{1}{20}$in.

Adult female red, filling the test but shrivelling at gestation. Anal tubercles conspicuous, setiferous. Antennæ rather long and slender, with seven joints, of which the third and fourth are the longest, the fifth, sixth, and seventh the shortest and subequal: the antenna might seem to have more of a Dactylopid than an Acanthococcid appearance if the last joint were not so short. Feet having the tibia distinctly longer than the tarsus: digitules fine hairs, the lower pair slightly dilated at the tip. Anogenital ring with eight hairs. Mentum dimerous. All round the margin of the body is a row of strong conical spines, and a large number of smaller spines are visible on the dorsum, and are largest on the cephalic and thoracic regions. The epidermis also bears numerous small circular spinnerets.

Larva red, flattish, elongated, active: length about $\frac{1}{60}$in. Anal tubercles conspicuous. Antennæ short, thick, with six subequal joints. Feet normal. On the margin a row of strong conical spines, and four longitudinal dorsal rows of very small spiny hairs.

Adult male unknown.

Hab. In New Zealand, in crevices of the bark of *Fagus fusca*, Reefton district.

This is a clearly distinct species, from the form of the antenna and the length of the tibia in the adult female. The last of these is abnormal in the genus *Eriococcus*, but as all the other characters are normal I have been unable to remove it from that genus: indeed, if that were done, a new genus would have to be established to receive it, and there are scarcely sufficient grounds for such a course. I have seen one or two specimens in which the thinness of the sac on the dorsum might almost relegate the insect to *Gossyparia*, but I think these were exceptional.

Eriococcus eucalypti, sp. nov. Crawford Coll. Plate V., figs. 6–14.

Sac of adult female yellowish- or reddish-brown or brown, but covered with a number of small white glassy tubes, usually directed longitudinally, which give it often a peculiarly clean

and bright appearance when viewed under a lens; convex, elliptical: length about $\frac{1}{14}$in. There is usually an orifice at the posterior extremity. The sacs are frequently clustered in great numbers on the twigs.

Sac of male rather lighter in colour than that of the female, more cylindrical and much smaller: length about $\frac{1}{30}$in. The glassy tubes are often not noticeable in this sac.

Adult female dark-purple or almost black, filling the sac but shrivelling at gestation. Antennæ normally of seven joints, of which the second and third are the longest and subequal, the last four short and equal: in some specimens observed the antennæ appeared to have eight joints, the first being very short; but this would probably be quite exceptional. Foot normal, the tibia being a very little shorter than the tarsus; on the trochanter is a long hair; digitules fine hairs. On the dorsum are a very great number of short, thick, conical spines not arranged in any definite order; also many small circular spinnerets with slender cylindrical tubes. Anal tubercles conspicuous, each bearing on the inner side two strong spines; anogenital ring with eight hairs.

Larva red, flattish, elliptical, active: length about $\frac{1}{70}$in. Antennæ of six short subequal joints. Margin bearing a row of strong, thick, conical spines, from which spring curling glassy tubes. Anal tubercles rather small.

Adult male not observed by me. I have a rough sketch by Mr. Crawford which shows two dorsal eyes, two ventral eyes, and two ocelli, a short conical spike, and two very long cottony "tails:" the antennæ and feet are not shown.

Hab. In Australia, on *Eucalyptus diversicolor* (Adelaide, from Mr. Crawford); on *Bursaria spinosa* (Melbourne, from Mr. French). In a memorandum of Mr. Crawford I find it stated that the insect is "very destructive to young gum-trees."

This species, in the late Mr. Crawford's collection, originally received from him the name "*Thekes eucalypti.*" In assigning it to its proper genus I thought at one time of changing the specific name, because it has been frequently sent to me on *Bursaria*, and probably has also other food-plants; but, the insect having been referred to elsewhere (*e.g.*, by Professor Webster, in "Insect Life," vol. i., p. 363) under the name *Eriococcus eucalypti*, it has been thought better to leave it so here. No description of it has hitherto been published.

Eriococcus eucalypti, by the characters of its sac and of its dorsal conical spines, belongs to that section of the genus of which the New Zealand *E. multispinus* may be taken as the type, as mentioned presently.

Eriococcus tepperi, sp. nov. Crawford Coll. Plate V., figs. 15–17.

Sac of female dirty-white or yellowish, elongated, elliptical, often aggregated in masses: length about $\frac{1}{14}$in.

Sac of male similar, but rather smaller.

Adult female dark-red or brown, shrivelling at gestation: length about $\frac{1}{16}$in.: subglobular. Anal tubercles conspicuous. Antennæ of six joints, the first three subequal (the third a little the longest), and each about twice as long as the fourth and fifth, the sixth rather shorter than the third, and bearing some hairs. Feet rather slender: tarsus nearly twice as long as the tibia. Anogenital ring with eight hairs. Mentum dimerous. No marginal spines, but on each segment is a transverse row of rather slender spines. Epidermis bearing numbers of small, simple, circular spinneret-orifices.

Larva red, flattish, elliptical, active: length about $\frac{1}{65}$in. Anal tubercles conspicuous, setiferous. Antennæ as in the adult. On the margin a row of slender spines, and a transverse row of similar spines on each segment.

Adult male dark-red, wings iridescent. Length about $\frac{1}{80}$in. Antennæ and feet normal. Spike short, conical: the cottony "tails" are very long.

Hab. In Australia, on *Eucalyptus globulus* and *Bursaria spinosa*.

This is another of the late Mr. Crawford's species, and was named by him after Mr. J. G. O. Tepper, of Adelaide. The species is allied to the New Zealand *E. pallidus*, but is rather smaller, and differs also in the form of the antenna, the third joint being only very little longer than the second, whereas in *E. pallidus* it is a good deal longer.

Genus RHIZOCOCCUS, Signoret.

Rhizococcus grandis, sp. nov. Plate VI., figs. 1, 2.

Adult female dark-red, naked, subglobular or subelliptical, convex, distinctly segmented: length about $\frac{1}{5}$in. Anal tubercles small, and usually hidden by the convexity of the abdomen. Antennæ of six joints, of which the second is the longest, the first third and sixth shorter and subequal, the fourth and fifth the shortest: on the sixth are several short hairs. Foot rather slender: tarsus longer than the tibia; at the extremity of the tibia a spine; upper digitules fine hairs, lower pair slightly dilated. Mentum dimerous. Anal ring with eight hairs. On the dorsum are some scattered slender spines.

Larva red, flattish, active: length about $\frac{1}{65}$in. Antennæ, foot, and tubercles normal. Round the margin runs a row of rather long and slender spines, and on the dorsum are two longitudinal median rows of smaller spines.

Male unknown.

Hab. In Australia, on roots of *Acacia longifolia:* specimens from Mr. French.

This very large insect has much the appearance to the naked eye of *Coccus cacti* (the cochineal insect), being of very much the same size and colour; but examination shows that the characters just described are distinctly Acanthococcid, and, as no sign of a sac was observed on any of the specimens sent to me, I have attached it to the genus *Rhizococcus*. In this instance I think that the size of the insect may be taken as a distinguishing character, being so much greater than that of any other known species.

Generic and Group Distinctions amongst the Acanthococcidæ and the Dactylopidæ.

Plate IV., figs. 11–17.

It is always useful to find some character which may at once decide the position of an insect in a family, group, or genus, and which will simplify the work of the systematist. Thus, for example, although in general appearance many Aleurodids or Psyllids bear close resemblance to Coccids, these latter may invariably be at once distinguished, whether in the adult or larval stages, by the existence of only a single claw on the foot; and the observer may then with perfect certainty proceed without further trouble as to the family. So, again, the last abdominal segment in an adult female at once decides its position amongst the Diaspids or the Lecanids. I have thought that it might be useful to give here a guide to a feature which will mark, for a student of Coccids, a distinction between the *Acanthococcidæ* and the *Dactylopidæ* noticeable almost at the first glance: I mean the form of the antennal joints. In both subdivisions the *number* of the joints may vary—the normal antenna of *Eriococcus*, for example, has six joints, and that of *Dactylopius* eight joints, but I believe I have not erred in attaching to these genera such species as *Eriococcus fagicorticis* or *Dactylopius hibbertiæ*, which have seven joints. But in almost all the species of both with which I am acquainted there is this distinction: that in the *Acanthococcidæ* the last joint is very little, if at all, longer than the penultimate, whereas in the *Dactylopidæ* it is very considerably longer. I do not know of any exception to this rule as regards the former group; but *Dactylopius eucalypti* (presently described) departs from its type in having a very short last joint, and is indeed abnormal in other respects. The figures 11 and 13 of Plate IV. exhibit the differences mentioned: it will be seen that there is a squatness and "stumpy" appearance about the former, and a com-

parative slenderness about the latter, to which the shape of the last joint contributes a good deal. I find this long last joint in *Pseudococcus* and *Ripersia* as well as in *Dactylopius;* whilst in *Orthezia* (at least, in my specimens of *O. urticæ*) it is markedly and excessively long. A student may therefore, I think, have no hesitation in assigning at least to its proper subdivision any insect of the Coccid group from inspection of its antenna.

In a good many species of *Dactylopius* I have found the antenna sharply bent between the first and second joints; but I am not prepared as yet to employ this as an important distinction.

Passing now to the genus *Eriococcus*, the figs. 11, 12, and 14 of Plate IV. show that there are three antennal forms, and figs. 16 and 17 that there are two forms of marginal spines in that genus. Fig. 14 (*Erioc. raithbyi*) differs from fig. 11 (*E. multispinus*) only in having seven joints: in both the joints are subequal. But in fig. 12 (*E. pallidus*) the third joint is much longer than any of the others. As regards the spines, those of *E. pallidus* and its allies are shown in fig. 16 to be much longer and more slender than those of *E. multispinus* and its allies, fig. 17. Some species combine the characters of both—*e.g.*, *E. phyllocladi* (as shown in figs. 3, 4 of the same plate) has the long third joint with the short conical spines. I mentioned these points in my paper of last year: the figures now given will illustrate them. In some species the marginal spines are very small, if not absent—*e.g.*, *E. confusus*, or the European *E. buxi*—but in most they are present and conspicuous, whether slender or stout.

Subdivision DACTYLOPIDÆ.

Genus DACTYLOPIUS, Costa.

Dactylopius albizziæ, sp. nov. Plate VI., figs. 3–10.

Adult female very dark purple, or perhaps, indeed, deep glossy black, resting on a cushion of snowy-white cotton; form subglobular, segmented: length about $\frac{1}{14}$in. Antennæ of sometimes seven, sometimes eight, joints, subequal except the last, which is rather long and fusiform, bearing several shortish hairs. Feet slender, normal: the tibia is very slightly dilated at the end; upper digitules long fine hairs, lower pair slightly dilated. Mentum rather large, doubtfully trimerous. Anal tubercles very small and inconspicuous, each bearing a seta. Anal ring with six hairs. Epidermis bearing a great number of small circular spinnerets and some slender spiny hairs.

Larva dull dark-red or purple, covered with scattered white meal; elliptical; active: length about $\frac{1}{50}$in. Antennæ of six

joints, of which the sixth is much the longest and fusiform. Feet normal, rather thick. Anal tubercles small, setiferous. On the dorsum a number of very fine spiny hairs.

Adult male reddish-brown: length about $\frac{1}{20}$in. Thorax and abdomen rather thick. Spike short, conical. Antennæ of ten joints, all rather short and subequal, except the last, which is twice as long as any of the rest. Wings rather thick and mealy. Dorsal eyes, two; ventral eyes, two: ocelli, two.

