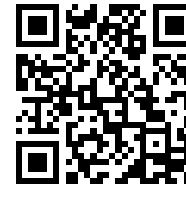

Forest insects

Claude Fuller

DATE DUE

DEC 16 1971			

DEPARTMENT OF AGRICULTURE,

SYDNEY, NEW SOUTH WALES.

FOREST INSECTS.

Some Gall-making Coccids:

BY

CLAUDE FULLER.

SYDNEY: CHARLES POTTER, GOVERNMENT PRINTER, PHILLIP STREET.

1896.

11b 179—95-6

From Agricultural Gazette of N. S. Wales.

April, 1896.

Forest Insects.

Some Gall-making Coccids.

By CLAUDE FULLER.

The *Coccididæ* are better known by such popular terms as Scale-insects Bark-lice, and Mealy-bugs. They are classified by entomologists under the great order *Hemiptera*, the members of which are easily distinguished from other insects by their beak-like mouths. On account of this peculiar formation of the mouth, they are essentially suctorial in their habits, nourishing themselves upon the juices of plants and animals.

The order is divided into two distinct divisions—the *Heteroptera*, which includes the true bugs, and the *Homoptera*, which embraces *Cicadidæ*, Aphides, and Scale-insects. The differences between these two sections are well-defined. The true bugs have the beak springing from the front of the head, and the upper or first pair of wings are one-half thick and the other half thin—that is, the basal half is thick and leathery, whilst the tips, which overlap each other, are thin and membranous. In the *Homoptera* the beak grows underneath and from the hinder part of the head, the wings differing in being of the same consistency throughout, and usually carried in a sloping position against the side of the insect's body.

The family *Coccididæ* is in itself regarded as an anomalous group, its members departing widely from the original type of the order. It is not, therefore, surprising that in such a land of anomalies as Australia the greatest irregularities are found to exist. Such an irregularity is the genus *Brachyscelis*, the members of which live exclusively upon trees and shrubs of the order *Eucalyptus*. These insects cause woody-galls of many interesting shapes to grow upon the tree, in the heart of which they live; in the case of the females till death, and of the males until the adult stage is reached.

The popular name "Gall-maker," as with the terms Scale-insect and Mealy-bug, has its origin in the external character exhibited by the insects, but the gall-growth differs from the "meal" of the Mealy-bug and the "scale" of the Bark-louse, insomuch that it is brought into existence at the actual and direct expense of the tissue of the plants, whilst the scales and meal are products of the animals themselves being secreted through pores or openings in the body.

The Male Insect.

Upon issuing from the gall, in which it has undergone its transformations, the male resembles a fly having two white wings. It has very long antennæ and legs, which give it quite a spidery appearance. The antennæ are hairy, and consist of about ten joints; the basal joints are short, and, with the exception of the terminal, the others are rather long and constricted. The legs are hairy, and bear several spines, a pair of distinct upper digitules, and are furnished with simple claws. The abdomen is long and cylindrical, the

last segment bearing two lengthy, cottony filaments, and terminated with a stout style, which is the external organ of reproduction. The males of the different species, as far as observed, are somewhat similar in appearance and size. The general colour is a light brownish-yellow, which contrasts strongly with the prominent dark eyes.

The Female Insect.

The colour of the adult female is either brown or yellow, and in the earlier stages white. In shape it has a striking resemblance to the school-boys battered peg-top; it is soft and much wrinkled, the abdomen more or less incised. The head and prothorax appear as one segment; supporting the mouth, antennæ and first pair of legs; upon the ventral surface, and separating the anterior portion from the meso-thorax is a deep transverse curved furrow, forming a distinct chin below the mouth. This "facial" furrow is an arc of different dimensions in the various species, being more acute in some than others. Below the furrow, and between the intermediate pair of legs, is a deep depression generally transverse and oblong, sometimes square or constricted, and at times obconical; the depression always shallows up into the facial furrow.

The abdomen is conical and tapers more or less acutely, the last three or four segments being of a hard horny character; the posterior margins of all but the last segment usually bearing dorsally an irregular row of conical thorn-like spines. The last segment carries two apparently tubular appendages which give it a cleft appearance; in some instances these "points" are themselves bifid, terminating in two distinctly tubular organs which may yet be found to perform similar functions as the honey-dew producing organs of the *Lecanids*. The antennæ and six legs are almost rudimentary; the mouth-parts comparatively small but no doubt capable of use. The softer portion of the body is covered with hairy tubular spines and peculiar spinnerets which, in some species, have the appearance of rings of minute circles enclosed by simple concentric rings. The insect is coated with a secretion of powdery white meal.

The Larvæ.

The larvæ of all the *Brachysceles* are very similar in appearance, and afford no sufficient characteristics for the determination of species. They are active, of a bright yellow colour, flat and elliptical in shape; the legs are long and well developed, bearing several spines and a pair of digitules; the antennæ are slightly hairy, about seven joints; the eyes are a brownish-red and large, the edge of the body surrounded with a fringe of stout alate spines; the "wings" of the spines are thin and transparent, and soon become broken off.

Shrader* and Froggatt† both speak of these insects as "digging" or "mining," but this is obviously an error. How can insects with suctorial mouths, and legs unformed for such purposes, either "dig" or "mine"?

Galls of the Male Coccid.

These are invariably short cylindrical tubes, two to six lines in length, generally growing upon the leaves; they are mostly of a purple-claret colour, but often brown or green. Some are simple tubes with a notched rim at the summit, others have the rim dilated forming a saucer-like top. The male gall

* Proc. Ento. Soc., N.S.W., pp. 4, 5. Vol. I (1866).
† Trans. Linn. Soc., N.S.W., p. 356. Vol. VII, 2nd Series (1892).

