ART. XXXVII.—*Further Notes on New Zealand* Coccidæ.

By W. M. MASKELL.

Plate VII.

[*Read before the Philosophical Institute of Canterbury, 5th June,* 1879.]

I HAVE a few new species of Coccidæ to describe; but I must first correct some errors in my former paper.*

I included last year amongst the Coccidæ some insects, to which I gave the names of *Asterochiton* and *Powellia*. Further investigation has shown me that these have to be eliminated. The Order Homoptera is divided into three Classes, distinguished by the number of joints of the tarsus :—1st, the Trimera, including the Aphidæ; 2nd, the Dimera, including Psyllidæ and Aleyrodidæ; and 3rd, the Monomera, or Coccidæ. In some of their stages, the 2nd and 3rd Classes much resemble each other, and my error of last year was caused in a great measure from the fact that the specimens examined presented monomerous tarsi. I have, however, since been fortunate enough to procure a more complete series of these insects, and must now relegate both of them to the Dimerous Homoptera, family Aleyrodidæ. This family is perhaps more anomalous than the Coccidæ, inasmuch as *Aleyrodes* in its earlier stages is scarcely distinguishable from *Lecanium*, but in the adult form widely diverges. In my *Asterochiton*, for instance, only the closest inspection will detect the difference; whilst in *Powellia* the double claw alone (except in the last stage) renders it certainly not a Coccid. However, there is now no doubt, for the adult insects which I have collected have 2-jointed tarsi, double claws, and four broad floury wings,—characters peculiar to Aleyrodidæ. I have no means at present of distinguishing between my *Powellia* or *Asterochiton* and the European species of the family. In the absence of evidence, I leave the names as they are, eliminating the insects from the Coccidæ.

I may remark on the extreme closeness with which the families of the Homoptera run, as it were, one into another. The gradation from *Lecanium* to the earlier stages of *Aleyrodes* is imperceptible; *Aleyrodes* has many features closely resembling *Psylla;* and *Psylla* is linked intimately with *Aphis*. On the young shoots of *Eucalyptus* there is, as I said last year, an insect much resembling in some features my *Powellia*, and this is, I believe, a *Psylla*.

My specimens of *Powellia vitreo-radiata* were from *Discaria* and *Pittosporum*. I have found, on *Olearia ilicifolia*, another species, wanting the long glassy fringe of the earlier stage, and having, instead, a row of lanceolate spines. I would call this species *P. doryphora*.

* Trans. N.Z. Inst., Vol. XI., Art, XVI.

I have also one or two slight errors to correct as to the Coccidæ. In *Ctenochiton spinosus* the upper digitules are not, as I stated, short; they are long, fine, knobbed hairs. In *Acanthococcus multispinus* and in *Dactylopius glaucus* the lower digitules are broad, as in *Lecanium*.

Further, the insect described by me last year under the name *Diaspis gigas*, is not, as I think now, a *Diaspis*, but belongs to the genus *Fiorinia*, Targioni-Tozzetti, where the pellicle of the second stage almost fills the puparium. I, therefore, as the insect appears to be new, name it *Fiorinia asteliæ*.

Before proceeding to describe the new species which I have obtained, I may mention that *Lecanium hesperidum* seems to be doing less damage—about Christchurch at least—than formerly. Many of the plants and hedges which I have seen nearly destroyed by this insect, are now in much better condition. In Europe and elsewhere the ravages of this insect appear to have been intermittent, and there is no reason why the same should not be the case here. Possibly the dry seasons which we have been suffering under lately may have something to do with this.

Mytilaspis pomorum, on the other hand, is increasing in numbers and destructiveness. I know of scarcely a fruit tree in our orchards (except the cherry) which is not every year being more and more covered with this scale; and the quickset hedges are as much troubled with it as with the saw-fly larva in autumn. Minute as the apple-scale is, its immense numbers must seriously weaken and damage the trees; and I recommend owners of orchards to employ the remedy suggested in my former paper, namely, to paint over their trees in winter with a mixture of two-thirds linseed oil to one-third kerosene. This has, to my knowledge, succeeded admirably in instances where it has been tried, as the oil insinuates itself between the bark of the tree and the puparium of the insect, and so envelopes the eggs and the young that they cannot get out, and so die. Care should, however, I believe, be taken to perform this work only at the dead of winter, when the sap is not rising, and when the tree is, so to speak, asleep.

