

INSECTS OF HAWAII, JOHNSTON ISLAND AND WAKE ISLAND

BY

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AND COLLABORATORS

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very short, flattened beak. The fore tarsus consists usually of a single segment, termed the *pala*, forming a more or less falcate scoop, furnished with a row of stiff bristles; in the males, a series of small pegs or tooth-like processes also occur, and are supposed to be the organs which produce the characteristic stridulations beneath the water, by rubbing against a finely toothed area on the femur. The pala usually has no claw, but in some genera it ends in a single claw or a bristle. The Australian species have been proved by Hale to be carnivorous, feeding on mosquito and other insect larvae; but Hungerford in America has reared Corixidae on algae and the sediment of ponds. Probably they are almost omnivorous.

Family 26. **Corixidae** (Water-boatmen) [Aus. 14, N.Z. 3]. Four genera occur in Australia, viz., *Arctocorisa*, *Porocorixa*, *Micronecta* and *Diaprepocoris*; only the first and last of these are found in New Zealand. The commonest Australian species are *A. australis* Fieber, *P. curynome* Kirk. and *P. parvipunctata* Hale; the seven species of *Micronecta* are not so frequently met with. In New Zealand *A. arguta* F.B.W. (fig. Q18) is the commonest species; it is a handsome, brown insect, mottled all over with tiny spots of darker brown. All the species swim rapidly in still waters by means of their oar-like hindlegs. The eggs are stalked and attached to the stems of water-weeds.

Suborder HOMOPTERA

(Cicadas Plant-hoppers, Plant-lice, Scale Insects).

This Suborder has the head highly specialized, as indicated in the Key on p. 144, but the wings are much more primitive than those of the Heteroptera. The forewing shows no sharp division into corium and membrane, and is termed a *tegmen*, being usually of the same consistency throughout, and only seldom even with a faint line dividing it transversely; venation generally complete. Wings usually held roof-wise over the body, only seldom folded flatly, and then not completely overlapping distally (except in a few Achilidae). The straight beak is in line with the mid-ventral surface of the greatly inflexed head (fig. Q1) and extends backwards between the forelegs, the sides of the head being in contact with the fore coxae. An extraordinary internal structure of great interest, found in all Homoptera except the Jassidae and Fulgoroidea, is the wonderful *filter* by means of which the liquid food is "short-circuited" from the crop to the hind-gut, only the more solid matter passing through the mid-gut. All the species suck the juices of plants. Australia has about 1100 species, including 330 Coccidae and 180 Cicadas; New Zealand has only 230 species, over 100 being Coccidae.

In the classification of this Suborder, the chief points to bear in mind are the form of the antennae, the structure of the tarsi, (i.e., the number of segments, the number of claws and the presence or absence of an empodium between them), the number and position of the ocelli, the form of the head-sclerites, the condition of the coxae, and certain details of venation. For the head, the student must be able clearly to distinguish the limits of the epicranium, frons, clypeus and genae (fig. Q1), and must bear in mind that, owing to the inflexion of the head, these parts are often placed much further ventrad than in most insects. The *forewing*, or *tegmen*, has a very variable type of venation, generally characterized by more or less fusion of the basal portions of two or more of the main veins; when these are all fused together from *Sc* to *Cu₁*, as in the most highly reduced types, then the fused stem is spoken of as the *principal vein*. In many forms *Sc* is entirely absent, and often *R₁* is absent also, or only appears as a small end-twig of *R₂₊₃**; *M* is normally three or four-branched, and *Cu₁* has a terminal fork in most cases. *Cu₂* is a deeply impressed furrow-vein, forming the *vena dividens*, separating off the very distinct anal area or *clavus* from the rest of the wing in all except the most reduced forms. The *clavus* itself is generally more or less triangular or elongated in form, with a sharp distal angle or *apex*; it usually carries only two anal veins, *1A* and *2A*, though *3A* is present in some Fulgoroidea. Some of the Fulgoroidea have a highly specialized venation with abundant branchings, paralleling that of the Planipennia; in such forms, there is often a separate costal vein *C*, with a distinct *precostal area* between it and the costal margin. The hindwing is entirely membranous and usually has a folded anal area; its venation is comparatively simple, the main stems of *R*, *M* and *Cu₁* being often quite separate.