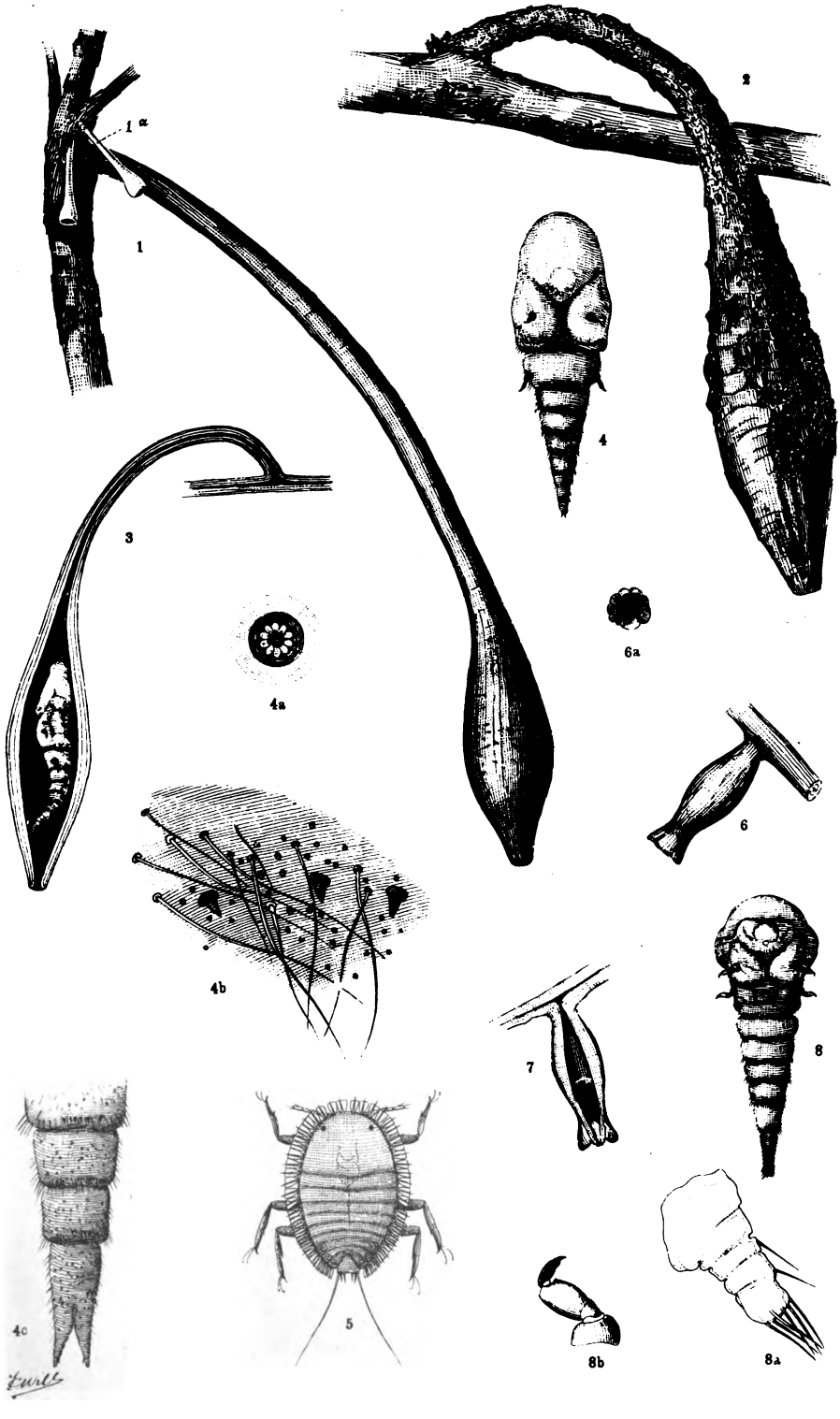

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Plate I.

of *B. rugosa*, Froggatt, is emerald green, cylindrical, constricted at the base stout with thick soft walls, the apex truncate; length, four lines; breadth, one line. In several species these male galls grow upon the female gall; *B. Munita*, Shrader, has the males separate and springing from the horns; in *B. phratrata*, Shr., *B. Thorntoni*, Frogg., and *B. nux*, they are congregated together in a cup-like growth. This growth expands like a flower, and is, I am afraid, rather inaptly described by Shrader as a cockscomb, and as a mushroom-like growth by Froggatt. There is generally only one cup-growth attached to a female gall, but *B. nux*, as a rule, has two, and often three. They are attached at one side of the summit of the female gall, which they often exceed several times in size.

The Female Galls

Exhibit a great variety of forms, which are the easiest means of distinguishing the different species, varying in size from one-half to six or seven inches in length. In the shape there is as great a variety as in the size; many of them resemble cone-like fruits, others nuts and fruits, whilst the lateral growths of *B. duplex* are not unlike leaves. Occasionally growing on stalks, they more often sit close upon either the twigs, branches, or leaves, from which they spring.

The Formation of Galls.