Male pupa purple, enclosed in loose white cottony secretion.

Hab. In Australia, on *Albizzia lophantha:* specimens from Mr. French, who informs me that the insect threatens to do much damage to the trees—and, indeed, the twigs sent to me were thickly covered with insects in all stages.

This is rather a striking-looking species, the contrast between the white cotton and the very dark-coloured insect being very noticeable. It is clearly distinct.

Dactylopius hibbertiæ, sp. nov. Plate VI., figs. 11–14.

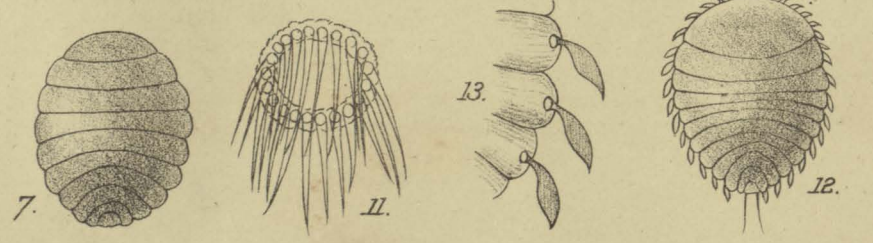
Adult female dark-purple, resting on a cushion of yellow cotton, and frequently covered with a quantity of similar cotton, which, however, does not seem to be joined at the edges to the lower cushion. The margins of the cushion are often turned upwards, and exhibit transverse grooves and foldings. Female subglobular, segmented: length about $\frac{1}{10}$in. Antennæ of eight (rarely seven) joints, subequal except the last, which is somewhat longer than the rest, and cylindrical, bearing some short hairs. Feet rather short and thick; digitules fine hairs. Anal tubercles very small and inconspicuous, each bearing a seta and several spines. Anal ring with six hairs. Mentum dimerous. Margin having some small spines, not set closely together. Epidermis bearing great numbers of small circular spinneret-crifices, interspersed with minute spiny hairs.

Larva brown; elliptical, active: length about $\frac{1}{65}$in. Antennæ of six joints, the last the longest. Feet short and thick. Anal tubercles very small, setiferous. A few small spines on the dorsum and margin.

Adult male unknown.

Hab. In Australia, on *Hibbertia linearis* and *Hibbertia virgata:* specimens were sent to me early in 1890 by the late Mr. Crawford.

This insect differs from *D. albizziæ* in the character of the cottony cushion and upper covering, and also in the form of the feet and antennæ of the adult female, and other minute characters. It would seem that the upper cottony mass falls off at gestation, leaving the insect shrivelling up in the cup formed by the lower cushion.



W.M.M. delt ad nat. COCCIDIDÆ. C.H.P. lith.

W.M.M. delt ad nat. COCCIDIDÆ. C.H.P. lith

Dactylopius acaciæ, sp. nov. Plate VI., figs. 15, 16.

Adult female very dark-purple or dull intense black; aggregated frequently in masses on the plant, with small quantities of white cotton: insect subglobular, segmented: length about $\frac{1}{25}$in. Antennæ rather long, with seven joints, subequal except the last, which is large and fusiform, and bears several hairs. Feet rather long and strong: the digitules are all fine hairs. Anal tubercles very short and inconspicuous, with, on each side rather higher up, two smaller lobules: all the six bear a number of short, rather strong spines, and on each of the median tubercles is a longish seta. Epidermis covered with great numbers of circular spinneret-orifices, which are most numerous near the margins; interspersed with spines and some longish fine hairs. Anogenital ring with six hairs. Mentum trimerous.

Larva and male not observed.

Hab. In Australia, on *Acacia linearis* and *Acacia lophantha*: several specimens from Mr. French.

The differences between this species and the two last depend not so much upon its size and the character of the cottony envelope as upon the minute features just described. It might, indeed, at first sight be taken almost for a small form of *D. albizziæ*; but the six abdominal lobules and the antennæ and feet separate it from that species.

Dactylopius iceryoides, sp. nov. Plate VII., figs. 1–5.

Adult female light-brown, with transverse darker streaks, and powdered over with yellow or buff-coloured meal; resting on a thick cushion of yellow cotton, in which it is partly imbedded, and frequently only attached to the plant by the cephalic extremity, the remainder being raised up by the mass of cotton beneath. Form elongate-elliptical, distinctly segmented, very convex; the dorsum frequently elevated in a distinct longitudinal ridge. Length variable: some specimens observed reach nearly $\frac{1}{5}$in., the accompanying mass of cotton being as large as a pea. Antennæ of eight joints, the first two larger and rather longer than the next five, which are subequal; the last fusiform, as long as the first two together, and bearing some hairs at the tip. Feet rather strong, normal. Mentum dimerous. Anal tubercles very small, inconspicuous, setiferous, borne upon small wide lobes, which bear a few spines. Anogenital ring with six hairs. Epidermis bearing numbers of very small circular spinnerets, which are most numerous near the margins, interspersed with fine spiny hairs.

Female of second stage dark-red, with a quantity of white or yellowish cotton round the edge, and also some on the dorsum; form elliptical, slightly convex; very active: length about $\frac{1}{16}$in. Antennæ rather thick, with seven joints, all sub-

equal except the last, which is large and fusiform. Feet thick and strong: tibia and tarsus equal in length. Anal tubercles very small and inconspicuous, setiferous, with a few spines. Epidermis bearing spinnerets and spiny hairs, as in the adult.

Larva and male not observed.

Hab. In New Zealand, on *Fagus fusca*, Reefton district: specimens from Mr. Raithby.

This is a very peculiar species, and in its habit of growth and position departs a good deal from the normal type of *Dactylopius*. In its way of standing on its head and filling the space between its body and the twig with cotton it imitates *Icerya*, and I have therefore given it the specific name above. It might very easily be mistaken, on superficial observation, for *Gossyparia cavellii*, which also lives on *Fagus* and constructs large cushions of yellowish cotton; and the similarity is enhanced by the position of the insect—half embedded in the cotton, with the dorsal region exposed. But, apart from the much greater size of *D. iceryoides*, examination of its organs shows at once that it is not an Acanthococcid. The insect is one of the largest *Dactylopidæ* known to me, and it certainly presents a very striking appearance as viewed in its natural position on a twig.

Dactylopius cocotis, Maskell. N.Z. Trans., vol. xxii., 1889, p. 149.

Amongst the quantity of *Aspidiotus destructor* mentioned above as sent to me by Mr. Cotes, of Calcutta, on leaves of cocoanut from the Laccadive Islands were a few insects which I consider to be only a variety of *D. cocotis*, originally described by me from Fiji. Their colour was yellowish instead of red, and in some cases the antennæ exhibited only seven joints. In other respects, especially in the tufted hairs of the epidermis, they agreed with the type, and neither of the two points just mentioned is sufficient to raise them to specific rank.

Dactylopius globosus, sp. nov. Crawford Coll. Plate VII., figs. 6–8.

Adult female enclosed in a mass of white, or sometimes greyish, rather loose cotton, which, when separate, takes a more or less globular form, but may be aggregated in large masses covering the twigs. Insect subglobular, flat beneath and convex above; colour red, or purple, or brown; distinctly segmented: length sometimes reaching $\frac{1}{8}$in. Antennæ of properly eight joints, but sometimes of seven; the fourth, fifth, sixth, and seventh the shortest, the last the longest and cylindro-fusiform. Mentum rather large, pointed, trimerous. Feet usually normal, sometimes rather short. Anogenital

ring with six hairs. Epidermis bearing large numbers of simple circular spinnerets and fine hairs.

Larva not observed.

Male pupa brown, enclosed in a sac of white cotton smaller and more elongated than that of the female. Adult male unknown.

Hab. In Australia, on *Acacia armata* and *Acacia decurrens*.

Another of Mr. Crawford's species, to which he originally attached the name of *Erium globosum*. My specimens on *Acacia decurrens* were sent by Mr. French.

Dactylopius eucalypti, sp. nov. Crawford Coll. Plate VII., figs. 9–13.

Adult females congregated in masses of white cotton between the sheets of bark of the plant; form subglobular, segmented; colour red or yellowish-brown: length about $\frac{1}{11}$in. Antennæ of seven joints, of which the third is the longest, and the seventh is scarcely longer than the sixth. Feet with a rather short tarsus, not more than a third of the length of the tibia, and rather thick; all the digitules are long fine hairs; on the trochanter are two rather strong hairs. Anal tubercles scarcely visible; anogenital ring compound, with many hairs (in some specimens apparently twenty). Mentum doubtfully dimerous. Epidermis bearing many small circular spinnerets, and on the cephalic region a number of rather long spiny hairs.

Larva yellowish-brown, congregated sometimes in very great numbers on the bark, mingled with thin white cotton or meal; form subcircular, slightly elongated and tapering somewhat posteriorly; distinctly segmented, flattish, active: length about $\frac{1}{30}$in. Antennæ of five subequal joints, the third a little the longest; on the last joint there is an excessively long hair. Feet rather thick: the tibia is shorter than the tarsus. All round the margin is a row of conspicuous feather-like pointed processes, forming a fringe. Anal tubercles small, setiferous.

Male pupæ congregated in sacs of white loose cotton, mixed with those of the females and larvæ, or sometimes in masses by themselves.

Adult male reddish-brown; abdomen rather slender: length of body about $\frac{1}{20}$in. Wings hyaline, slightly iridescent. Antennæ of ten joints. Feet long and slender, with a very short tarsus. Abdominal spike short, conical. Dorsal eyes, two; ventral eyes, two: ocelli, two.

Hab. In Australia, on bark of *Eucalyptus amygdalina*.

This is one of the late Mr. Crawford's species. It appears to be clearly distinct, and in some of its characters abnormal.

The seven-jointed female antenna is found also in some other species of *Dactylopius;* but the mentum, which may possibly be monomerous, and the anogenital ring, with its large number of hairs, depart altogether from the generic type. At the same time, I do not consider that, for the present, it is necessary to remove the insect from *Dactylopius* and establish a new genus on these characters. The male seems to present no specially distinguishing features; and the larva, although specifically distinct enough, with its feathery fringe and minute anal tubercles, may yet be considered as generically normal. It has been already remarked that the shortness of the last antennal joint is exceptional. On the whole, I leave the species for the present as a *Dactylopius*.

Dactylopius herbicola, Maskell. *Agricultural Gazette of New South Wales,* June, 1891, p. 352.

I mention this insect here only for a reference to the publication in which its description has appeared, and which may perhaps not be so well known as its excellence and usefulness deserve. The insect is Australian, on grass.

This species may also usefully be compared with the next, which also infests grass.

Dactylopius graminis, sp. nov. Plate X., figs. 9–12.

Adult female enclosed in a sac of white felted secretion, aggregated in masses thickly covering stems of grass: the sacs are of irregularly elliptical form. Insect dark-purple, or almost black, globular, segmented: diameter about $\frac{1}{20}$in. Antennæ of eight joints, the first seven subequal (the sixth perhaps shorter than the rest), the last as long as any two of the others, fusiform, and bearing a few hairs. Mentum trimerous. Feet slender; digitules all fine hairs. Anal tubercles very small and inconspicuous, each with a seta and two or three spines. Anogenital ring with six hairs. Epidermis bearing a number of simple circular and small tubular spinnerets.

Larva and male not observed.

Hab. On grass, Natal, South Africa. My friend Mr. J. W. Douglas, of London, has sent me several specimens, and has allowed me to add the species to this paper.