*See remarks on p. 142 (fossils).

The Suborder falls naturally into two very distinct Divisions, according to the following Key:—

- Tarsi 3-segmented; the beak clearly arising from the posterior ventral part of the head. Division *AUCHENORRHYNCHIA*
 Tarsi 2 or 1-segmented; the beak appearing to rise from between the fore legs. Division *STERNORRHYNCHIA*

Division *AUCHENORRHYNCHIA*

This Division contains all the larger and less specialized forms, in which the venation is for the most part not reduced, and sometimes even becomes secondarily increased, as in the higher Fulgoroidea. The Division is more primitive than the Sternorrhyncha in all characters except only the antennae, which are reduced to the two basal segments with a terminal flagellum composed of few more or less indistinct segments. It contains two well-marked superfamilies, as follows:—

Middle coxae short and close together; hind coxae mobile. Pedicel of antennae without sensillae, the flagellum with sensory grooves. Tegulae absent. Tegmen with the two anal veins not forming a Y-vein.

XII. CICAIDOIDEA

Middle coxae elongate, placed wide apart; hind coxae immobile. Pedicel of antennae with numerous sensillae; a single large sense-organ on the basal segment of the flagellum. Tegulae present. Tegmen generally with the two anal veins forming a Y-vein.

XIII. FULGOROIDEA

Superfamily XII. CICAIDOIDEA

In addition to the characters in the Key, it should be noted that the ocelli, which are seldom absent, are placed either on the vertex, on the front margin of the head, or between the eyes. There are only four families, separated as follows:—

1. Hind coxae not reaching sides of sterna. 2
 Hind coxae transverse, reaching sides of sterna. 3
2. Ocelli three, on vertex; fore femora thickened; empodia absent; males usually with a sound-producing apparatus at base of abdomen.

Fam. 27. CICAIDAE

Ocelli two or none; fore femora not thickened; empodia present, large; never any sound-producing apparatus.

Fam. 28. CERCOPIDAE

3. Pronotum hypertrophied, generally prolonged backwards over abdomen; genae not dilated.

Fam. 30. MEMBRACIDAE

Pronotum never prolonged backwards over abdomen; genae dilated or broadened.

Fam. 29. JASSIDAE

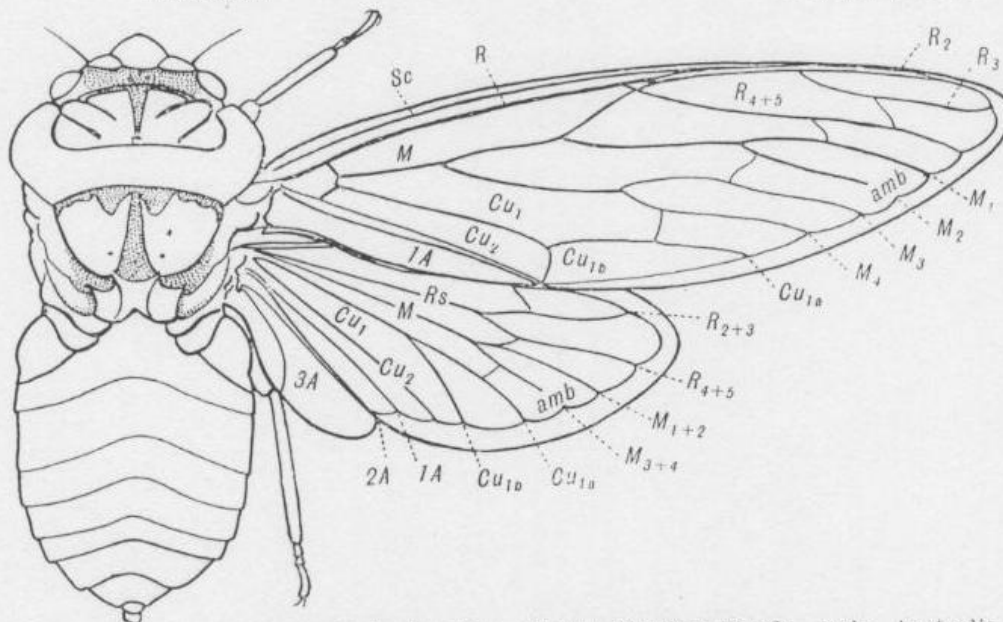


FIG. Q19. *Cyclochila australasiae* Don., Green Monday Cicada, male, Australia. Fam. Cicadidae, subfam. Cicadinae. Length of body 40 mm. Lettering as in fig. A8, p. 22, except amb, ambient vein. See remarks on p. 142 (fossils). [A. Tonnoir del.]