The number of various gall-making insects which have the remarkable power of diverting the forces of nature, as represented in the growth of a plant, to their own advantage, has given rise to a deal of speculation and experiment to discover the inherent element or property possessed by the insect by means of which it operates. Up to the present we can go no further than to say that the galls are due to an irritation set up by the insect, yet each individual species must have some peculiar properties or how would we find such wildly differing results when in their initial stages the producers are as alike as the two proverbial peas. Mr. Tepper asserts that the larvæ always select an embryo-bud, and by the context he evidently wishes an undeveloped but true bud to be understood. This is, however, not the case; it may hold good in some instances, but certainly not in all. Whether upon stem or leaves the gall-growth originates from the cambium ring; the developmental activity of the cells is released by the insect, and a shoot forms over the growth of which the animal maintains direction. This is proved by the cessation of growth when the coccus, in a young stage, is killed by parasites.

The rudimentary gall, according to Dr. Adler,* draws its nourishment from the surrounding tissue; later on, however, processes are driven into the gall from the spiral vessels of the cambium ring which form a new element to assist in its development, and it thus becomes an independent structure, having individual powers which regulate its shape, position, &c. These remarks, whilst referring to galls formed by wasps, apply equally to coccid galls.

Previous Notices on Brachysceles.

The first notice of the genus appeared in Vol. I of the Trans. Ento. Soc. N.S.W., in which several descriptions are published by Mr. H. Shrader, of Sydney. A similar paper from the same author appeared shortly afterwards

* Alternating Generations: A Study of Oak Galls and Gall Flies, by Hermann Adler, M.D. Translated and edited by Chas. R. Stratton, F.E.S., &c., Oxford, 1894.

in a German publication.* Mr. Shrader formed the genus and named it *Brachyscelis.* The second account, from the pen of Mr. W. W. Froggatt, of the Sydney Technical Museum, appeared in Vols. VII and VIII (2nd series) of the Trans. Linn Soc. N.S.W. Mr. Froggatt publishes nine new species of *Brachysceles*, and also several descriptions of insects belonging to Shrader's allied genera, *Opisthoscelis* and *Ascelis.*

An account of the genus, with descriptions of some gall-growths, appeared in Vol. XVII of the Proc. Royal Society of South Australia, by Mr. J. G. O. Tepper. The galls are classified according to the "direction of the axis of the gall." The classification is a distinct innovation, and may be intended to apply to galls and tumours formed upon plants by any insect agency. As far as the genus *Brachyscelis* is concerned, the direction of the axis of the gall is not constant enough to merit more than passing consideration. In his criticism of Mr. Tepper's paper, Mr. Froggatt† asserts that the growth named *regularis* is synonymous with *B. pedunculata; unalis* with *B. Shraderi*, and *strombylosa* with *B. crispa.* While not denying that the gall called *strombylosa* is similar, if not identical, with that formed and inhabited by the insect *B. crispa*, I cannot agree that the others are, as neither Teppers drawings or descriptions tally with the galls of *B. pedunculata* or *B. Shraderi.* Personally I regard it as decidedly wrong to name an insect without describing or perhaps even seeing it, and for that very reason refrain from specifically naming the maker of the pretty and interesting gall figured on plate III, figs. IV to VII.

The following descriptions which I have prepared are intended to assist in the classification of the insects from the characters of the tapering abdomen.

It is with extreme regret that I have to draw attention to the name bracketed after each species. The specific name of each insect was originally chosen by the late Mr. Olliff and myself, and, had my friend lived, the descriptions would have been published conjointly: his death deprives them of much genuine value. They are, however, presented as the result of careful and original work, and as a poor memorial of my late chief, at whose suggestion the work was taken in hand immediately prior to his sudden death.

Brachyscelis pedunculata, n. sp. (Olliff, M. S.), (Pl. I, figs. i to v), ♀ [see Note, p. 213] coccus (Pl. I, fig. iv), brownish yellow, four last abdominal segments and appendages deep brown; elongated, head and thorax somewhat cylindrical; abdomen tapering; last segment of the thorax separated by a deep incision from anterior portion; length, 12 lines; breadth, 3-4 lines across broadest part of thorax; clothed with numerous hairy, tubular spines, conspicuous upon the first four segments of the abdomen. Dorsally, and situated in a line upon the hinder margin of each abdominal segment except the last, are conical thorn-like spines. These are always greater in number upon the posterior segments, varying from two to four upon the first to from seven to ten upon the sixth. (Pl. I, fig. iv b, c). The last segment of the thorax occasionally bears two or three similar spines. The body-wall is punctured thickly with scattered, floriform spinnerets (Pl. I, fig. iv a), which, however, in the thicker abdominal portion appear as simple pin-hole orifices.

The "facial" furrow which divides the head and prothoracic segment from the meso-thorax is angular and deep, making the "chin" prominent. Median

* Verhandlungen der K.K. Koologische-botanischen Gesellschaft in Wien, Jahrg. 1863, p. 189. Taff iii.

† Trans. Roy. Soc. S. Aust., Vol. XVIII, p. 95 (1894).