This insect is not far removed from *D. poæ* and from *D. herbicola,* the former of which infests grass in New Zealand, the latter in New South Wales. It differs from *D. poæ* in its colour, in its aërial habitat (the New Zealand species being subterranean), and in the more solid nature of its sac. The difference from *D. herbicola* is not so clear at first sight, although in the Australian species the dorsal portion of the sac

is apparently never quite complete; but the feet differ considerably, and are sufficient to distinguish the two species.

Genus RIPERSIA, Signoret.

This genus was formed to include the *Dactylopidæ* with antennæ of six joints. I have been frequently asked the meaning of the word; and the only explanation I can give is that it is an anagram of the name of M. Ed. Perris, a friend of Dr. Signoret, to whom he had already dedicated two species—*Westwoodia perrisii* and *Porphyrophora perrisii*—and whose name he preferred on this occasion to twist round as above. I do not know any other derivation.

Ripersia rumicis, sp. nov. Plate VIII., figs. 1–3.

Adult female dull dirty-yellow, or yellowish-white, subterranean, naked or excreting only a very thin white meal; form irregularly elliptical, obscurely segmented: average length about $\frac{1}{24}$in. Antennæ very short, placed very close together at the cephalic extremity; with six joints, of which the first two are equal and moderately large, the next three very short, the sixth the longest and fusiform. Mentum probably trimerous. Feet very short: tibia only slightly longer than the tarsus; the tibia has a spine at the extremity. The feet are somewhat far apart, the anterior pair being placed near the base of the antennæ, the second pair median, the posterior pair at about two-thirds the whole length. Anal tubercles very small, setiferous; anogenital ring with six hairs.

Second stage of female rather smaller than the adult, of similar colour and form, and with antennæ of six joints.

Larva and male not observed.

Hab. In New Zealand, underground, amongst roots of *Rumex acetosella* (garden sorrel): my specimens are from the Reefton district, sent by Mr. Raithby.

This is a very peculiar little insect, which, from its very small size and dull colour, is by no means easy of detection. Mr. Raithby informed me that it was only from the little patches of white meal noticed in the earth while digging that he was led to discover the Coccid; and in dry earth, after having been kept for some time, it is only by some patient search under a lens that the insects can be picked out. I was at first somewhat disposed to look upon this form with six-jointed antennæ as *possibly* the second stage of *Dactylopius poæ*, another subterranean New Zealand Coccid; but the position of the antennæ and feet seemed to forbid this, and the finding of some specimens with enclosed eggs settled the matter entirely. The species is clearly a distinct one, and I know of no other Coccid in which the antennæ are placed so

close to each other. It is by no means easy to mount a specimen of this insect for minute examination and preservation on a slide, on account of the excessive softness and thinness of the skin.

From a later letter from Mr. Raithby I gather that this insect is very plentiful in its locality—so much so that on turning over a sod the earth looks as if "stricken with mildew."

Ripersia formicicola, sp. nov. Plate VIII., figs. 4–7.

Adult female flattish, sometimes circular, sometimes slightly elongated; colour yellow, or brown, or red; diameter averaging about $\frac{1}{25}$in. without the processes; segmented; powdered dorsally and ventrally with white meal, and having a number of white cottony tassels all round the margin, forming a kind of fringe which is sometimes more or less equal all round, sometimes longer at the posterior region; the tassels are frequently as long as half the diameter of the insect. Antennæ of six joints, of which the third and sixth are much the longest and subequal, the fourth and fifth the shortest, the sixth is fusiform, and all the joints have hairs. Feet rather long and slender: tarsus a little more than half as long as the tibia; digitules fine hairs. Mentum conical, long, trimerous. Anogenital ring compound, with six hairs; anal tubercles very small, setiferous.

Larva yellowish-pink, covered slightly with white meal; flattish, elongated, active: length about $\frac{1}{50}$in. Antennæ of six joints, of which the last is much the longest. Feet moderate: tibia shorter than the tarsus. Mentum long, conical, trimerous. Anal tubercles small, setiferous, and each bearing two conical spines.

Male unknown.

Hab. In New Zealand, underground, in ants' nests: my specimens are from the Ashburton district, sent to me by Mr. W. W. Smith.

This is a clearly distinct species, its generic position being fixed by the antennæ. In Mr. Smith's letters accompanying the specimens he informs me that the insects are free, and travel about in the galleries of the ants' nests (sp. *Tetramorium striatum* and *T. nitidum*, Smith), and that when the nests are suddenly disturbed the ants may frequently be seen carrying off the *Ripersiæ* with their own eggs for safety to the innermost galleries, but that they seem never to eat or otherwise harm the Coccids. Mingled with all are often specimens of *Dactylopius poæ*, but these are evidently attached to the roots of grass penetrating the nests, and have no connection with either ants or *Ripersiæ*. It would be interesting to know whether in other countries Coccids are found under similar

conditions, and, if so, how the ants and they mutually behave to each other. There appears to be a general consensus of opinion that Aphides are made use of by ants for their honey-dew—or, as frequently stated, employed as "milch-cows:". but this is the first instance that I know of where ants and Coccids dwell together; and the quantity of honey-dew excreted by the *Ripersia* cannot be very great. It is to be regretted that naturalists so frequently neglect to enter into any detail about their observations. I think I can recall a number of casual remarks and incidental allusions tending to indicate that Coccids of various species furnish food, through their honey-dew, to ants; but no previous definite statement by any author is known to me.* The point, nevertheless, is not without interest.

SPECIES OF UNCERTAIN POSITION.

On various species of *Casuarina* in Australia there occur some Coccids which I cannot at present assign to any known genus, or even to any definite group. Having examined numerous specimens of adults and larvæ, I confess myself fairly puzzled. No specimen of a male or of a male pupa has come under my notice; males might perhaps clear up the difficulty. It will be seen presently that in treating of the Brachyscelid group I draw attention to the presence therein of an excessively prolonged abdominal region: in the insects about to be described this feature does not appear, and they may therefore not be Brachyscelid. The simple, hairless anogenital orifice points to the *Monophlebidæ:* but I am not prepared as yet to place them there. The larvæ may be either Dactylopid or Monophlebid: the adults do not agree with any known Dactylopid form. On the whole, probably, the balance will be in favour of their Monophlebid relationship; but then the group will have to be somewhat extended to receive them.

SPHÆROCOCCUS. Gen. Nov.

I am not yet prepared to attach definite characters to this genus.

Sphærococcus casuarinæ, sp. nov. Plate VIII., figs. 8–20.

Adult female globular, naked; the cephalic portion greyish, the abdominal region dark-brown; there is usually a small quantity of white cotton under the body; diameter about

* Whilst this paper is in the press, I find that Mr. J. W. Douglas, in the *Entomological Monthly Magazine* for September, 1891, describes an *Orthezia* found in ants' nests in Colorado; but it is not quite clear whether this *Orthezia* inhabits ordinarily the nests or was taken there accidentally.

$\frac{1}{16}$in., but shrivelling at gestation; the anterior region is smooth, the abdomen indistinctly segmented and roughly wrinkled. Antennæ very small, almost atrophied, sharply conical, the joints indistinct, but apparently four or five in number; on the last joint are a few hairs. Feet entirely absent. Rostrum rather large; mentum conical and dimerous. There are four large spiracles on the anterior region, each bearing at the orifice a ring of small circular glands, and near the posterior pair are two patches containing large numbers of similar but much smaller glands. Anogenital orifice simple and hairless, with a tubular organ leading to it, which appears to bear at its interior end a number of circular glands. Epidermis covered with great numbers of circular multilocular spinnerets, which are small and scattered on the light-coloured anterior region, but larger and much more numerous on the dark abdominal portion; they are interspersed with very minute, short, slender, spiny hairs.

Female of the second stage red in colour, globular, very indistinctly segmented; the abdominal region is rather darker in colour than the rest: diameter about $\frac{1}{30}$in. Antennæ short, conical, of five joints, subequal in length, but varying in thickness. The feet are somewhat peculiar, having usually a soft, slender, weakly appearance, with a very slender femur (as in fig. 17) and an almost setose claw; but the anterior pair are sometimes more normal (as in fig. 18); there seem to be no digitules. Anogenital ring compound, with apparently only two short hairs. Spinnerets as in the adult, but less numerous.

Larva yellow, elongated, active; length about $\frac{1}{50}$in.; elliptical, segmented. Abdomen rounded, with two very small median anal tubercles, each bearing three short hairs, and above them two others equally small, each bearing a long seta. Antennæ of six joints, the first five short and subequal, the sixth fusiform, as long as any three of the others, and bearing some longish hairs. Feet rather thick; digitules fine hairs. Rostrum large; mentum long, conical, and dimerous.

Hab. In Australia, on *Casuarina quadrivalvis:* specimens from Mr. French. All the individuals observed occupied positions amongst the small scales clothing the bases of the long pointed galls formed by the next insect to be described, *Cylindrococcus*. This was the case with more than twenty specimens received, and I have failed to find any on other parts of the plant. This association at first led me to think that there might be some connection between the two, even if this external insect were not somehow an immature form of the other: the suspicion was strengthened by finding, as mentioned below, two specimens of the second stage *inside* the galls. But, later, I obtained a specimen in the act of gesta-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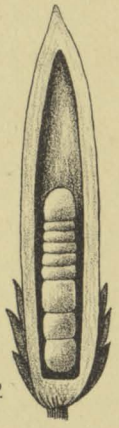
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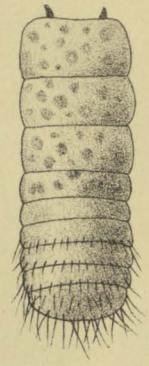
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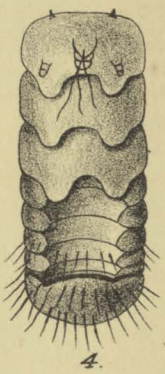
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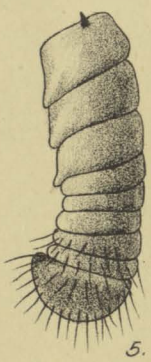
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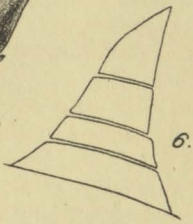
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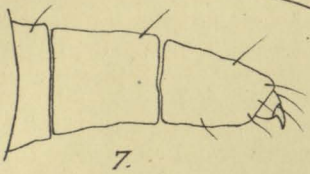
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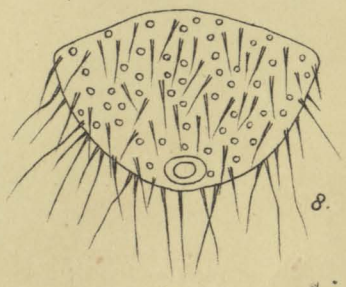
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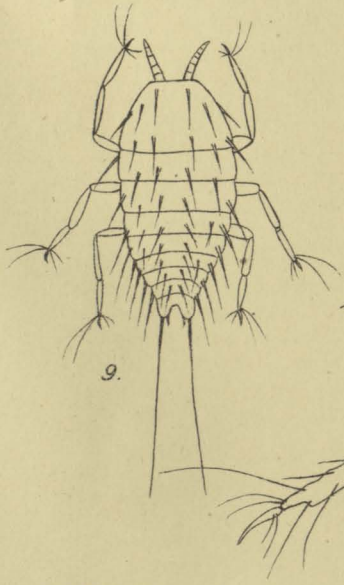
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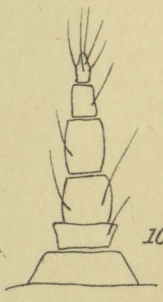
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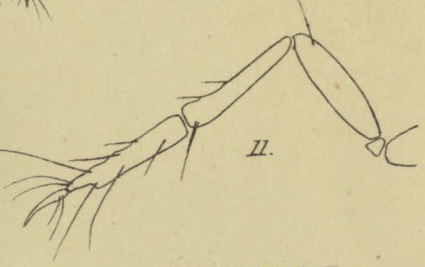
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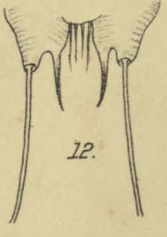
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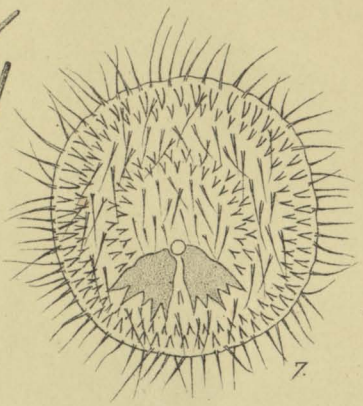