I proceed now to the description of my new species.

1. *Mytilaspis phymatodidis*, sp. nov.

Plate VII., fig. 1, abdomen.

General appearance resembling *M. pomorum*, but the puparium is broader, as in *M. pyriformis*. The abdomen ends with a deepish median depression, as in *Diaspis rosæ*. There are several scaly processes on the terminal lobes, and a good many spiny hairs on the sides of the body. The usual five groups of spinnerets, and many single ones scattered on corrugations of the body.

I have not seen the male.

My specimens were on a fern, *Phymatodes billardieri*, from Wellington.

2. *Mytilaspis metrosideri*, sp. nov.

Plate VII., fig. 2, abdomen of female.

Puparium white, pyriform. Female in all stages dark-coloured; in last stage nearly black. General outline resembling *M. drimydis*, but the abdomen is much sharper and more pointed, with a finely-serrated edge, ending in three minute-pointed lobes joined by a scaly process. Spinnerets in an almost continuous arch, which may be resolved into five groups; 70 or 80 openings; several single spinnerets. The rudimentary antennæ can be made out.

The young female has an elongated oval outline, little corrugated. The feet, digitules, antennæ, etc., resemble those of *M. pomorum*. The abdomen is like that of the adult, without the groups of spinnerets.

I have not the male of this species.

My specimens are from the *rata* tree.

3. POLIASPIS, gen. nov.

This genus is characterized by having the spinnerets in more than five groups, and in a double row, the edge of the abdomen as in *Diaspis*.

Signoret forms a genus, *Leucaspis*, which possesses the same character; but it has also a fringe of spiny hairs set close together round the edge of the abdomen, which fringe is absent in *Poliaspis*.

Poliaspis media, sp. nov.

Plate VII., figs. 3–5.

The puparium is white, broad. The adult female, which may reach $\frac{1}{24}$ inch in length, resembles in outline *Mytilaspis pomorum:* it is usually greenish-white, and shows the rudimentary antennæ. The abdominal extremity is much jagged, with a median depression as in *Diaspis rosæ*, and with a few scattered hairs. There are eight groups of spinnerets; four, containing each from twenty to thirty orifices, are placed in opposite pairs, the fifth, with four to six orifices, being between the upper pair; above these, three other groups form an arch, the two outer ones having eight to ten openings, the middle one three to five. Many single spinnerets follow the corrugations of the body as in *Mytilaspis cordylinidis*.

The male insect is of a bright scarlet or deep orange colour. The antennæ, covered with longish hairs, have ten joints; the first two very short and thick; the next five long, equal and cylindrical; the eighth and ninth somewhat shorter; the tenth fusiform and as long as the seventh. The legs are rather long; the femur thick, the tibia more slender, broadening towards the tarsus, which is about one-third as long as the tibia, and narrows sharply down to the claws. Both tarsus and tibia are hairy. The

digitules are only long fine hairs ending in minute knobs. The thoracic band occupies about half the width of the body. The abdominal spike is long and, as usual, hairy. There is indeed not much difference in the males of most species of the Diaspidæ. The male of *Poliaspis* is not greatly unlike that of *Aspidiotus epidendri*, or of *Diaspis gigas*.

Poliaspis media, which I have from a *Veronica* and from *Leucopogon fraseri*, is the species alluded to in my former paper,* and which I had not then sufficiently examined.

4. Cœlostoma, gen. nov. (?).

The insects which I have just described belong to the group Diaspidæ; my next belongs to the group Coccidæ, subsection Monophlebidæ.

In my former paper I mentioned, as characteristic of the group Coccidæ, a bi- or tri-articulate mentum, and in the synopsis attached to this paper I give, as a characteristic of the Monophlebidæ, antennæ of eleven joints, a number found in no other subsection of the group. The genus *Cœlostoma* possesses this last character, but it presents the unusual feature of having a mouth formed of only a hollow opening, without any mentum, rostrum, or buccal setæ.