Family 27. **Cicadidae** [Aus. 180, N.Z. 20]. The Cicadas, commonly but inaccurately called "locusts" both in Australia and New Zealand, are medium to large insects which are at once recognized by the shrill screech of the males during the summer months. The sound produced by the smaller

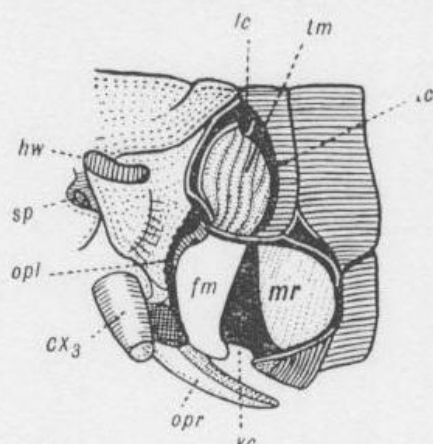


FIG. Q20. *Cyclochila australasiae* Don., male, left lateral and slightly ventral view of metathorax and first three abdominal segments, to show the sound-producing apparatus. *cx*₃, hind coxa; *fm*, folded membrane; *hw*, hindwing cut away; *lc*, lateral cavity; *mr*, mirror; *opl*, edge of left operculum cut away; *opr*, right operculum; *sp*, second thoracic spiracle; *tc*, edge of tympanal covering, cut away; *tm*, tympanum; *vc*, ventral cavity. Left operculum and tympanal covering removed to show the structures enclosed by them.

[R. J. T. del.]

species is pleasant enough to listen to, but that of the larger is ear-splitting and is frequently continued far into the night. The males alone produce the sound, the females being quite voiceless. The sound-producing structures are very complex and peculiar to the family. The most conspicuous parts, externally, are the two *opercula* (fig. *opl*, *opr*), which are large, latero-ventral, posterior expansions of the metasternum, covering the sound-organs more or less completely from below. On lifting one of the opercula, there will be seen a large cavity, called the *ventral cavity* (*vc*), whose dorsal or upper limits are chiefly formed by two tightly stretched membranes, viz., the anteriorly placed, whitish *folded membrane* (*fm*) and the posteriorly placed, tightly stretched, delicate, iridescent *mirror* (*mr*). Latero-dorsally from the folded membrane lies a smaller cavity, called the *lateral cavity* (*lc*), within which is a smaller, strongly ridged membrane called the *tympanum* or *timbal* (*tm*). In the highest subfamily, the Cicadinae, the latero-dorsal margins of the first abdominal segment are produced forwards so as to cover the tympanum from above; these expansions are called the *tympanal coverings* (*tc*); they are absent or imperfect in the other subfamilies. Three pairs of *spiracles* are covered by the *opercula*, viz., the second thoracic and those of the first two abdominal segments.

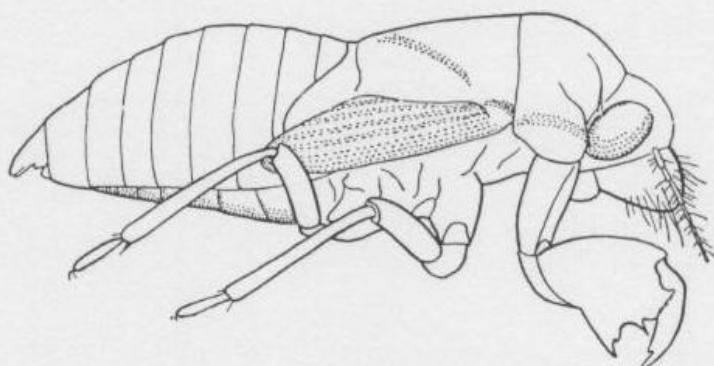


FIG. Q21. Burrowing larva of *Melampsalta emguata* Fabr., last instar; New Zealand. Fam. Cicadidae, subfam. Tibicininae. Length 27 mm.