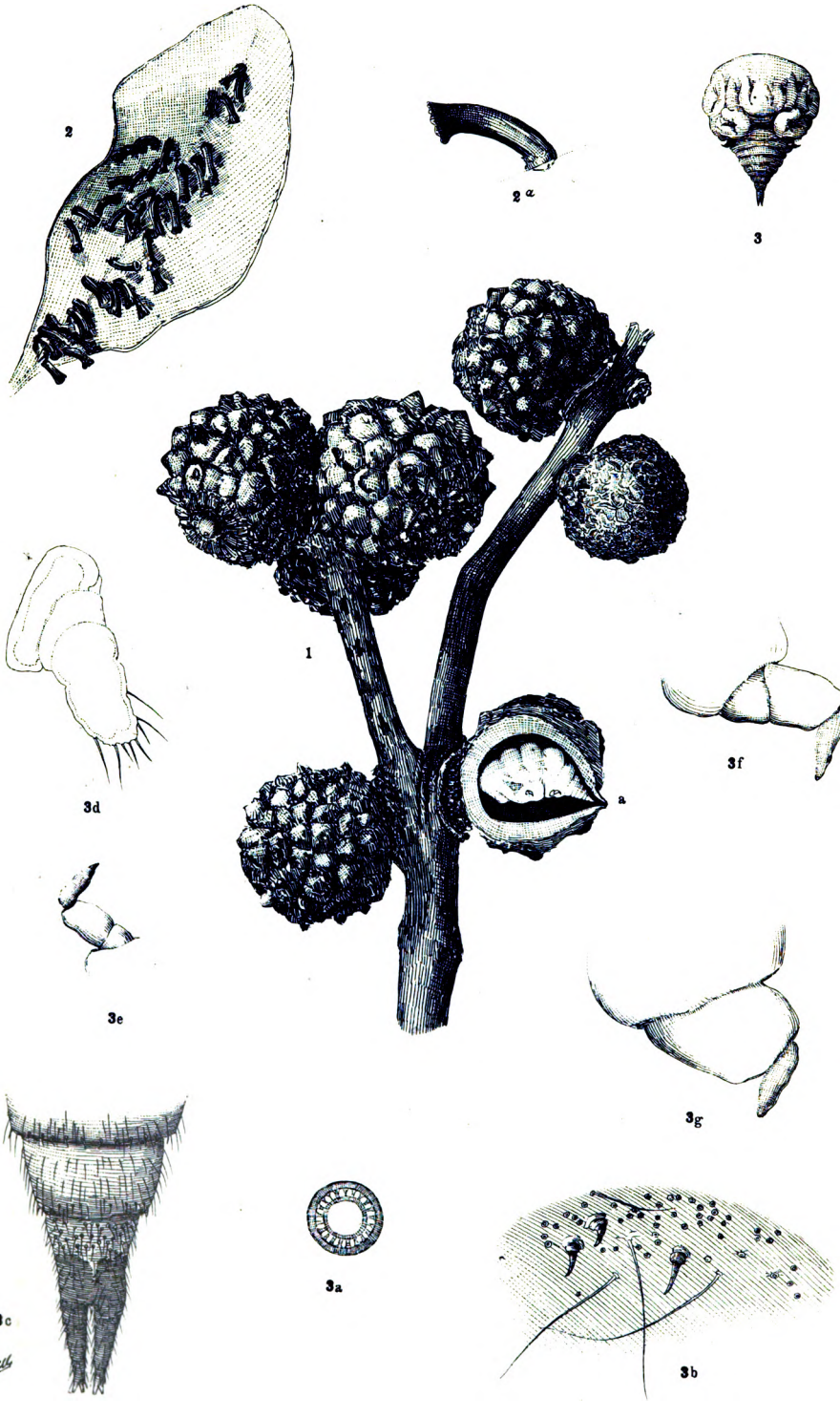

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Plate II.

depression of thorax obconical. The anal appendages (Pl. I, fig. iv c) are stout, and each bear three thorn-like spines, which appear fairly constant. One is situate above the extreme tip; the other two are close together, situated lateral of the juncture of appendage and segment. Occasionally there is a conical spine upon the inner edge of the appendages, but it is not a constant feature. Antennæ small, rudimentary, joints indistinct. Legs, anterior pair comparatively small, intermediate and anterior pair conspicuous colour, deep brown.

♀ gall (Pl. I, figs. i, ii, and iii), pendulous; elongated ellipsoidal; pedunculated, stalk generally curved; striated longitudinally; apex truncate; length, including stalk, 3 to 4 inches; greatest diameter, 5 to 6½ lines; colour, reddish-brown and green intermingled. Female chamber tubular, following external lines of the gall; a long fine tube can be traced through the stalk to the heart-wood of the supporting twig. Walls parallel, fibrous and thin, about 1 line in thickness, with a dark-brown papery lining internally.

♂ coccus, unobserved.

♂ gall, clavate, cylindrical; summit hollowed out; 6 to 8 lines long (Pl. I, fig. i a); only observed on twigs.

Larva bright golden yellow, margin obtusely crenulated, spines alate and well developed.

This gall has been obtained upon several varieties of eucalypts in the neighbourhood of Sydney. It is very symmetrical, the stalk being chiefly selected by inquilines as shown in fig. ii, Pl. I. Birds are apparently fond of the insects, as I have found many specimens torn open and the inhabitant gone.

B. pedunculata was once sent to the Department of Agriculture as an enemy to peach-trees; at any rate, the gall was said to have been obtained from such a tree. Our correspondent was asked to forward some twigs of the actual tree from which the gall was taken, and a neat bundle of peach-twigs was sent in return. The matter was, unfortunately, never settled satisfactorily.