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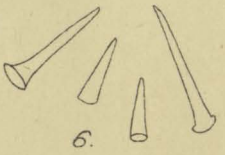

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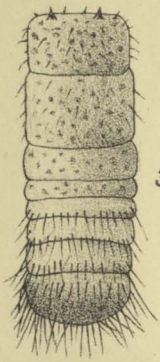

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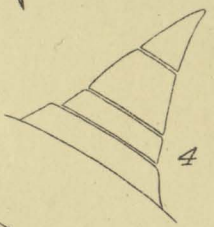

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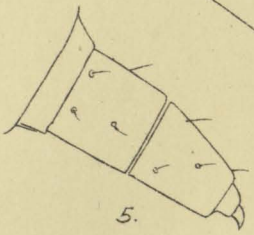

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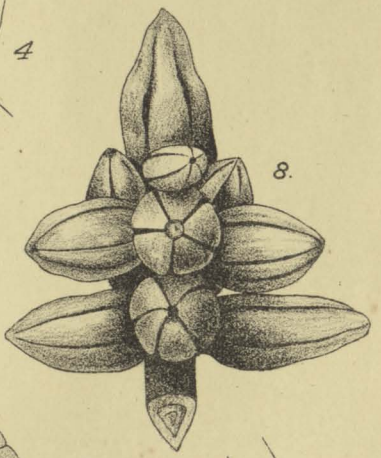

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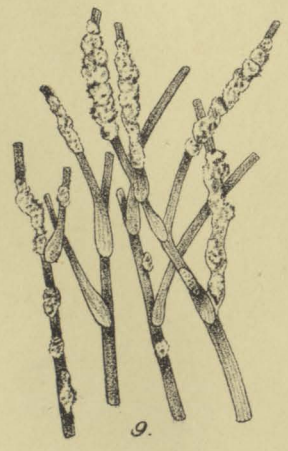

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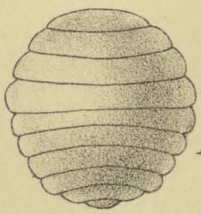

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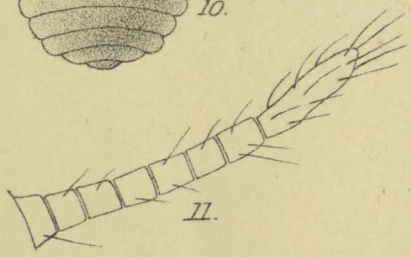

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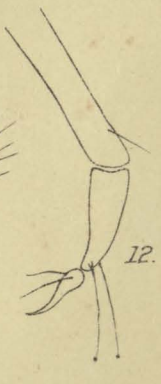

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W.M.M. delt ad nat. COCCIDIDÆ. C.H.P. lith.

tion, and the larva just described was one which emerged from the mother. There was consequently no further room for doubt that the two insects are separate and distinct.

CYLINDROCOCCUS. Nov. Gen.

Insects inhabiting galls which appear to be evidently aborted and misshapen forms of the twigs of the plant, as in each case the teeth or small scales seen at the ordinary joints have become a thickish mass clothing the base or the surface of the gall. In the two species about to be described only the anterior pair of feet are present, the others being represented by merely small dark patches on the epidermis. Anal segment circular, slightly convex, not prolonged in a "tail."

The galls formed by the two species differ. That of *C. casuarinæ* is long and slender, varying from nearly 1in. long and $\frac{1}{6}$in. wide at the base to not much more than $\frac{1}{4}$in. long and $\frac{1}{20}$in. wide at the base. The gall is smooth, except for the clothing of small scales round the base. That of *C. spiniferus* is externally much thicker in proportion to its length. Specimens observed vary from $\frac{3}{8}$in. long and $\frac{1}{4}$in. wide at the base to nearly 1in. long and more than $\frac{1}{2}$in. wide. The whole gall is very rough, being covered from base to tip with pointed scales, which are larger than the ordinary scales of the plant. In the interior, however, of this rough gall there appears to be always a central narrow elongated tube in which the insect is found, resembling thus the gall of *C. casuarinæ*.

I am not acquainted with any other genus of Coccids in which the anterior pair of feet only are preserved in the adult female. In the genera *Capulinia*, Signoret, and *Opisthoscelis*, Schrader, the posterior pair are alone visible. *Cylindrococcus* is therefore entirely distinct, if only on this account.

Cylindrococcus casuarinæ, sp. nov. Plate IX.

Insects inhabiting long narrow cylindro-conical galls, which appear to be evidently aborted and misshapen forms of the twigs of the plant, as in each case the small scales seen at the ordinary joints have become a thickish mass clothing the base of the long narrow gall. These galls vary in length and thickness: some are nearly 1in. long and $\frac{1}{8}$in. wide near the base; others not more than $\frac{1}{4}$in., and proportionately slender; but I have found adults, or remains of adults, in both large and small. The extremity of the gall is somewhat sharply pointed; the consistence varies, some being rather solid and hard, others appearing more like several strips pasted together more or less lightly. The interior is always a cylindrical tube; the exterior is smooth above the basal scales.

The adult female occupies the lower end of the tube, her

cephalic extremity resting on the base, and the rostrum applied to the termination of the unharmed portion of the twig. Form elongated, cylindrical, with parallel sides; the cephalic end more or less truncate, the abdominal extremity rounded. Length variable: specimens observed from about $\frac{1}{9}$in. to about $\frac{1}{5}$in. Colour red, with frequently many darker spots on the cephalic and thoracic regions, and often powdered with white meal, which on the cephalic region frequently appears rather solid. Viewed dorsally, the body exhibits several segments, of which the three anterior ones are the largest; viewed ventrally, each of the three anterior segments is seen to possess two rounded lobes or processes developed posteriorly, and slightly overlapping the next segment. The median segments are short and concave, and the rounded anal segment is frequently turned upwards (as shown in fig. 5, side view). In the hollow thus formed crowds of larvæ may be frequently seen congregated and crawling about. On all the abdominal segments, especially on the last two, are many longish hairs; the cephalic and thoracic segments are almost, if not quite, hairless. The last abdominal segment forms a circular, slightly convex plate, with the anal orifice (which is simple and hairless) in the centre. On this segment there are no spines, but only the longish fine hairs just mentioned. The antennæ are placed quite at the cephalic extremity: they are very short, conical, with very broad base, and terminating in a sharp point. I can only make out four joints, of which the second is the shortest, and there seem to be no hairs. The anterior pair of feet are very thick and stumpy, and appear to have at first sight only four joints; but on close examination there is seen to be a short thick coxa, with a thick cylindrical femur, and a tibia also thick and slightly tapering. The tarsus is very small and short, and the distinction between it and the small claw is not easily made out. The figure 7 of Plate IX. exhibits the features of this foot. The posterior pairs of feet are only represented by maculæ, which, however, seem to be usually very slightly convex. Rostrum rather large; mentum dimerous. I have not been able to detect any eyes. On the epidermis are several small and simple spinneret-orifices.

The foregoing description applies to the normal, uninjured, adult female. But the great majority of the specimens which I have observed have been attacked by parasites, and probably the student may more often find parasitised females than any others. Insects in this condition may be recognised, first, by being usually of a light-yellow colour, and next by having an almost regularly cylindrical form, in which there is scarcely any trace of segments: in fact, the appearance is bloated and unnatural. The lighter colour is due to the semi-transparency of the skin, and the absence of the ordinary red internal

organs; the smooth unsegmented appearance is similar to that exhibited frequently by Aphides attacked by parasites. Indeed, the insect under these conditions is nothing but a bag containing parasitic larvæ. I have found several, not actually dead, containing as many as fifteen large, fat, white grubs closely packed. These are probably hymenopterous, for in a few instances I have seen Hymenoptera inside the Coccids, just on the point of emergence. When mature, the parasite escapes from the gall through a small round hole in the usual way.

Female of the second stage not observed. But in two instances I have found, flattened between the adult female and the base of the gall, exuviæ which at first I took to be those of this stage, though afterwards I recognised them as the second stage of *Sphærococcus*, just described. Their presence inside the galls can only, I suppose, be accidental—they must have entered through some chink and been unable to get out again; but the situation in which they were found only tended to make the diagnosis of the gall-making species more difficult.

Larva dark-red, elongated, elliptical, tapering slightly posteriorly; very active: length about $\frac{1}{50}$in. Antennæ placed close together at the cephalic extremity, which is rather truncate: they are short, tapering, with six joints, of which the first is very thick, the last two small; on the last are several hairs. Feet rather long and slender: tibiæ about equal to the tarsi; claw slender; digitules all long hairs: the tarsus is somewhat sharply narrowed near its tip, and at this spot there are two long hairs. Mentum short, thick, dimerous. There are six dorsal longitudinal rows of spines, which are very long and slender, especially those on the margin of the abdominal segments. Anal tubercles moderate, each bearing a strong spine and a long seta.

Male not observed.

Hab. In Australia, on *Casuarina quadrivalvis:* Mr. French has sent me several specimens.

Cylindrococcus spiniferus, sp. nov. Plate X., figs. 1–7.

Insects inhabiting galls which they form on the twigs of the plant: these galls are sometimes seen in bunches of half a dozen together, sometimes singly. The external form is somewhat like that of a filbert, wide at the base and narrowing rapidly to a point: length varying from $\frac{3}{8}$in. to 1in., the basal width being from $\frac{1}{4}$in. to $\frac{1}{2}$in. The surface is very rough, being covered with large pointed scales, and these are so disproportionate to the size of the ordinary small scales, or teeth, at the joints of the twig that it is not easy to make out how they are collected. There are, indeed, some scattered scales on

the bark which more nearly resemble those on the gall; but even these are usually smaller, and always much less closely aggregated. On cutting open a gall longitudinally the interior is found to be more or less solid, with, in the centre, a slender elongated tube, resembling the gall of *C. casuarinæ*, and within this tube will be found the female insect.

Adult female resembling in general appearance *C. casuarinæ*, but generally rather brownish than red in colour, and the spots are darker. The larvæ congregate in the concavity of the ventral region, as in the last species. Antennæ very short, broad at the base and sharply pointed. I have not been able to satisfy myself as to the number of joints, but these are probably four, the second being the shortest. Only the anterior pair of feet are present, and these resemble generally those of *C. casuarinæ*, but may perhaps be more slender. The characteristic features of *C. spiniferus* are found in the spines which it bears. These, on the cephalic and thoracic regions, are scattered in fairly large numbers, some being long and slender, others shorter and thicker. On the anal segment, which is circular, slightly convex, and bearing numerous long fine hairs, the spines are short, rather thick, and arranged in several concentric rows. Moreover, in the middle of the circular disc formed by this segment, close to the anal orifice, there are two adjacent, flattish, broad, protruding lobes or plates, irregularly quadrangular, with deeply-serrated terminal margins, and bearing on the serrations usually five strong thick spines.