[A. Tonnoir del.]

Cicadas possess a strong beak (fig. Q1) with which they suck the sap of trees and shrubs. Some species do a considerable amount of damage, both in this manner and also by slitting the bark when laying their eggs. The larvae (fig. Q21) live underground, often taking two or three years or more to become full-fed; they have strong burrowing forelegs and feed by sucking the sap from the roots of trees and shrubs. The full-grown larva burrows upwards out of the ground

and climbs a tree-trunk or paling; then the adult cicada emerges, leaving behind the tough exuviae, which are common objects during the spring and summer months.

The most archaic subfamily is the Tettigarctinae, which includes only the two species of *Tettigarcta*, viz., *T. tomentosa* F.B.W. from Tasmania and *T. crinita* Dist. (pl. 11, fig. 11) from Victoria. They are very hairy, brown cicadas of about 3 inches expanse; the males are quite voiceless, without any vestiges of a sound-producing apparatus. The forewing has a strong transverse line suggestive of the beginnings of a division into corium and membrane.

The Tibicininae have the sound-producing organs of the male well developed, but without any tympanal coverings. All the New Zealand species belong here, being included in the genera *Melampsalta* and *Pauropsalta*, both of which are also well represented in Australia. *M. cingulata* Fabr. (pl. 2, fig. 9) is the largest New Zealand species, expanding about $3\frac{1}{2}$ inches; it is of a pretty olive green colour with black markings, and has a loud chirp ending with a click of the wings. Common smaller species are the dark red *M. cruentata* Fabr. and the bright green *M. muta* Fabr.; *M. cincta* Walk. frequents sand dunes along the coast. There are about 50 Australian species of *Melampsalta* and 20 of *Pauropsalta*, mostly dark brown or blackish in colour, with yellow, orange or red markings. *M. torrida* Er. and *M. abdominalis* Dist. are common and widespread species. *Pauropsalta mneme* Walk. (pl. 12, fig. 18) is found on the Blue Mts., N.S.W., while the somewhat smaller *P. encaustica* Germ. is much commoner in most parts of Australia. This genus and the allied *Diemeniana*, from Tasmania, differ from *Melampsalta* in having one apical cell less in the hindwings. *Burbanga gilmorei* Dist. (pl. 12, fig. 19) is a small greyish cicada from Queensland with narrow and rather prettily marked wings. The genus *Abricta* includes the largest Australian species of this subfamily. The "Floury Miller," *A. curvicauda* Germ., is 4 inches in expanse, reddish brown with whitish pubescence on abdomen; *A. aurata* Walk. is a somewhat smaller and darker species found in Tasmania and Victoria. The extraordinary Bladder Cicadas of the genera *Cystosoma* and *Chlorocysta* occur in the warmer parts of Eastern Australia; the finest species is *Cys-*