Brachyscelis crispa, n. sp, (Olliff, M. S.), (Plate II, figs. i to iii g), ♀ coccus (Pl. II, fig. iii), light brownish-yellow, last two segments and appendages deep reddish-brown; globular, squat, abdomen tapering rapidly; length, 7 lines; breadth across thorax, 5 lines; clothed with hairy, tubular spines, which are plentiful and long upon the last three segments of the abdomen, and conspicuous upon the anal appendages. The body-wall punctuated with spinnerets, which, except under a high magnification, appear as broad, simple rings. (Pl. II, fig. iii a). The posterior margin of the first six abdominal segments is ornamented with somewhat slender, conical, thorn-like spines, varying in number from six on the first segment to eighteen and fourteen upon the third and fourth. (Pl. II, fig. iii b). The "facial furrow" concave, short, forming the anterior edge of a four-sided hollow median of the meso-thorax, the other sides of which are also concave. The anal appendages (Pl. II, fig. iii c) are rather long, set somewhat apart at the base, roughly wrinkled, coated with long hairy spines; the apex of each point bears two truncate tubes. Antennæ comparatively large, three joints, basal and intermediate short, terminal as long as both others and surmounted by three spines. Legs stout; anterior pair, four joints, tibia and tarsus appearing as one; intermediate pair, four joints; posterior pair, basal joint broad, trochanthur and femur much dilated, tibia and tarsus appear as one joint, a dividing line can, however, be made out; mouth parts, small.

NOTE.—Throughout these descriptions the symbol ♂ has been used to signify male, and ♀ female.

♀ gall (Pl. II, fig. i) sessile; length, 8 to 12 lines; generally deflected, but often growing out laterally; spherical; summit truncate, depressed; conical apex of hard wood rising from bottom of depression. The outer portion of the gall is corky, broken into irregular wrinkles, and excresences which are often pyramidical. The inner walls are hard and solid, and in the form of the hard conical apex penetrate through the corky or bark-like layer at the summit. Female chamber (Pl. II, fig. i a.) irregularly balloon-shaped; width, 6 lines.

♂ coccus, unobserved.

♂ gall (Pl. II, fig. ii and ii*a*) cylindrical, striated, truncate; summit dilated, rim obtusely crenate; colour, purple-brown; length, 3 lines. Scattered irregularly over leaves.

B. crispa resembles a cone-like fruit, and is common in the neighbourhood of Sydney. The specimens figured are sent to me by Mr. A. Rudder, Forest Ranger, Booral, N.S.W., whom I have to thank for many valuable specimens. The galls are usually blackened with fumagine, and attended by numbers of ants, two circumstances which point to the power of this species to secrete honey-dew.

Brachyscelis nux, n. sp. (Olliff, M.S.) (Pl. III, figs. i to iii). ♀ coccus (Pl. III, fig ii), grey to pale yellow, last abdominal segment and appendages reddish-brown; globular; abdomen tapering rapidly; slightly coated with mealy secretion.

The body-wall is sparsely clothed with short hairy spines, and punctuated with comparatively few indistinct and floriform spinnerets (Pl. III, fig. ii a). First to sixth abdominal segments bearing dorsally slender conical tubular spines, about five upon the first, seven upon the sixth, and varying from eight to twelve upon the intermediate (Pl. III, fig. ii b). Facial furrow long, curved. Median depression of mesothorax transverse and narrow. Anal appendages (Pl. III, fig. ii c) rather long, distinctly tubular, clothed thickly with long hairs, slightly deflexed outwards, each bearing two tubular truncate points. Antennæ small; five rudimentary joints can be made out, the terminal bearing several spines. Legs slight and small; anterior pair, four-jointed, trocanthur and femur appearing as one, claws, simple; intermediate pair, three-jointed, claws blunt and rudimentary; posterior pair, three joints.

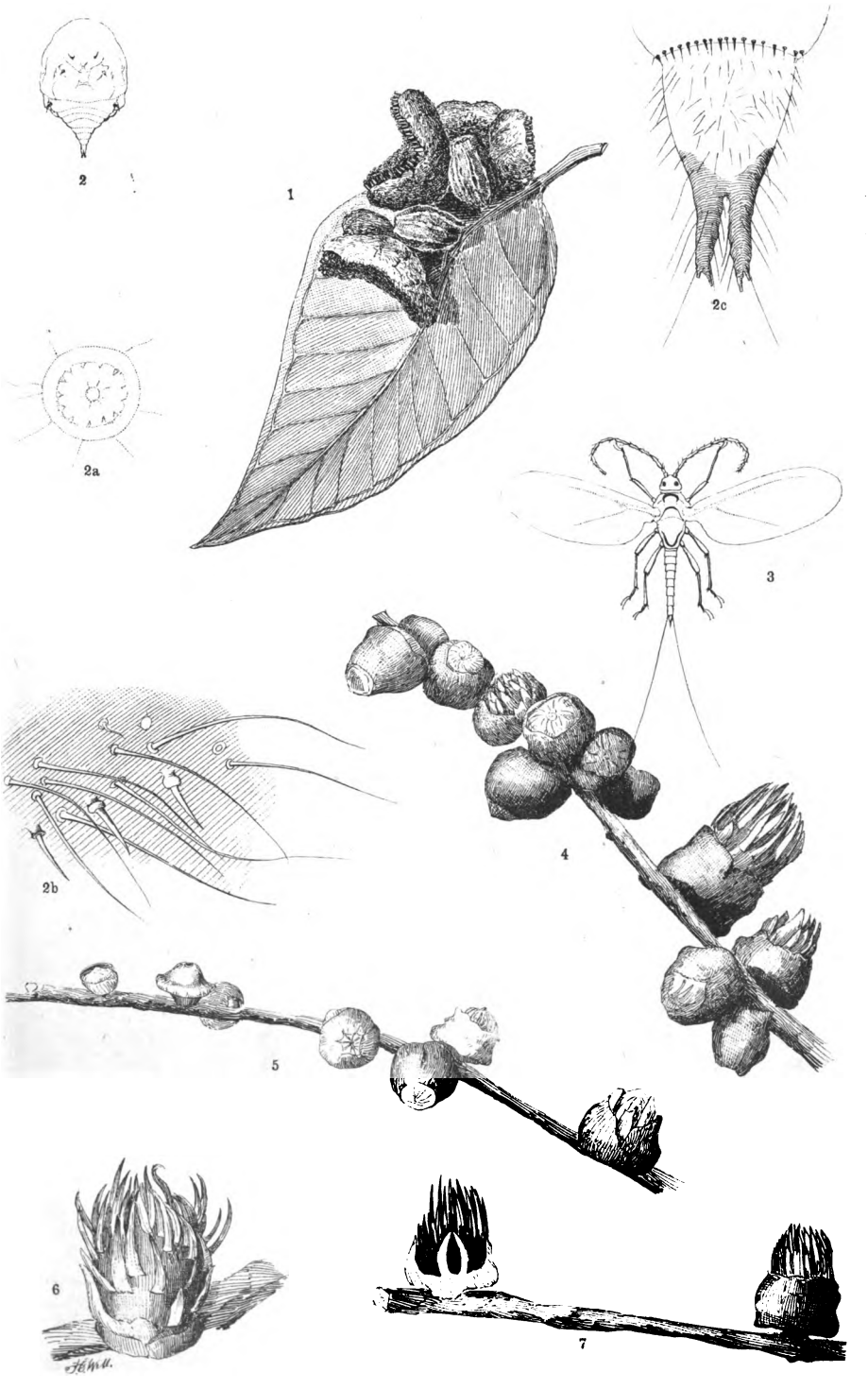
♀ gall sessile, growing from either mid-rib or stalk of the leaves; small, length, 4 to 5 lines; breadth, 3 to 3½ lines; cylindrical, constricted at base, dilated and widest in the middle, tapering towards the summit, which is truncate. Sides deeply ribbed longitudinally, the ribs running from base over the summit, finishing abruptly around the apical orifice. The colour of the gall is a dark violet, and contrasts strongly with the green of the leaves. Female chamber ovate; length, 3 lines; breadth, 2 lines; walls comparatively thick, ¾ line.