Second female stage not observed.

Larva dark-red, elongated, elliptical, tapering slightly posteriorly; very active: length about $\frac{1}{60}$in. Antennæ as in *C. casuarinæ*, of six joints, of which the last two are very small. The feet, marginal and dorsal spines are as in *C. casuarinæ*, but I think the tibiæ and tarsi are rather thicker.

Male not observed.

Hab. In Australia, on *Casuarina quadrivalvis*: Mr. Tepper and Mr. French have sent me several specimens.

The external form of the gall and the numerous spines on the adult female sufficiently distinguish this very interesting insect: the larva is also rather smaller than in the other species. I know of no Coccid in any group or genus which presents similar lobes and spines on the anal segment.

Cylindrococcus, sp. (?) Plate X., fig. 8.

I possess a photograph by the late Mr. Crawford of a curious group of galls on *Casuarina*, of which I have endeavoured to give an accurate representation. Mr. Crawford evidently considered this as the same as *C. spiniferus* just described, for on the same photograph is a twig with galls of

that species. Yet I perceive a difference in this respect: that the galls shown in my figure are smooth, and apparently built up of several longitudinal segments meeting at the tip. Mr. Tepper, of Adelaide, sent me some time ago two galls which resembled these. On cutting them open I found them filled with numbers of small cavities in which were larvæ and pupæ of some dipterous insect, and I conjectured this to be some species of *Cecidomyia*. On that occasion I could not detect any Coccid in the interior, and so informed Mr. Tepper; but in a subsequent letter he told me that the boys about Adelaide used to be rather fond of eating these galls, on account of their sweet taste, until somebody drew their attention to "the red insect inside." Supposing, then, that this "red insect" will turn out to be a Coccid after all, I think I may venture to predict that it will be a third species of *Cylindrococcus;* and perhaps by next year I may be able to identify it. Meanwhile the figure which I give will serve very well to show the differences in external form of the galls of this curious genus.

I suppose that there may have been twenty or thirty dipterous larvæ in the cavities of the substance of each gall which I cut open. No similar case has hitherto come under my notice. Parasites attacking the insects themselves are of course common enough amongst Coccids; but in this instance the Diptera were living in the gall, and not in the female Coccid.

Subdivision MONOPHLEBIDÆ.

Genus CŒLOSTOMA, Maskell.

Cœlostoma compressum, sp. nov. Plate XI., figs. 1–8.

Adult female red, elongated, convex, segmented, active; excreting at gestation a quantity of white or pinkish cotton, covering the dorsum, and forming an ovisac behind it; this cotton frequently takes the form of curly laminations: length of insect about $\frac{1}{5}$in. as a rule, but specimens reach $\frac{1}{3}$in. Antennæ of ten joints, slightly tapering as far as the eighth, the two last increasing a little in thickness; the first nine joints are subequal, the second being a little the longest; the last joint is as wide at the base as the end of the ninth, so that the two almost look as if joined in one; all the joints bear several hairs. Feet rather strong and thick: tarsus more than half as long as the tibia; the tarsus is curved; both tibia and tarsus bear on the inner edges a row of spines: there are two digitules, one tarsal, the other on the claw; both are long fine hairs: the trochanter bears several setæ. Rostrum and mentum absent. Anogenital ring simple; anal tubercles very small, setiferous. The epidermis bears great numbers of circular compound spinnerets, intermixed with some longish fine hairs which are not very numerous.

Female of second stage red, darkening with age; elongated; segmented: average length $\frac{1}{4}$in., but some specimens observed exceeded $\frac{1}{3}$in.: occupying a groove in a mass of white, or greyish, or yellowish wax, which leaves the dorsal region usually exposed; this waxy mass would doubtless be more or less globular if it were not squeezed nearly flat by pressure between the laminæ of the tree-bark, the consequence of the pressure being that the wax spreads out round the insect, sometimes with a diameter of more than an inch. Antennæ atrophied, reduced to a single small joint bearing several short hairs. Feet entirely absent. Rostrum large; mentum conical, trimerous. The anal tube seems to be simple. Epidermis covered with great numbers of circular compound spinnerets, which are most numerous near the margins.

Larva red, elongated, somewhat slender, active: length about $\frac{1}{24}$in. Antennæ of seven joints, the first and last the longest, second and sixth shorter and equal, the rest still shorter and equal; the third, fourth, and fifth are also the narrowest, so that the antenna is rather irregular. Feet moderate: tarsus longer than the tibia; there are no tarsal digitules, the lower pair being fine hairs. Anal tubercles very small, setiferous. Mentum trimerous.

Male unknown.

The adult female of this species is sometimes "parthenogenetic," as will be noticed presently.

Hab. In New Zealand. The second stage of the female is found between the layers of bark on *Podocarpus totara*, in the Reefton district. My specimens are from Mr. Raithby.

I have included this insect in the genus *Cœlostoma*, on account of the absence of the rostrum and mentum in the adult stage, and other generally normal characters; but it departs from the type in the ten-jointed antenna of the adult, and the seven-jointed antenna of the larva. Both of these antennæ, also, are abnormal in not being conical or tapering from base to tip in the adult, and as far as the penultimate joint in the larva. These points serve readily to distinguish the species, apart from the crushed condition of the waxy mass in the second stage, which indeed may be only accidental.

I have stated that this insect is "parthenogenetic." Whether there is really any such thing as true parthenogenesis amongst insects is a question which I need not discuss. Mr. Buckton (Monogr. of British Aphides, vol. i., p. 61) remarks that there are "interesting forms in which we might almost believe, though the evidence be but negative, that no male occurs;" and he goes on to say that Leuckart and von Siebold "distinctly assert that such anomalies exist in nature." At the same time, other observers consider that there are among

Aphides species which are truly hermaphrodite. I believe, however, that, as far as any thorough investigations have yet been made, the so-called parthenogenesis is but the continuous action of an original sexual act between a true male and a female, acting through a certain number of generations, after which the race would be extinguished without a repetition of the sexual act.* This form of generation (which undoubtedly is itself sufficiently wonderful) appears to have been satisfactorily observed in Aphides and in certain species of *Diptera;* while, as regards Coccids, something analogous has already been announced in the case of *Lecanium hesperidum*, by M. Moniez (Comptes Rendus de l'Acad. des Sci., 1887), where the male is stated to remain in the body of its female parent, and, *itself in the larval stage, to impregnate the female larvæ* before they emerge. As far as the females are concerned, Sir R. Owen has accounted for the facts observed (Disc. on Parthenogenesis, 1849), by a theory of the retention of the power of reproduction in some of the "nucleated cells" of the first female of the series. Of course, the explanation would not touch the point of the generative power in the male of *L. hesperidum* existing only in its earliest and quite incomplete stage.

However, although, in the case of Aphides, the attention of entomologists has, ever since the days of Réaumur, been directed to this phenomenon of unisexual generation, very little has been known or written about it in connection with Coccids. Incidental remarks may be found in various entomological and other works to the effect that the *Homoptera* as an order are endowed with this special power; but it would seem that these are simply generalisations from the particular case of Aphides; and I am not aware of any writer on Coccids who has mentioned an actual instance for any species of that family. It will therefore be not uninteresting to note here a case under my own observation, and undoubtedly clear.

The first examples of *C. compressum* which I received (in 1890) from Mr. Raithby were females of the second stage on pieces of bark, each resting in its mass of excreted wax. Some of these I dissected or mounted; others I placed in my cabinet in the usual way—with a pin through the bark. My experience of insects in this stage is that in the great majority of cases they remain *in sitû*, and in a few days die: adults I

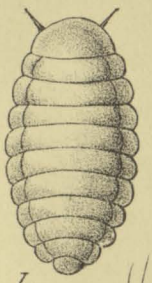
* In *Psyche* for September, 1891, p. 150, I find it stated that "to a description of a hermaphroditic spider Bertkau appends a catalogue of recent cases, and states that 361 hermaphroditic *Arthropoda* are now known, of which . . . . 349 insects." I do not know where the paper referred to is to be found; but in the list given in *Psyche* no mention is made of *Homoptera*.

find (as in the case of *M. crawfordi*, below) to live longer. Sometimes I have had adult females which emerged in confinement, but not often. This was the case in the present instance, for about a week afterwards I found an adult *C. compressum* crawling about the drawer, the exuviæ of the second stage being left in the wax. I transferred her to a glass-covered box, and forgot her until, some ten days later, I found that she had covered herself with cotton and was beginning to form an ovisac. In perhaps a month afterwards this ovisac was plainly being filled with red eggs, which I could detect through the cotton. This female could not possibly have had access to any male since her metamorphosis, being shut up in a cabinet-drawer. The power of oviposition under such circumstances being thus established, it remained to ascertain whether the eggs were fertile or sterile. I therefore left the insect undisturbed for some months, until in December I found three larvæ which had emerged from the eggs and were crawling about. There was thus no further room for doubt that the female of *C. compressum* can produce fertile eggs without the access of a male in her adult stage.

Earlier in the year I had received the specimen of *Monophlebus crawfordi* of which I shall say something presently, and this also in confinement produced many eggs from which emerged larvæ. But I am unable to say whether, before being captured in Australia, this insect might not possibly have been visited by a male. There is, however, this difference between the two cases: that every egg of *M. crawfordi* seems to have been fertile, the larvæ emerging in swarms, whereas only three or four larvæ of *C. compressum* came out; the rest of the eggs (perhaps many scores) still remain in the ovisac, and are apparently dead. This difference seems to point to at least more powerful action in the case of direct sexual impregnation. But, at all events, we have here a positive instance of propagation by a female which, if ever impregnated by a male, must have been impregnated at an early and incomplete stage of her existence.

I have already stated that I am not aware of any *definite* cases of a similar character adduced by previous writers on Coccids. It is necessary to guard this statement by the acknowledgment that I have not been able to procure von Siebold's essay on "Parthenogenesis in the *Arthropoda*" (Leipzig, 1871): at the same time, it is probable that this author would not enter into many details regarding *Coccidæ*.