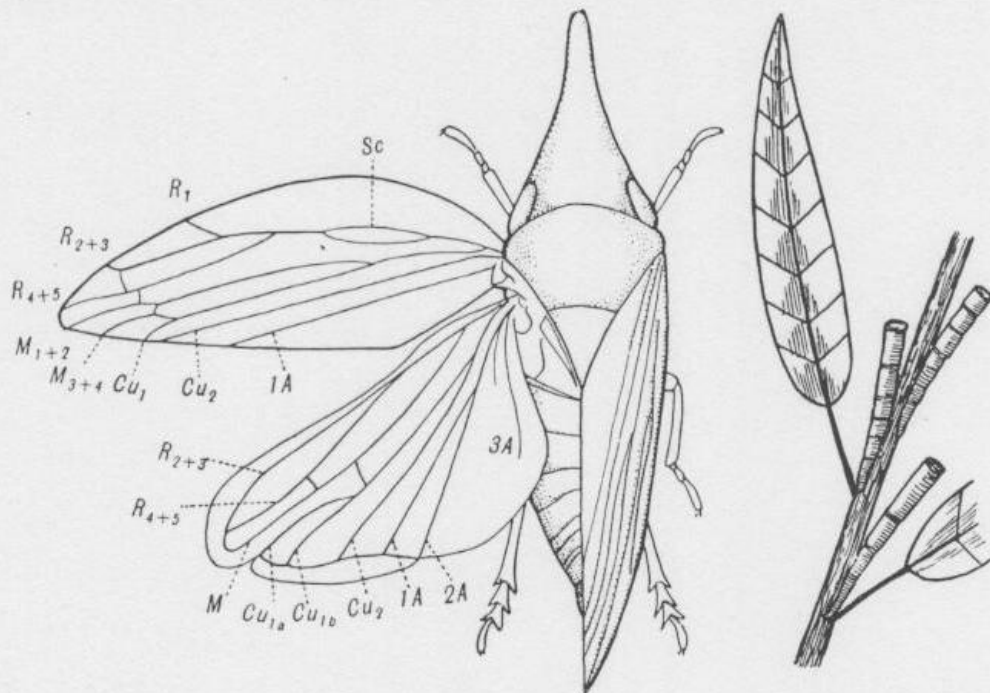


FIG. Q22 (left). *Philagra parva* Dist., Australia. Fam. Cercopidae. Length 10 mm. Lettering as in fig. A8, p. 22. See remarks on p. 142 (fossils).

FIG. Q23 (right). Larval tubes of *Pectinariophyes* sp., Sydney, Australia, last instar, attached to twig of eucalyptus sapling. Length of tubes 10-12 mm.

tosoma saundersi Wwd. (pl. 12, fig. 20), with inflated green abdomen and opaque green forewings with reticulate venation. The species of *Chlorocysta* are smaller, with hyaline wings and more normal venation.

The Cicadinae have complete tympanal coverings, and are represented in few species occur in tropical Australia, belonging to the genera *Gaeana*, *Tettigia* and *Tamasa*.

The Cicadinae have complete tympanal coverings, and are represented in Australia by a number of endemic genera with large and handsome species. The genus *Macrotristria* contains a number of well-known species, including the common "Fiddler", *M. angularis* Germ., dark brown spotted with yellow, and having the veins of the distal part of the forewing heavily shaded. *Henicopsaltria* includes the handsome Mottled Brown Cicada, *H. eydouxi* Guer., a very common Eastern Australian species expanding 5 inches, chestnut and pale brown in colour, with reddish-orange opercula and lightly clouded venation on forewings, and the White-banded Cicada, *H. fullo* Walk. (pl. 12, fig. 21), a handsome blackish species expanding only 3 inches, common in Western Australia. *Psaltoda moerens* Germ. is the common large Black Cicada, also called the Red Eye. *Ps. aurora* Dist. is a much handsomer allied species from N. Queensland. *Cyclochila australasiae* Don. is the very common large Green Monday Cicada (fig. Q19) expanding up to 5 inches; a rich yellow variety is called the Yellow Monday. The finest cicadas of all are the two handsome species of *Thopha*, a genus having the tympanal coverings hypertrophied and much larger than the opercula. The Double Drummer, *T. saccata* Fabr., is a handsome black and red species expanding 5 inches, ranging from South Australia to South Queensland; the allied *T. sessiliba* Dist. (pl. 11, fig. 12) is a rarer northern species of a lovely purplish brown colour.

Family 28. **Cercopidae** [Aus. 30, N.Z. 4]. This family contains the Frog-hoppers or Spittle-insects, the former name indicating their frog-like appearance, the latter the habit of most of the larvae in secreting a mass of froth or "cuckoo-spit", within which they live, sucking the juices of plants. They are