♂ coccus (Pl. III, fig. iii), small fly-like animal, about $\frac{1}{10}$ inch in length; wings white and transparent; abdomen cylindrical and comparatively long, terminating in a stout style, and bearing two longish setæ. Colour, light yellow. Legs bearing two stout spines lateral of the underside of the tibia before its juncture with the tarsus.

♂ galls small, cylindrical truncate tubes congregated together in a rough shallow saucer-like receptacle, which is attached upon the the side and near the summit of the female gall. Larvæ, typical.

These galls were obtained at Bungendore by Mr. A. M. Lea, Entomologist to the Bureau of Agriculture, W.A.

Brachyscelis Shraderi, n. sp. (Olliff, M.S.) (Pl. I, figs. vi to viii).



(11b179-95-6) Plate III.

♀ coccus (Pl. I., fig. viii), pale yellow, last abdominal segments black; cylindrical; head rounded, and abdomen tapering slowly.

The body is coated with fine hairy spines, and bears dorsally upon the head and abdominal segments rather prominent conical spines. The facial furrow is deep and curved. Median depression of mesothorax forming with furrow a three-sided hollow. The abdominal segments are distinct and incised. The anal appendages, so far as I have been able to observe, are wanting. The last abdominal segment is truncate, cylindrical, dilated somewhat anteriorly. The legs are very well developed, especially the intermediate and posterior pair, which are long and shapely.

♀ gall, length 12 lines, urn-shaped, constricted at base, and at about ¾ the height; truncate, summit flat, edge circular, and obtusely crenated, apex rising in form of a small finely pierced cone from the centre, female chamber elongate fusiform, walls comparatively thick.

Habitat Tamworth, collected by Mr. A. M. Lea.

Brachyscelis Fletcheri, n. sp. (Olliff, M.S.), (Pl. IV, figs. i to xiv).

♀ coccus (Pl. IV, fig. vi), orange yellow, four posterior segments of the abdomen a dark brown to black; head and thorax circular somewhat globose; abdomen narrow and tapering; body slightly powdered with mealy secretion; abdomen sometimes surrounded with a cloud of cottony filaments.

The wall of the abdomen is thickly perforated with pin-hole orifices, the softer cephalic portion with peculiar floriform spinnerets (Pl. IV, fig. vi a). Body covered with hair-like spines. The dorsal margins of the abdominal segments do not exhibit the conical thorn-like spines seen in the other species. The sixth and seventh segments appear as one; the appendages of the seventh are short, truncate, close together, and straight, but sometimes curled over each other; this segment also bears laterally and dorsally, short stout spines which are arranged irregularly in transverse rows. Facial furrow long, almost forming a ¾ circle. Median depression of mesothorax is longitudinal, constricted, and merging into the facial furrow.

Antennæ inconspicuous, five rudimentary joints and few hairs. Legs stoutish, with simple hooks; anterior pair, the trocanter is indistinct; intermediate pair, five jointed, longish and prominent, springing from well-developed cushions which are rather characteristic; posterior pair retracted to the sides of the insect. Mouth parts small, proboscis discernable but short.