There is a subsection of the group Coccidæ known as "*Porphyrophora*," Brandt (*Porph. polonica* used to be much employed in Europe as a dye), where not only the rostrum and setæ are absent, but there is absolutely in the adult female no trace of a mouth at all! In what manner *Porphyrophora* contrives to extract its nourishment from the plants it lives on I do not know. The *males* of all Coccidæ are destitute of mouths, and it may be presumed that their office is merely to impregnate the females. But how these latter, if mouthless, are enabled to live and grow fat during the period of gestation is not clearly intelligible. But as *Cœlostoma* possesses, at any rate, an œsophagal opening, I must include it amongst the Monophlebidæ; looking on it as perhaps an intermediate genus between *Monophlebus* and *Pophyrophora*.

The characters of this genus are, therefore, antennæ of eleven joints in the adult female, anal tubercles wanting or indistinguishable, an entire absence of mentum, rostrum, or buccal setæ, but retention of an œsophagal opening.

Cœlostoma zealandicum, sp. nov. (?)

Pl. VII., figs. 6–13.

The adult female, figs. 6, 7, is brick-red in colour, reaching ½-inch in length, and rather more than ¼-inch in breadth at the widest part, which is toward the abdominal end. It is fat, corrugated, slug-like: there are eleven or twelve corrugations, those toward the head being the widest. It is sur-

* Trans., Vol. XI., p. 203.

rounded by a thick envelope of white cotton, in which it deposits the eggs, which are oval and brick-red in colour.

The antennæ, fig. 9, spring from the lower side of the head and point downward; they have eleven joints, tapering from the root to the tip. They are all pretty nearly equal in length, but the fifth may be the shortest; the last joint is rounded. All the joints have several longish hairs, those on the last including some longer and thicker than the others.

The anterior pair of feet are placed somewhat forward, near the base of the antennæ, and the next two pairs are not widely separated from them, so that the abdominal region is equal in length to, if not somewhat longer than, the thoracic and cephalic portion. The legs, fig. 8, are black, rather short. The coxa is broad, the femur thick and strong, the tibia more slender, but thickened at the end toward the tarsus. This last is about half as long as the tibia, and tapers to the claw. I saw no digitules, but there is a short stiff bristle at each side of the root of the claw. Each joint of the legs has some hairs; the tibia and tarsus have each, on their inner edge, a fringe of strong hairs. The trochanters are excessively developed and bear a few hairs, of which one is very much longer than the rest.

As I have stated, there is no trace of a rostrum, mentum, or buccal setæ, and the only sign of a mouth which I can detect is a minute orifice situate in a deep depression between the second pair of legs. Indeed, it is not without difficulty that one can discover any sign of a mouth. After maceration in potash and pressure on a glass slide I have noticed a ring surrounding this orifice of somewhat thicker substance than the rest of the skin, and I observed that all round there seemed to be converging masses of muscular tissue; it may be that these, in the act of feeding, are protruded, so as to press the orifice as a sucker on the plant, being withdrawn again at will.

The eyes are very minute, and are so placed in small hollows just behind the base of the antennæ that it is not easy to discover them. They are tubercular, slightly protruding, and appear to show a central orifice. They are not, I believe, facetted.

There are no anal tubercles, as in the Coccidæ proper, and the anus is only an oval opening in the last fold of the body without any ring or long hairs. In the interior of the abdomen, near the anal orifice, is found a small organ which I take to be the oviduct, consisting apparently of a double tube, fig. 10; a ring of recurved spines surrounds the end of each portion, and at the tip are some long hairs. In one specimen also, I have found what I suppose to be the ovary, a long elliptical sac on a stem which extends toward the base of the oviduct, and seemingly full of eggs.

The body generally is flat underneath, rounded above; the corrugations generally smooth, but in some places there appear hard protruding lumps

or callosities as of some exuded substance. The skin, as shown in fig. 10, is covered with minute hairs interspersed irregularly with circular spinnerets. The spiracles appear to be round, as in *Lecanium*; the tracheæ are very large; there are no spiracular spines.