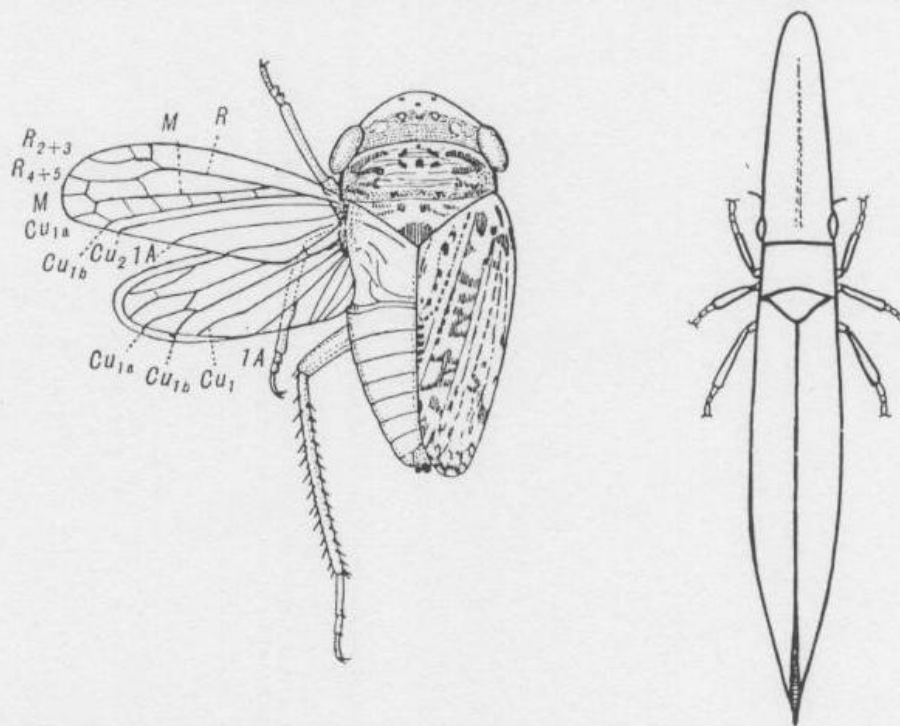


FIG. Q24 (left). *Tylozygus cassiniiae* Myers, New Zealand. Fam. Jassidae, subfam. Cicadellinae. Length 4 mm. Lettering as in fig. AS, p. 22. See remarks on p. 142 (fossils). [R. J. T. del.]
FIG. Q25 (right). *Cephalotus hudsoni* Myers, New Zealand. Fam. Jassidae, subfam. Cephalotinae. Length 11 mm. [A. Tonnoir del.]

closely allied to the Cicadidae, but have only two ocelli instead of three; the tibiae are smooth, and the hind pair are armed with one or two stout, solid spines and a cluster of smaller, solid spines at the apex. *Philacnus trimaculatus* F.B.W. (pl. 2, fig. 10) is the common three-spotted Frog-hopper of New Zealand, prettily marked in green and reddish-brown; *Cercopis jactator* F. B. W. is a larger and rarer species. The commonest forms in Australia belong to the genus *Philagra* (fig. Q22), and are of a dull brown colour, with the head produced forwards

like a snout; these insects live chiefly on she-oaks (*Casuarina*). Australia also possesses two interesting genera of the subfamily Machaerotinae, or tube-forming cercopids, viz. *Pectineriophyes* and *Polychaetophyes*, in which the larvae form delicate tubes (fig. Q23) attached to the stems of eucalyptus saplings; they live in their own froth inside these tubes, and the last larval stage closely resembles a true pupa.

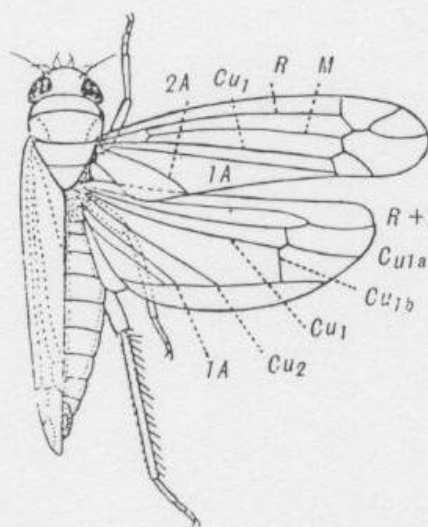


FIG. Q26. *Typhlocyba australis* Frogg., the Yellow Apple Leaf-hopper, Australia and New Zealand (introd.). Fam. Jassidae, subfam. Typhlocybinae. Lettering as in fig. A8, p. 22. Length 3 mm. [R. J. T. del.]