♀ galls generally congregated, forming hypertrophic swellings or tumours (Pl. IV, figs. i, ii), which vary in size and shape according to their age, and the number of insects forming them; appearing on the thicker branches as a series of swellings and constrictions, and upon the small twigs, as globular galls varying from 2 to 3 inches in diameter. The gall made by a single insect forms upon the side adjacent to the insect (Pl. IV, figs. iii to v), and is somewhat hemispherical. The young galls (Pl. IV, figs. ix, x) are smooth, partaking of the nature and colour of the bark, and are without any visible aperture when about three months old. When at the very least twelve months' old an oval plate of bark begins to separate cracking transversely (Pl. IV, fig. iii a), subsequently a second and occasionally a third plate scales off fissuring irregularly. The plates are firmly affixed, and are all thrown off together presumably when an expansion is caused by an increased rising of the sap; when removed a cone, the apex of which rises from the bottom of a countersunk depression in the living bark, is exposed. (Pl. IV, fig. i a.) The outer oval plate is not seen in the tumour formed by a number of insects The female chamber, seen by a longitudinal section (Pl. IV, fig. v), is from.

8 to 9 lines in length and 4 lines wide. The plane exhibited is that of an attenuated rhomb. The cavity presents the general appearance of two hollow cones base to base, the ob-cone is countersunk into the ligneous portion of the gall, the apex reaching into the heart of the twig; the upper cone forms a hard woody test of reddish colour, which covers the abdominal segments of the insect, and whose base is inserted into that of the ob-cone. This conical test is partly buried in the sappy part of the wood through which the apex rises into the countersunk depression mentioned above. A rim grows around the outside of the cone at about half its height, and forms the bottom of the countersunk depression.

♀ coccus, 2nd stage (Pl. IV, figs. xi to xii b), active, white, mealy, flattish; length, $\frac{8}{100}$ inch; greatest breadth at base of thorax, $\frac{3}{100}$ inch. Abdomen tapering slightly; anal segment comparatively large and broad, cleft; appendages set widely apart, deflexed outwards, tips sharp, each bearing dorsally and somewhat towards the inner edge a well-developed conical spine, laterally a long hair-like spine, and ventrally a long setæ and hair-like spine (Pl. IV, figs. xi and xii). The walls of the abdominal segments are not thickened as in the adult. Dorsally from 10 to 12 very long hairy spines are born upon the last thoracic and abdominal segments. The cephalic portion is bordered by a row of shorter hairs. Antennæ appearing as a single ovate joint, the edges slightly serrated. Legs distinct, anterior pair thrown forwards, and the posterior four backwards, as in adults; upper digitules present, but short. Anogenital ring (Pl. IV, fig. xii a) distinct, six spines, situated on anterior portion of anal segment; mouth parts small situated between bases of first pair of legs.

♂ coccus, adult unobserved.

♂ galls (Pl. IV, figs. vii and viii), cylindrical, truncate; rim slightly crenate; length, 2 lines; colour, purple claret; found generally upon the leaves, and rarely upon small twigs.

This interesting insect was first brought prominently into notice by Mr. J. J. Fletcher, Curator of the Linnean Society of New South Wales, who, in company with Mr. C. T. Musson, of the Hawkesbury Agricultural College, discovered two Eucalyptus trees on Ham Common, Richmond, laden with the galls. During the first year of the Department's existence a single specimen was sent in for identification from North Willoughby, and recently I have found it common upon several species of Eucalyptus in the Parramatta district. The formation of the female gall and the lack of the thorn-like spines separate the insect from all other described species, but, until we know really something of this remarkable group of coccids, it is perhaps preferable to place it as a *Brachyscelis*. Figure xiv, Plate IV, gives a fair idea of how this gall is first formed. A depression, caused, no doubt, by an arrest of development immediately against the insect and the growth of the surrounding tissue, is the first indication. Subsequently a circular wall commences to "shoot" around the insect. This wall I take to be the beginning of the conical test, whilst the depression ultimately forms the remainder of the gall cavity. This initial formation must be soon buried by the hypertrophy of the surrounding bark-tissue and the insect completely shut in. At some future date I hope to be in the position to state definitely the duration of the life of this species, and I believe that as our knowledge of it increases it will prove to be of as great an interest as any of the gall-making *Coccididæ* previously described.

I have received from Mr. A. Rudder, Forest Ranger in charge of the Port Stephens district, a very interesting gall (Pl. III, figs. iv to vii), which grows