The eggs, as stated above, are brick-red in colour, oval in shape; and I was fortunate enough to hatch out a number of the young insects. These, as shown in fig. 11, have generally the shape of the adult, and are of the same colour. The antennæ, fig. 12, have six joints, of which the last is the largest; on this are several strong hairs. The eyes resemble those of the adult; as also the legs, generally; but these latter, fig. 13, are somewhat longer, and there is no fringe on the internal edge of the tibiæ and tarsus. The trochanter shows the same long hair, but instead of the bristles at the claw there are two long fine knobbed digitules. The rostrum and mentum are prominent and well defined; the latter seems to be bi-articulate; and the setæ are very long and strong (I can only make out three). The skin is covered with circular spinnerets and minute hairs, and the spinnerets are most numerous at the end of the abdomen, where also are two long hairs. The anal orifice seems to be encircled by a folded ring. Length of the young insect, about $\frac{1}{24}$ inch.

In the second stage of its existence the insect does not generally differ from its later form, but the antennæ have only nine instead of eleven joints, and the fringe of strong hairs on the inner edge of the tibia and tarsus is much less developed.

It will be seen that the antennæ follow the same gradation as in the genus *Icerya* (described by me last year), increasing from six to nine, and lastly to eleven joints.

It remains to decide the affinities of this insect. I have put notes of interrogation at the head of this description because I cannot be quite certain that *Cœlostoma* is new. The whole group of the Monophlebidæ requires, I think, more investigation. Most of the species are tropical, or at least, found in out-of-the-way places, and the facilities for examination and description have been by no means great. In one genus of the group, *viz.*, *Monophlebus*, I believe that the females have never been described, and, as I have not the male of *Cœlostoma*, I cannot distinguish it from *Monophlebus*, with this exception,—that I cannot find that *Monophlebus* is destitute of a rostrum. In fact, *Cœlostoma* possesses the characters, as far as I am aware, of most genera of the group. The young insect resembles *Callipappus;* the trochanters of the adult female are like *Porphyrophora;* the callosities of the body resemble *Drosicha*. But it differs from all, and unless it is the female of *Monophlebus*, it must be a new genus; but the frequency of the males of *Monophlebus* elsewhere, and their rarity here,

would seem to eliminate that also. Under the circumstances, especially in view of the curious mouth of the insect, I shall consider it, for the present, as new.

My specimens are partly from Otago, partly from Canterbury. Those from Otago were given to me by Professor Hutton, who informs me that the insect is found there on the bark of large trees. Those from Canterbury I found buried in the ground and in the chinks of rocks, by the Sumner Road, Lyttelton, interspersed with another curious Coccid, feeding on *Muhlenbeckia*, a creeping-plant growing thereabouts. The difference of habitat is, I think, not a little curious.

Since writing the foregoing, I have found some specimens of the male of *Cœlostoma*, which have set at rest any doubts as to its identity. Taken in conjunction with the peculiar mouth of the female, the characters of the male make it impossible to consider the species otherwise than as new. It cannot be *Monophlebus*, as it wants the curiously protruding lobes or tassels attached to the segments of the abdomen; and it agrees with no other genus of the Monophlebidæ.

The male is somewhat large, about $\frac{1}{5}$ inch in length, and nearly $\frac{1}{2}$ inch from tip to tip of the wings when expanded; red or purplish in colour, with a strong red nervure along the anterior edge of the wings, which have also a bluish purple tinge all over. The eyes are large, prominent, and numerously facetted, a character of the Monophlebidæ. The antennæ have ten joints; the two first short and thick, the remainder long and thin, somewhat diminishing to the extremity; each joint with many long hairs, but no distinct nodosities as in *Leachia* (Signoret). The feet are long with a somewhat large trochanter; femur, tibia, and tarsus not thick, the tibia has a dilation at the extremity next the tarsus; both tibia and tarsus have a fringe, on their internal edge, of strong spines (as in the female) also several hairs. Claw long and thin, one pair of digitules which are only long fine hairs; on the trochanter, as in the female, is one hair much longer than the rest. From the term "Monophlebidæ" there should be only one nervure in the wings, but, as M. Signoret remarks, this is a doubtful character; in *Cœlostoma* the nervure appears to me to branch twice at least. The abdomen is corrugated, and on each corrugation are many short fine hairs interspersed with small circular marks; but there is no fringe as in *Callipappus*, Guérin. The sheath of the penis has the form of double oval valves; the penis itself protrudes as in *Callipappus* (and in some *Dactylopii*) as a semi-transparent, soft, white tube several times folded, covered with minute hairs pointing backwards. There is a minute haltere of peculiar shape (like *Porphyrophora*), but, I think, without a seta.