There is a capriciousness, so to speak, in the occurrence of male Coccids in different species which is worthy of further inquiry. Sometimes males are excessively numerous—*e.g.*, *Cœlostoma wairoense* in New Zealand, or *Ericerus Pé-La* in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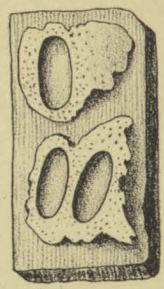
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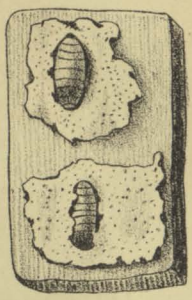
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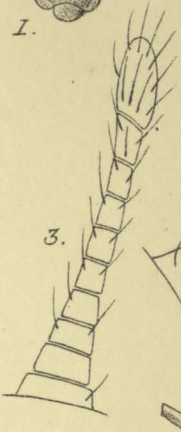
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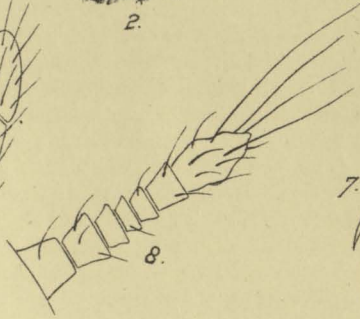
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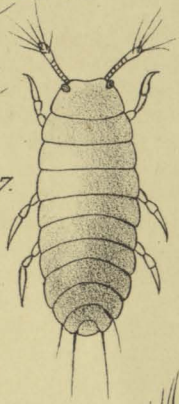
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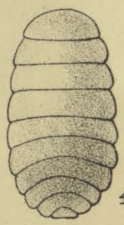
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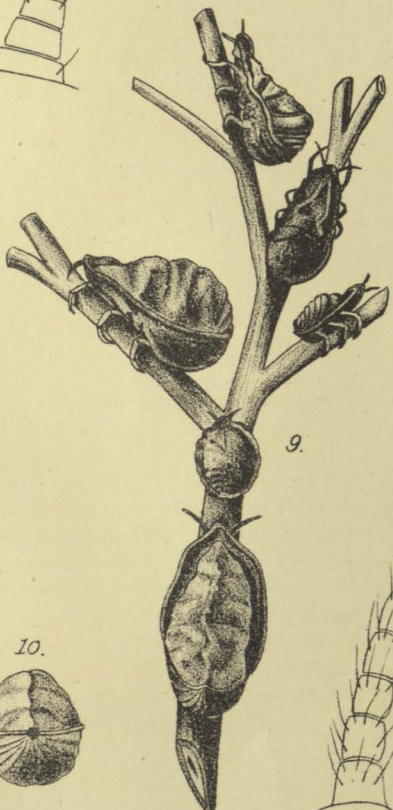
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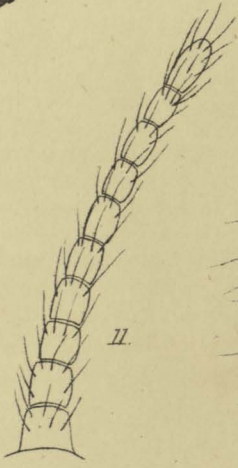
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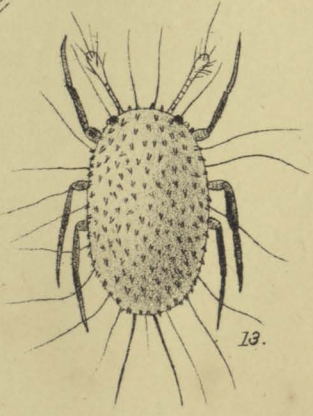
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W.M.M. delt ad nat. COCCIDIDÆ. C.H.P. Lith.


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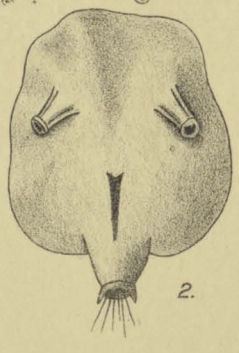
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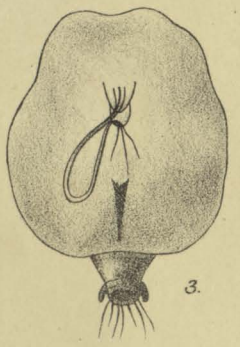
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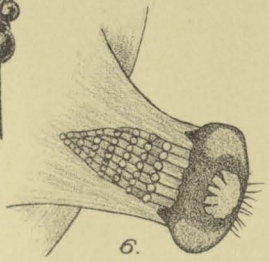
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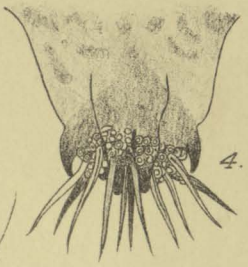
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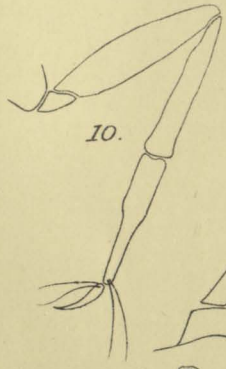
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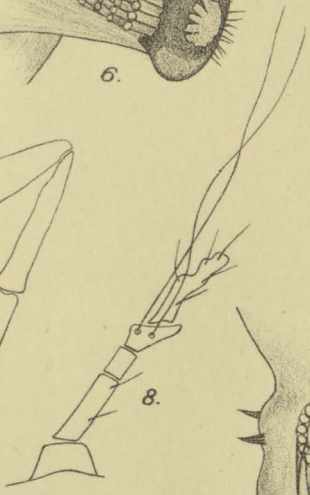
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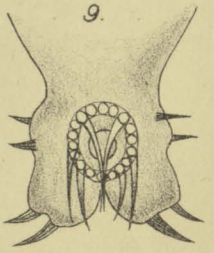
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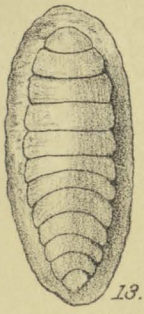
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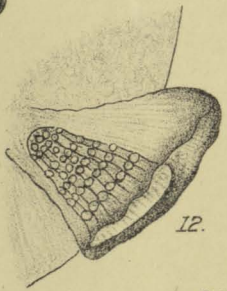
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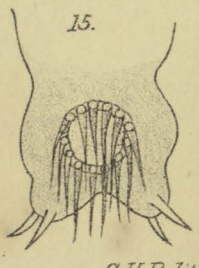
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W.M.M. delt ad nat. COCCIDIDÆ. C.H.P. lith.

China, where they are far out of proportion to the number of females. Sometimes there is a fair equality in the sexes, or a few more females than males: this may be taken as the normal condition. Sometimes the males are excessively rare, even undiscovered after many years' search—*e.g.*, *Lecanium hesperidum* or *Mytilaspis pomorum*. Sometimes the sexes are intermingled, sometimes separate: I have seen a branch of *Acacia* with one long twig covered thickly with females alone of *Lecanium baccatum*, and another long twig covered still more thickly with males alone; and a tree of *Pittosporum tenuifolium* has been for two or three years in succession white with males of *Fiorinia asteliæ*, only a few females appearing here and there.* The student of Coccids is constantly meeting with phenomena and problems such as have been discussed in these paragraphs, which tend to strengthen his conviction that few, if any, families of the great insect class of the animal kingdom equal them in complexity and interest.

Cœlostoma pilosum, Maskell. N.Z. Trans., vol. xxiii., p. 29.

Since last year I have obtained specimens of the male of this species. The insect is darkish-red or brown in colour, but covered with hairs and with a good deal of whitish meal on the body and legs: length of body about $\frac{1}{10}$in., expanse of wings about $\frac{3}{8}$in. Wings rather thick, with a strong red nervure. Antennæ long and slender, with ten joints, the first two short and thick, the rest long and subequal; on all the joints are many hairs. Feet long and slender, very hairy, and the hairs on the inner edges of the tarsus and tibia are spinous; no tarsal digitules, the pair on the claw being long fine hairs. Abdominal spike short, subcylindrical. Eyes large, facetted.

There is little difference between this insect and the male of *C. zealandicum:* it is rather smaller and rather more hairy, and has a larger quantity of meal, the male of *C. zealandicum* being usually, almost, if not quite, clean; but in the anatomical characters the two seem to be very similar.

Cœlostoma immane, sp. nov. Crawford Coll. Plate XI., figs. 9–12.

Adult female of a dull dark-red or reddish-brown colour, sometimes nearly black; elongated and, if viewed from above, more or less elliptical: length in the specimens observed varying from $\frac{1}{3}$in. to 1in. Viewed sideways the cephalic extremity appears thin and flattish, the thoracic and abdominal regions considerably inflated both dorsally and ventrally, so that in a large specimen the head is only about $\frac{1}{7}$in. thick, while the

* This tree has since been killed by the Coccids.

thickness of the abdomen is more than ½in. The insect has thus much the appearance of an old leather bag or bottle, with one end flattened and a seam running round the middle of it. The skin is much wrinkled, but it is not easy to make out regular segments. The antennæ are short and tapering, and seem to have only ten subequal joints, but possibly the last joint may be broken off in all the specimens seen. The feet are rather long and, for the size of the insect, slender: on the trochanter is a longish seta; there seem to be no digitules, or at least only a short one on the claw. In all the specimens observed the feet are clasped round the twig, as if the insects were afraid of falling off. Rostrum and mentum wanting. At the posterior extremity there is a rather large simple anal orifice, the skin round it being much wrinkled. The epidermis is closely marked with great numbers of minute pits, and there are some short hairs.

Amongst the specimens observed is one which resembles the rest in colour and in general form when viewed from above, but it has not an inflated abdomen, and the general appearance is smoother. I have been inclined to consider it as the second stage of the female, but it is destitute of a rostrum, and probably, therefore, is an adult female in its earlier state, before gestation. In this specimen there is a very small quantity of whitish cotton under the anal region; and along the margin, just below what I have called a seam on the edge, are ten small circular specks of white (five on each side), which may mark the position of spiracles.

Hab. In Australia, on *Acacia aneura*. My specimens were sent by the late Mr. Crawford in 1887: he informed me that they were forwarded some years earlier to the Museum at Adelaide by a shepherd from the interior, but the exact locality was unknown: I gathered, however, that it was somewhere in the direction of Cooper's Creek. The original discoverer having died soon afterwards, the insect could not again be traced. Mr. Crawford also stated that the largest specimen sent to me (1in. long) was "a Lilliputian compared with some that our Museum authorities have in spirits." If this is so the species must indeed be a gigantic one, far surpassing anything hitherto known.

I have been obliged to attach this insect to *Cœlostoma;* yet I do so in some doubt, having as yet had only a few specimens, and some of those not entirely perfect. I look upon the practice of erecting species (and sometimes even genera) upon insufficient, or single, or perhaps mutilated specimens, as reprehensible in the highest degree, and, indeed, very little less than an insult to readers and students. In the present case the specific name here adopted, which simply expresses the huge bulk of the insect, will be applicable to it under whatever

genus it may hereafter be found to belong to. I think I have placed it correctly in *Cœlostoma*, on account of the absence of a rostrum and the tapering form of the antennæ. There is no doubt of its being a Monophlebid; but further examination, especially of the earlier stages and of the male, is required for absolute certainty.

My specimens do not exhibit any signs of a cottony envelope or of an ovisac, except in the very small quantities mentioned above; but I should not like to say that in the natural state they may not excrete a good deal.

Genus MONOPHLEBUS, Leach.

Monophlebus crawfordi, Maskell. Trans. Roy. Soc. South Australia, 1887, p. 108; N.Z. Trans., vol. xxiii., p. 28. Plate XI., figs. 13–15.

In my paper of last year I expressed doubts whether the "long white setous anal hairs" spoken of by Mr. Koebele belonged really to the adult stage of this insect. Since then I have had opportunities of examining three more adult females, and, although each of them lived for several weeks, no signs of such setæ appeared. The very fine female mentioned last year as being sent to me in April remained alive, but seemingly unchanged in condition, until September, when it began to excrete some long thin curling yellowish threads from various portions of the dorsum; and towards the end of the month indications of a posterior cottony sac became noticeable. These were only slight until the 20th October, when she began to excrete a much larger number of dorsal threads, and also to increase the sac, which grew in size until near the end of November: the sac was not of any definite form and was loose in texture, and as its growth progressed the insect became gradually raised up *a tergo*, as in *Icerya*. On the 2nd November I noticed the first eggs deposited in the sac, and thence to the 25th November the eggs came forth in great numbers, of the usual elliptical form and red colour: as oviposition continued the female shrivelled up, until at the end of November its formerly large red body was scarcely to be made out in the loose cottony mass.