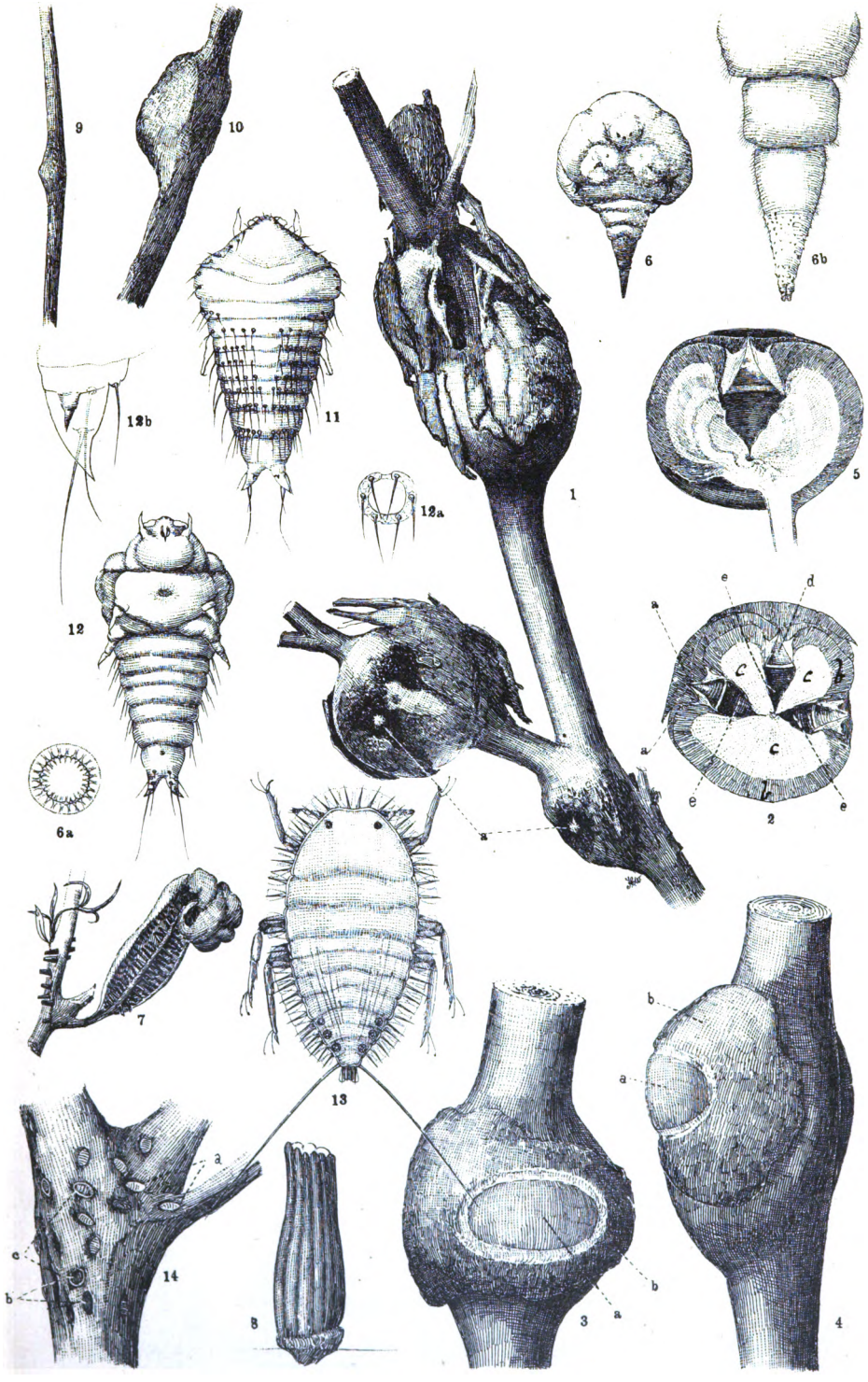


Plate IV.

(116179-95-6)

out from a cupule after the manner of an acorn, the adult gall bearing a number of leaf-like bracts. It is without doubt originated by a *Brachyscelis*. The name *excupula* would suggest itself for the producer when observed.

The plates which accompany these descriptions have been prepared by Mr. Fred Wills, of this Department, from nature and my own drawings.

PLATE I.

Brachyscelis pedunculata—

Fig. I. Female gall; and male galls (natural size).
II. „ (stalk affected by inquilines) natural size.
III. „ section, normal form (natural size).
IV. Adult female (enlarged).
IVa. „ spinneret (greatly magnified).
IVb. „ portion of dorsum showing spinnerets, hairy and conical spines (magnified).
IVc. „ last three segments of abdomen and appendages (magnified).
V. Larva (magnified).

Brachyscelis Shraderi—

Fig. VI. Female gall (natural size).
VIa. „ apex.
VII. „ section showing fusiform chamber.
VIII. Adult female coccus.
VIIIa. „ antenna.
VIIIb. „ anterior leg.

PLATE II.

Brachyscelis crispa—

Fig. I. Group of female galls (natural size); a, section showing adult ♀ coccus *in situ*.
II. Male galls on leaf (natural size).
IIa. Male gall (magnified).
III. Adult female (enlarged).
IIIa. „ spinneret (greatly magnified).
IIIb. „ portion of dorsum showing spinnerets, hairy and conical spines.
IIIc. „ last segments of abdomen and appendages.
IIId. „ antenna.
IIIe, f, g. „ anterior, intermediate and posterior legs.

PLATE III.

Brachyscelis nux—

Fig. I. Female and male galls on leaf (natural size).
II. Adult female (magnified).
IIa. „ spinneret (greatly magnified).
IIb. „ portion of dorsum showing hairy and conical spines.
IIc. „ last segments of abdomen and appendages.
III. Adult male (magnified).
IV–VII. Galls of *Brachyscelis* sp. (Manning R., N.S.W.), natural size. Showing different stages of growth.

PLATE IV.

Brachyscelis Fletcheri—

Fig. I. Tumours formed by ♀ coccids (two-thirds natural size); a a, apex of test (bark plates removed).
II. Section of tumour formed by three insects (two-thirds natural size); a a bark plates; b, living bark; c, wood; d, hard conical test; e e e, female chambers.
III. Gall of single coccus, front view (natural size); a, oval plate; b, second plate.
IV. ,, side view (natural size).
V. ,, section (natural size).
VI. Adult female (enlarged).
VIa. ,, spinneret (greatly magnified).
VIb. ,, last segments of abdomen and appendages (magnified).
VII. Male galls on leaf (natural size).
VIII. Male gall (magnified).
IX and X. Galls of young females.
XI. Second stage female, dorsal view (magnified).
XII. ,, ventral view (magnified).
XIIa. Second stage ♀ anogenital ring (magnified).
XIIb. ,, ♀ anal point (magnified).
XIII. Larva (magnified).
XIV. Enlarged view of very young shoot; a a, larvæ *in situ*; b b, depressions caused by larvæ; c c, rings forming round larvæ.

[4 Plates.]

Sydney: Charles Potter, Government Printer.—1896.