I have no doubt, after examination of the male together with the characters of the female given above, that *Cœlostoma* agrees with none of the

known and described species of the Monophlebidæ, and must be therefore new.

5. Eriococcus, Targioni-Tozzetti.

I described this genus last year, having then one species of it. Since then I have found another, to which I give the name of

Eriococcus hoheriæ, sp. nov.

Plate VII., figs. 14–20.

The sac is, as usual, white and cottony, but for a great part of the year is covered with the black fungus so commonly accompanying Coccidæ, so that it looks only like a small gall or excrescence on the bark. About midsummer, individuals may be found which are completing or have just completed their ovisac, which then shows white in the crevices of the bark. Many such sacs are usually clustered together.

The eggs are very minute, oval, red.

The young insect (fig. 14) is about $\frac{1}{50}$ inch long, red in colour, corrugated, tapering from the cephalic to the abdominal extremity, where it ends in two anal tubercles, each bearing a long seta and some hairs. Antennæ (fig. 15) of six joints, all nearly equal, with a few hairs, mostly on the last joint. Foot (fig. 16) with tarsus a little longer than the tibia; digitules all fine hairs, the upper pair rather long, the lower pair about equalling the claw.

The adult female (fig. 17) is red in colour, about $\frac{1}{30}$ inch in length, generally resembling in shape the young insect, and ending in anal tubercles with setæ. Antenna (fig. 18) of six joints, somewhat shorter than in the young. Foot (fig. 19) apparently atrophied; the tibia is very short, and the femur has a swollen appearance; the digitules are short fine hairs. The anal tubercles (fig. 20) seem at first sight only two; but after maceration in potash are found to be four, of which two bear long setæ. All have spiny hairs, and between them is the anal ring with, I think, eight hairs. Eyes very small, black.

There are some scattered minute hairs on the body, and a number of very small round spinnerets. On the last corrugations, just above the anal tubercles, these spinnerets increase greatly in number and size, and are intermixed with spiny hairs (fig. 20).

This insect, from the bark of *Hoheria*, on the hills above Lyttelton, is, I think, new. The genus *Eriococcus* is not much removed from *Acanthococcus*, Signoret; and the species of both are somewhat confused. Last year I described, under the names of *A. multispinus* and *E. araucariæ*, insects which seemed to me to differ from European species; and so, now, *E. hoheriæ* differs, I believe, from *E. thymi*, Signoret; but it requires some close investigation to distinguish between them; still, the European species has broad digitules, and a small tubercle at the base of the antenna, which I do not find in my specimens from Lyttelton.

I may conclude this paper with a synoptical list of New Zealand Coccidæ as far as I have described them as yet; excluding all those species, chiefly European, which abound in our gardens and greenhouses, with the exception of *Mytilaspis pomorum*, *Lecanium hesperidum*, and one or two other representative species.

ORDER—HOMOPTERA.
CLASS—MONOMERA.
Family—**Coccidæ.**

Group I.—DIASPIDÆ.

Insects enclosed in, or covered by, a test or puparium, composed partly of discarded pellicles of earlier stages, partly of secreted fibres; females, apodous in later stages.

1. *Mytilaspis.*

Puparium elongated; discarded pellicles at one end; not more than 5 groups of spinnerets.

a. *M. pomorum*	... ...	European.
b. *M. pyriformis*	... ...	New Zealand.
c. *M. cordylinidis*	... ...	New Zealand.
d. *M. drimydis*	... ...	New Zealand.
e. *M. phymatodidis*	... ...	New Zealand.
f *M. metrosideri*	... ...	New Zealand.

2. *Poliaspis.*

Puparium elongated; discarded pellicles at end; more than 5 groups of spinnerets.

a. *P. media*	... ...	New Zealand.

3. *Aspidiotus.*

Puparium round; discarded pellicles in the centre; not more than 4 groups of spinnerets.

a. *A. epidendri*	... ...	European.
b. *A. atherospermæ*	... ...	New Zealand.
c. *A. dysoxyli*	... ...	New Zealand.
d. *A. aurantii*	... ...	N.Z. and Australia.