I was anxious to watch the proceedings of this insect with some care, because I supposed it possible that before capture in Sydney she might perhaps have been visited by a male; and I wanted to compare her with *Cœlostoma compressum*, also ovipositing (certainly without any male) about the same time. I saw no change in the eggs of the *Monophlebus* until the 15th February of this year, when one larva was found crawling on the glass top of the box: by the 17th several scores had emerged, and by the 20th probably some

hundreds, all very lively, and changing the appearance of the white ovisac with red eggs into a seething mass of brown crawling insects mixed with whitish egg-shells. From the immense number of these larvæ, which left scarcely any unfertile eggs, I concluded that in all probability direct connection with the male had been effected in the adult stage of this female.

The larva of *M. crawfordi* is reddish-brown, elongated oval, active, segmented: length about $\frac{1}{24}$in.: there is a slight whitish meal on the dorsum. In a live specimen there are usually some long, very slender, hyaline marginal hairs, which, however, seem to be very brittle. Antennæ of six joints, of which the first and sixth are thick, the rest slender; the first five are subequal in length, the sixth much larger, as long as any two others, club-shaped, and bearing several hairs, of which one, not at the extremity, is very long. Feet long and slender: the tibia and tarsus thin, and the tibia is scarcely longer than the tarsus; claw slender, with two short fine digitules springing from small tubercular bases. Mentum apparently dimerous. Body covered with great numbers of cylindrical tubular spinnerets, interspersed with circular compound spinnerets and with spiny hairs: from these tubular spinnerets on the margin spring the long hyaline hairs mentioned above. Anal tubercles small, each bearing a long, rather strong, seta.

The general appearance of this larva and the forms of the feet and antennæ approach much more nearly to *Icerya* than to either *Cœlostoma* or *Leachia*. I regret very much that the want of appliances rendered it impossible to keep the larvæ alive and to watch their metamorphosis, as observation of the second stage of *Monophlebus* is very desirable for comparison with the other genera.

Group BRACHYSCELIDÆ, Schrader.

In the Journal of the Entomological Society of New South Wales, 1863, Mr. H. L. Schrader published a description of some new species of Coccids, seemingly all found on various *Eucalypti*, and differing a good deal from known genera, principally in their habit of forming large and strangely-shaped galls on the food-plant. A subsequent, and apparently nearly identical, notice by the same author appeared in the same year in the Transactions of the Zoolog.-Botanische Gesellschaft, of Vienna. Dr. Signoret included these species briefly in his "Essai." I have been able to procure Schrader's German paper, but not his Sydney one; and I regret that in the synopsis of groups and genera of Coccids given in my "Scale-Insects of New Zealand" a page containing this abnormal group dropped out in the printing.

Schrader's descriptions are exceedingly imperfect, and are

by no means satisfactory guides for a student. In fact, while it is convenient enough to use his generic names as forming a group of the *Brachyscelidæ*, and while the group-name (absurd as it is, for shortness in the feet would not even be a proper *generic* character) can be retained, it would be necessary to begin the systematic study of these curious forms quite afresh in order to obtain clearness. I understood some time ago that Mr. A. S. Olliff, of Sydney, had collected the material for such a study, but I suppose that press of other duties has prevented him from publication.

Of Schrader's species I possess fine examples of *Brachyscelis ovicola*, *B. munita*, and two others, which may be perhaps *B. pileata* and *B. pharetrata*. All of these came to me from South Australia.

As far as I can make out, the distinguishing character of the group *Brachyscelidæ* has been taken to be the formation of hard woody galls. In some species the females and males appear to occupy the same gall; in others they inhabit separate galls. In my specimens of *B. ovicola* the female gall is as large as a pigeon's egg, the separate male galls being very small and tubular; in the species which I suppose to be *B. pileata* the little tubes of the male are stuck in numbers on the round female gall, which is as large as a filbert. Coccids, however, are so capricious in their ways that it would not be in the least surprising to me to find some day a Lecanid or a Dactylopid gall-maker; and, indeed, I have in this paper hesitated to attach to *Brachyscelidæ* the insect which I have named *Cylindrococcus*. A more satisfactory course (I speak subject to correction by any student of this group) might be to take also into consideration the form of the female abdomen. This, in at least the specimens of *B. ovicola* and *B. munita* which I have examined, and in *Carteria* and *Frenchia*, described presently, is noticeably prolonged somewhat like a tail, more or less slender. The resinous mass in which *Carteria* lives is not at all like the gall of *Brachyscelis*, yet I agree with Signoret in thinking that *Carteria* may better be placed amongst the *Brachyscelidæ* than in any other group, and probably the abdominal prolongation (which exists in the American and the Indian as well as in the Australian species) may usefully be employed as a connecting character. I am aware that this suggestion involves an extension of the original group-characters as more or less defined by Schrader, but this is at least convenient, if not necessary.

It will be understood that the presence of a "tail" would not denote a Brachyscelid unless other characters were present. For example: I have lately received from Australia a peculiar insect with a particularly-pronounced "tail," and I find that the characters of the adult (all that I have yet seen) are dis-

tinctly Lecanid. But if, in the *Crustacea*, it is deemed right to separate those with sessile eyes from those with stalked eyes, a similar grouping based partly on the presence or absence of a "tail" might be allowed amongst Coccids.

Genus CARTERIA, Signoret.

This genus may be characterized by the prolongation of the abdominal segments of the female in a more or less distinct but not very long "tail," by the presence on the thoracic or on the abdominal dorsal region of two protruding tubes (probably the organs for excreting the resinous matter surrounding the insects), by the absence of feet in the adult, and by the presence of a large strong spine just above the abdominal prolongation.

The genus has hitherto been represented by the Asiatic and African species, *C. lacca*—producing the article commercially known as "shellac"—and by two American species, *C. mexicana* and *C. larreæ*, Comstock, which also produce much resin, though seemingly not in commercial quantities. I am unable to say from the specimens submitted to me whether the two Australian species herein described can be made useful in this way: their resin is not superabundant as far as I can tell, but it might be worth while to make further inquiry on the point.

Signoret at first ("Essai," 1874, p. 293) placed *Carteria* amongst the Lecanids, on account of the mononerous mentum, the presence of two very minute lobules close to the anal ring (which he considered analogous to the "squames anales" of *Lecanium*), and the very long anal spike of the male. In 1876, however (p. 429), he changed his view, and indicated that the genus might be placed amongst the *Brachyscelidæ*. I agree with this opinion, and have here adopted it, not on account of the formation of any gall, which *Carteria* does not effect, but partly because of the prolongation of the abdomen above mentioned. The characters of the larvæ are distinctly not Lecanid. Comstock, in his description of the two American species (Rep. on Insects, 1881), does not mention any larvæ, nor does he discuss the affinities of the genus. I prefer to make use of existing means of classification wherever it is possible, even if the boundaries must be very slightly enlarged, to proposing an additional group, which might require much revision hereafter.

Carteria melaleucæ, sp. nov. Plate XII., figs. 1–10.

Female insects producing a quantity of very dark-red or purple resinous matter, which may be aggregated in masses on the twigs, or in detached semi-globular pieces each of which contains an insect. On the outside of these resinous masses

may be frequently seen small quantities of white cottony fibres.

Adult female dark-red, globular: diameter about $\frac{1}{16}$in. Feet and antennæ entirely absent. Rostrum moderate; mentum short, thick, monomerous. Abdomen prolonged in a thick cylindro-conical process, which frequently appears as if formed of three segments, the basal one short and broad, the next cylindrical, the terminal one more or less conical, and bearing at the end the anogenital ring surrounded by small lobules and many strong hairs; two of these lobules are rather larger than the rest, and may answer for the anal tubercles. A little above the base of the abdominal process is one very large strong spine. On the thoracic region, nearly as high up as the rostrum, are two rather thick protruding cylindrical tubes, each ending in an orifice fringed with short hairs; the central tube leading to this orifice appears to bear a number of excretory glands, and the whole organ is probably employed in the production of the resinous matter or lac. A large compound spiracle is situated near the base of each tube. Epidermis bearing a good many, but not crowded, small circular spinnerets with minute spiny hairs; and in various parts of the cephalic region are little groups of small subcylindrical tubes: probably from all of these are produced the cottony fibres mentioned above.

Second female stage not observed.

Larva red, flattish, active; length about $\frac{1}{50}$in. Body ending in two short, but thick and conspicuous, divergent anal tubercles, each bearing about four strong short spines; and between the pair is a large compound anal ring, which appears to have six hairs. Antennæ slender, irregular, with five joints, of which the second is cylindrical; the third and fourth about half as long as the second; the fifth slender, irregular, as long as the second, and bearing some short hairs; the fourth joint, which is very widely dilated, bears two excessively long hairs. Feet long and very slender: tibia slightly longer than the tarsus; digitules four long fine hairs. Mentum monomerous.

Male unknown.

Hab. In Australia, on *Melaleuca uncinata* and *Eucalyptus* sp. (sent by Mr. French), and on *Melaleuca pustulata* and *Aster axillaris* (sent by the late Mr. Crawford).

All the species of *Carteria* are peculiar. The present insect differs from *C. lacca* in its globular form, and from the two American species in the position of the two lac-tubes and the structure of the abdominal process. It is perhaps nearest to *C. mexicana;* but I find no mention of the larva of that species for comparison. The resin or "lac" of *C. melaleucæ* is readily soluble in alcohol.

Carteria acaciæ, sp. nov. Plate XII., figs. 11–15.

Insects excreting a quantity of light-red or pinkish resinous matter, aggregated in masses or in detached irregular pieces.

Adult female red in colour, globular: diameter about $\frac{1}{25}$in. Feet and antennæ absent. Abdomen ending in a thick cylindro-conical process as in the last species, but in the specimens observed the extremity was very much less hairy. The usual large strong spine is placed above the base of the process. The two lac-tubes are on the thoracic region: they are shorter than those of *C. melaleucæ*, and more widely dilated at the end. The small circular spinnerets and the little groups of tubular ones seem to be distributed over the whole thoracic as well as on the cephalic region.

Female of the second stage covered with a light-red elliptical convex waxy test, the segments of the insect appearing through the wax: length about $\frac{1}{30}$in.: these tests are often very numerous on a twig. The enclosed insect is subelliptical, tapering slightly posteriorly; the abdomen ends in two short divergent anal tubercles, each bearing two spines; the compound anal ring between them bears several hairs. Antennæ and feet absent. Rudiments of lac-tubes may be seen on the thoracic region, about as high up as the rostrum. Rostrum rather small; mentum monomerous.

Larva not observed.

Male unknown.

Hab. In Australia, on *Acacia* sp. My specimens were sent by Mr. J. G. O. Tepper, of Adelaide, with a note: "Collected by Mr. Helms, of the Elder Exploration, in central Australia."

This species, in the colour of its lac, resembles closely *C. larreæ*, Comstock, an American species. I note that J. M. Stillman, in the "American Naturalist," vol. xiv., p. 783, says that *C. larreæ* is also found on *Acacia greggi*. Our Australian species differs, however, in the form and the position of the lac-tubes. Comstock does not describe either larva or second stage of his species.

Genus Frenchia. Gen. Nov.

Females excreting a tubular, smooth, woody test, which entirely covers them; also at gestation forming an inner waxy indusium closely attached to the insect; also producing gall-like swellings or excrescences in the twigs of the food-plant. Abdomen distinctly prolonged.

The only species yet known is apodous and without antennæ in the adult stage: pending discovery of other species I refrain from including these as generic characters.