4. *Diaspis.*

Puparium, round or oval; discarded pellicles at one side; not more than five groups of spinnerets.

a. *D. rosæ*	... ...	European.

5. *Fiorinia.*

Puparium, oval or elongated; pellicle of second stage nearly filling the puparium.

a. *Fiorinia asteliæ**	... ...	New Zealand.

* Described in Transactions, Vol. XI., p. 201, under the name *Diaspis gigas*.

Group II.—Lecanidæ.

Females retaining feet and antennæ; abdomen cleft at extremity, with two protruding lobes; antennæ generally with seven joints.

Subsection 1.—*Lecanium.*

Females naked; often vivaparous.

a. *L. hesperidum* ... ... European.

Subsection 2.—*Pulvinaria.*

Females naked; forming cocoons for eggs.

a. *P. camellicola* ... ... European.

Subsection 3.—*Lecanio-diaspidæ.*

Females covered by test, waxy or glassy, usually fringed; generally in last stage female shrivelling up at one end of the test.

a. *Ctenochiton perforatus* ... ... New Zealand.
b. *Ctenochiton viridis* ... ... New Zealand.
c. *Ctenochiton spinosus* ... ... New Zealand.
d. *Ctenochiton elongatus* ... ... New Zealand.
e. *Inglisia patella* ... ... New Zealand.

Group III.—Coccidæ.

Females naked, or covered with secretion of cottony fibres or meal; mentum, bi- or tri-articulate; abdomen ending in more or less conspicuous anal tubercles.

Subsection 1.—*Coccidæ.*

Antennæ of not more than eight joints.

a. *Acanthococcus multispinus* ... New Zealand.
b. *Eriococcus araucariæ* ... ... New Zealand.
c. *Eriococcus hoheriæ* ... ... New Zealand.
d. *Dactylopius calceolariæ* ... ... New Zealand.
e. *Dactylopius glaucus* ... ... New Zealand.
f. *Dactylopius poæ* ... ... New Zealand.

Subsection 2.—*Monophlebidæ.*

Antennæ of eleven joints.

a. *Icerya purchasi* ... ... New Zealand.
b. *Cœlostoma zælandicum* ... ... New Zealand.

To the above I may add the following insects, connected in my papers with the Coccidæ :—

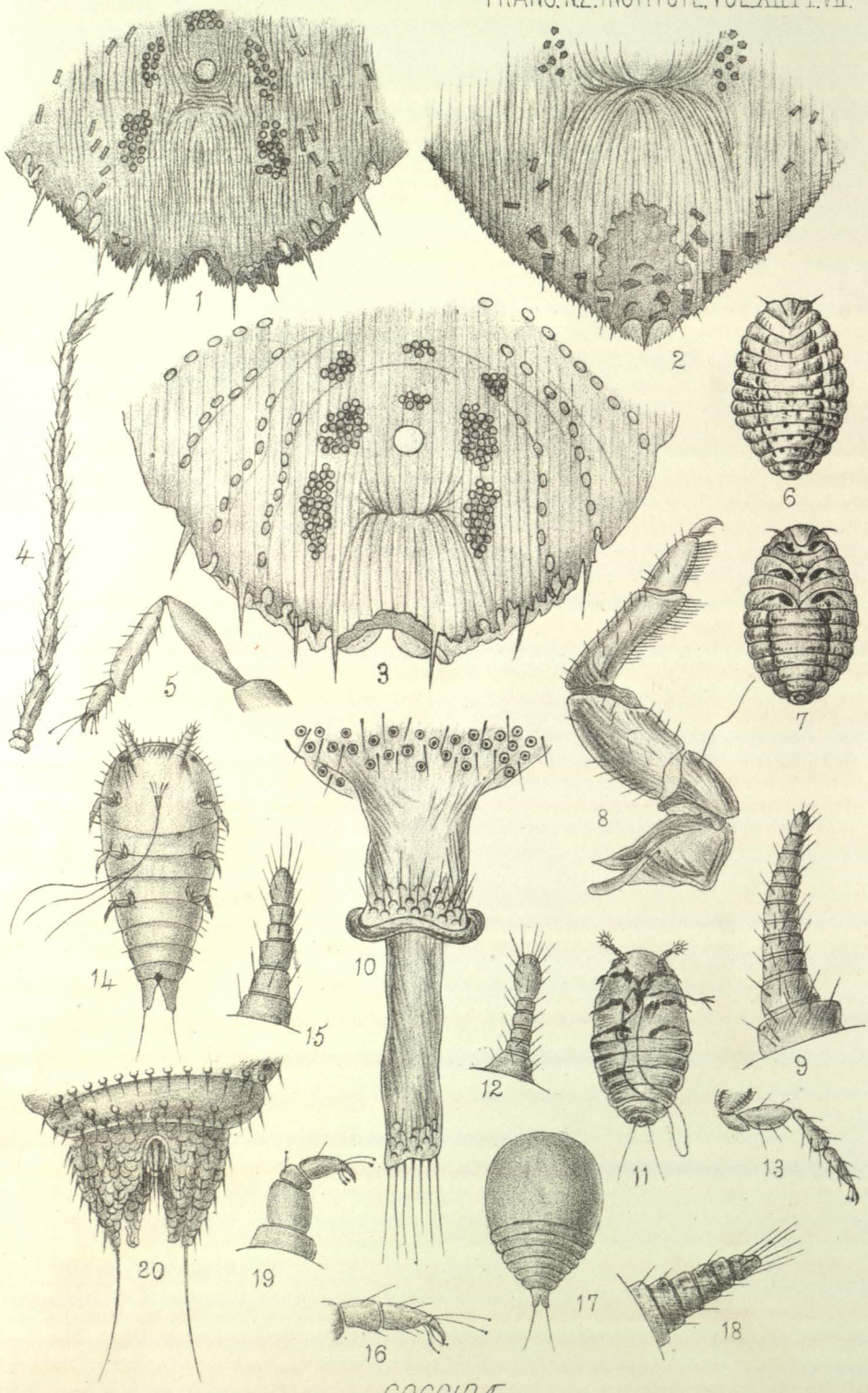
ORDER—HOMOPTERA.

CLASS—DIMERA.

Family—**Aleyrodidæ.**

Aleyrodes.

Four wings, covered with white meal, in both sexes; antennæ with six joints; tarsus two-jointed.



COCCIDÆ.

W. M. Maskell, del. J.B. lith.

a.	*Asterochiton lecanioides* ...	...	New Zealand.
b.	*Asterochiton aureus* ...	...	New Zealand.
c.	*Powellia vitreo-radiata* ...	...	New Zealand.
d.	*Powellia doryphora* ...	...	New Zealand.

I have also three species of Hymenopterous insects parasitic on Homoptera, and belonging, as I think, to the genera *Diapria* and *Coccophagus*.

DESCRIPTION OF PLATE VII.

Mytilaspis phymatodidis.

Fig. 1. Abdomen of female, magn. 200 diams.

Mytilaspis metrosideri.

2. Abdomen of female, magn. 200 diams.

Poliaspis media.

3. Abdomen of female, magn. 200 diams.
4. Antenna of male, magn. 100 diams.
5. Foot of male, magn. 100 diams.

Cœlostoma zealandicum.

6. Female, upper-side, magn. 2 diams.
7. Female, under-side, magn. 2 diams.
8. Female, foot, after treatment with potash, magn. 25 diams.
9. Female, antenna, after treatment with potash, magn. 25 diams.
10. Female, ovipositor, magn. 200 diams.
11. Young insect, magn. 25 diams.
12. Antenna of young insect, magn. 60 diams.
13. Leg of young insect, magn. 60 diams.

Eriococcus hoheriæ.

14. Young insect, magn. 60 diams.
15. Antenna of young insect, magn. 200 diams.
16. Foot of young insect, magn. 200 diams.
17. Female, magn. 25 diams.
18. Antenna of female, magn. 200 diams.
19. Foot of female, magn. 200 diams.
20. Anal tubercles of female, magn. 90 diams.

ART. XXXVIII.—*On* Melicerta ringens *and* Plumatella repens

By A. HAMILTON.

[*Read before the Wellington Philosophical Society, 22nd November*, 1879.]

HAVING recently (September, 1879) had occasion to gather a few specimens of *Myriophyllum* from a swamp in the Petane valley, near Napier, I came across several interesting organisms, which I propose bringing under your