I have included this genus amongst the *Brachyscelidæ*, as it seems impossible to place it elsewhere, and it accords with


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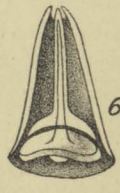
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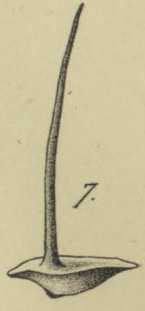
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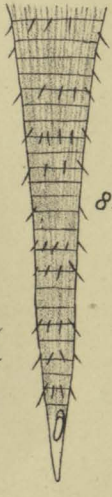
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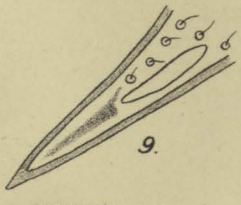
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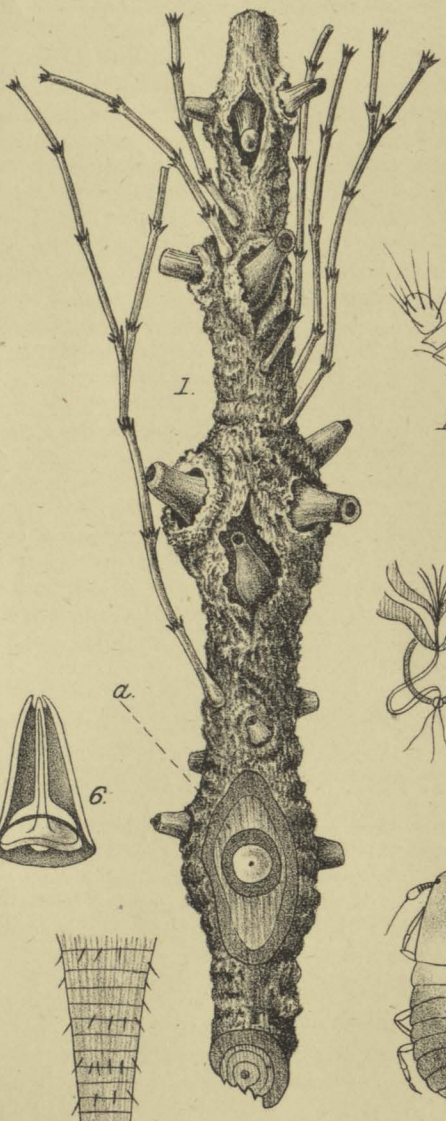
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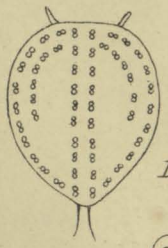
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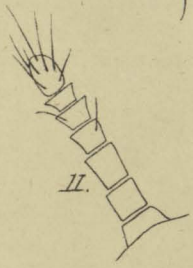
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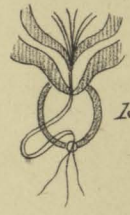
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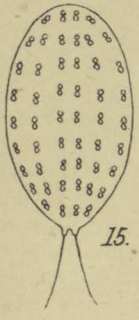
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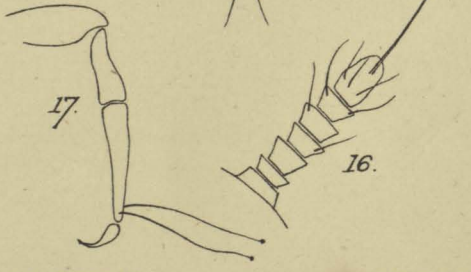
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W.M.M. delt ad nat. COCCIDIDÆ. C.H.P. lith.

that group in the formation of galls in the food-plant. It was, however, at first doubtful whether the insect should not be attached to Schrader's genus *Ascelis*, which likewise loses feet and antennæ. But, as no mention seems to be made by Schrader of any test in *Ascelis*, his genus apparently being covered only by the gall produced by it (as, indeed, are also *Brachyscelis* and *Opisthoscelis*), there seemed to be quite sufficient reason for its separation. I possess specimens of *Brachyscelis ovicola*, Schrader, and also of other species of the same group, and in none of these is the female covered with anything but a single gall-like, seemingly vegetable domicile. In *Frenchia* the female in its very latest stage has three coverings—the inner waxy indusium, the hard woody tubular test, and the plant-gall.

I have pleasure in attaching to this very peculiar insect the name of Mr. C. French, who appears to have first discovered it.

Frenchia casuarinæ, sp. nov. Plate XIII.

Adult female covered with a cylindro-conical, hard, tubular test, woody, of very close texture: the wide base of this tube is open; the other end being at least partially closed until gestation, after which it remains open: the length of the tube varies with the age of the insect, attaining at full growth an average length of rather over $\frac{1}{2}$in., the base being sometimes $\frac{1}{3}$in. in diameter: the colour at first is yellow, deepening with age to reddish-brown or nearly black: the outside is quite smooth; the inside is likewise smooth, and powdered with white meal. The tube is set deep in the bark, the open base closely attached to the wood of the tree; the cylindrical portion protruding through the bark, sometimes for half its length or more; and in old specimens the adjacent bark is much cracked, exposing almost the whole tube. A single tube is commonly surrounded by more or less swelling of the plant, but often several tubes are placed close together, and in such cases the galls attain considerable size: some specimens observed reach more than 2in. in diameter, the unharmed portion of the twig not being more than $\frac{1}{2}$in.

Within this woody tube, for the greater portion of the insect's life, is only a coating of powdery meal; but in the latest stage much of the meal appears to become coagulated into a waxy white or yellowish indusium, which becomes attached to the insect, the lower part wide and circular, the upper portion tapering away in a slender tube to a point.

The adult female is at first reddish-yellow, then bright-red, and after gestation dark-brown. The form is peculiar, the cephalic portion circular and disc-like, rather thick in the middle and thinner at the edges, and from the upper side of

this the abdominal region proceeds in the form of a slender tapering tube passing up the woody test and terminating in a single point: in fact, the insect has something of the appearance of a tadpole. The cephalic region occupies the whole base of the woody tube; and its lower surface is at first slightly convex, applied to the wood of the tree by a small central protuberance in which is situated the rostrum, which has a short tubercular monomerous mentum and very short setæ. Antennæ and feet absent. I have failed to find an anogenital ring; but in the abdominal tube, a little above the point, there seems to be an orifice which may answer for it. There are four large spiracular orifices, and seemingly some others smaller: the tracheæ of the former are very large. The abdominal tube is obscurely segmented, the transverse corrugations being very numerous; and it is also longitudinally striated, having the appearance of being composed of strong muscular tissue: at intervals along it there are transverse rows of very small circular spinneret-orifices and of slender hairs. The dorsal cephalic epidermis bears great numbers of circular and also of tubular spinnerets. At gestation the under-side of the cephalic region becomes concave, and frequently covers the larvæ: no larvæ or eggs have been observed in the abdominal tube; but possibly they may emerge through the orifice in it, and make their way down to the cephalic disc, so as to escape under the edges of the waxy indusium and thence up the woody tube.

Female of the second stage reddish-yellow, elliptical, tapering slightly posteriorly: length about $\frac{1}{35}$in. Antennæ short, of seven joints, of which the three first are the longest, the sixth very short. Feet absent. Mentum tubercular, monomerous. Abdomen terminating in a small simple anal ring with two moderately long setæ. Epidermis bearing two median longitudinal rows of figure-of-8 spinnerets and two marginal rows of the same, the innermost of which last rows is only on the cephalic and thoracic regions. This second stage is found in very inconspicuous and minute brown papillæ on the bark, which are often scarcely to be detected except by their comparative smoothness: they are not deep in the bark, nor does the insect appear to reach the wood: there is sometimes noticeable a commencement of the woody tube; but I think that this second stage is not of long duration, for the insects in tubes, however short, are nearly always of the adult form and character.

Larva yellow, darkening as it grows, flattish, elongated, active: length about $\frac{1}{80}$in. Form subelliptical, the abdominal region rather dilated, the posterior extremity somewhat acuminate. Abdomen ending in two very small anal tubercles, each bearing a long seta. Antennæ of apparently six or seven

short joints, but the joints are somewhat confused; on the last is a long hair. Feet slender: tibia shorter than the tarsus; tarsus slightly dilated; upper digitules very long knobbed hairs, lower pair apparently wanting. On the dorsum are two marginal, two median, and two intermediate rows of figure-of-8 spinnerets.

Male unknown.

Hab. In Australia, on *Casuarina equisetifolia* and *C. quadrivalvis*: Mr. French has sent me several specimens.

This remarkable insect, as observed above, does not seem to fit into any known genus. It is not clear by what process the burrowing into the bark is effected. The larva does not seem to do it, at least to any great depth, because the female of the second stage is, as stated just now, found scarcely buried. As for the gall-like swellings of the plant, they may be accounted for in the usual way as the result of "irritation caused by the suction of the insects;" yet I see nothing to indicate that *Frenchia* has any organs of irritation not possessed by other Coccids. This question of gall-formation merits attention. Another Brachyscelid—*B. ovicola*, Schrader—forms great egg-shaped domiciles, which are only attached to the plant by their extreme tips. I possess specimens of these nearly 2in. long, on twigs scarcely $\frac{1}{10}$in. thick: there must be something more than "irritation" here. But, if there exist in certain species special organs with which they so act on a plant as to produce galls, it would be interesting to discover it. After several years' minute investigation of many (perhaps three hundred) different Coccids, no organ of the kind is known to me. Yet, as I have observed elsewhere (Entom. Monthly Mag., November, 1890), some Coccids produce galls, some make cavities, others exercise no influence on the *form* of a plant. As between, say, *Aspidiotus nerii*, *Lecanium hesperidum*, *Xylococcus filiferus*, *Rhizococcus fossor*, *Frenchia casuarinæ*, *Brachyscelis ovicola*, what is the difference of organs in each which results in the different action of each on the food-plant? Long ago Réaumur and Bonnet attempted to explain plant-galls on the theory that the softer portions of the structure would tend to growth on the lines of least resistance, and consequently would flow towards a puncture by an insect. The explanation, however, fails to show why in the great majority of cases neither galls, cavities, nor distortions occur, whilst a minority of Coccids bring about one or other of the three. In *Insect Life*, vol. iii., No. 7, p. 343, Professor Riley, commenting upon my paper in the *Entomological Monthly Magazine* just mentioned, expresses the opinion that "a poisonous principle must exist, however difficult to detect." Just so; but it would be interesting to have the subject worked out. Time will not permit of my entering upon this investigation, and,

indeed, I am not sure whether some amount of chemical knowledge might not be required for it. However, I venture once more to draw attention to the point, in the hope that some entomologist may get tired of the butterflies and beetles, and turn to the study of Coccids.

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ART. II.—*Notes and Observations on New Zealand Birds.*

By Sir WALTER L. BULLER, K.C.M.G., F.R.S.

[*Read before the Wellington Philosophical Society, 9th September, 1891.*]

Plate XIV.

Platycercus unicolor. (The Antipodes Island Parrakeet.)

I have mentioned in "The Birds of New Zealand" (vol. i., pp. 148, 149) the interesting circumstance of the rediscovery of this lost species on Antipodes Island by Captain Fairchild, half a century after the type specimen had been placed on the shelves of the British Museum. On the last visit of the "Hinemoa" to the same island, the crew obtained a number of them, which were brought to New Zealand alive. They bear confinement well, and soon become tame and tractable. The male bird has a conspicuously larger bill than the female. The irides are cherry-brown in colour, and the feet are dull-grey.

On Antipodes Island these birds were found frequenting the grass tussocks, and were easily run down and caught by the hand or by means of a neck-snare.

Sir James Hector records his belief (*l.c.*, p. 149) that this Parrakeet resembles a Kakapo, being "a ground Parrakeet, which flies feebly, does not care to perch, climbs with its beak and feet, and walks in the same waddle-and-intoed