Family 29. **Jassidae (Cicadellidae)** (Leaf-hoppers) [Aus. 200, N.Z. 52]. This immense family contains a large number of species in both countries, only a fraction of them having so far been studied. Most of the forms are small and inconspicuous; on account of the immense numbers in which they occur, they do a great deal of damage in the aggregate, though the individual punctures which they make on the leaves of plants are often not noticeable. In America they are known as "sharp-shooters" on account of the way in which they jump when disturbed. The family is recognized by the dilated or broadened cheeks, and by the possession of a double row of spines beneath the hind tibiae (feebly developed only in the Megophthalminae and Cephalelinae); these spines are not solid, as in Cercopidae, but are articulated on swollen bases. The group contains many diverse forms, and has already been split up by some authors into a number of separate families.

The Cicadellinae contains small species with the ocelli dorsally placed. The chief genus is *Tylozygus*, found in both countries. *T. cassiniae* Myers (fig. Q24) is common on *Cassinia* on the sea-coast of New Zealand; it is pale olive-brown, with whitish streaks and spots. *Vulturius* contains numerous Australian species.

The small subfamily Paropiinae or Megophthalminae, with abnormally shaped heads and feebly armed legs, is only represented by *Paropia* (*Megophthalmus*) and two other genera in Australia, and by two species belonging to a new genus in New Zealand.

The Jassininae are a large group of small forms having the ocelli on the border of the vertex or on the margin between vertex and frons, and the venation normal. *Xestocephalus* and *Deltocephalus* are represented in both countries, *Tartessus*, *Nephotettix* and many other lesser genera in Australia, and *Euscelis* and *Phlepsius* in New Zealand. *Tharra* is peculiar to Australia and Fiji.

The peculiar Cephalelinae have a very elongate head and feebly spinose legs; the tegmina are leathery with the venation obliterated. *Paradorydium* and *Cephalelus* occur in both countries. *C. hudsoni* Myers (fig. Q25) is found on the Jointed Rush (*Leptocarpus*) in New Zealand.

The Typhlocybinae have the ocelli absent or vestigial, and the main veins arising separately and not branched distally. This group includes the widespread genera *Dicrancura*, *Erythroneura* and *Typhlocyba* found in both countries. The bright yellow *T. australis* Frogg. (fig. Q26) was first found on apples in New South Wales, but has now become a very serious pest of apple orchards in New Zealand.

The Bythoscopinae are a large group having the ocelli placed ventrally on the frons. The well known genera *Bythoscopus* and *Idiocerus* occur in both countries, while *Eurinoscopus* and *Agallia* contain other Australian species of

small size. *Ipo* is a genus of small, broadly wedge-shaped forms with very wide heads, found in Australia. The most striking of the Australian forms are the much larger species of the *Eurymela* group of genera, comprising *Eurymela*, *Eurymeloides* and *Eurymelops*. They are handsome, wedge-shaped species, superficially resembling Cercopidae, living in colonies upon the green branches of eucalyptus saplings, and generally attended by ants. The general colouring is steel-blue or black, marked with white, cream, yellow or red. *Eurymela rubrovittata* A. & S. (pl. 11, fig. 13), is one of the handsomest species. *E. bicolor*

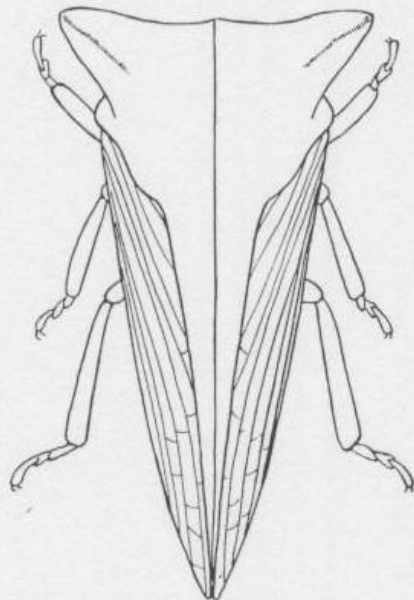


FIG. Q27. *Sextius virescens* Fairm., the Green Tree-hopper, Australia. Fam. Membracidae. Length 8.5 mm. [A. Tonnoir del.]

Burm. has a black head and thorax, red abdomen, dark steely tegmina with the basal third red, hindwings brownish. *E. distincta* Sign. has two whitish oval blotches on the tegmina and the hindwings purple. All these species expand an inch or more. *Eurymeloides pulchra* Sign. (pl. 12, fig. 22) is a smaller, dark brown species with two narrow whitish bands crossing the tegmen.

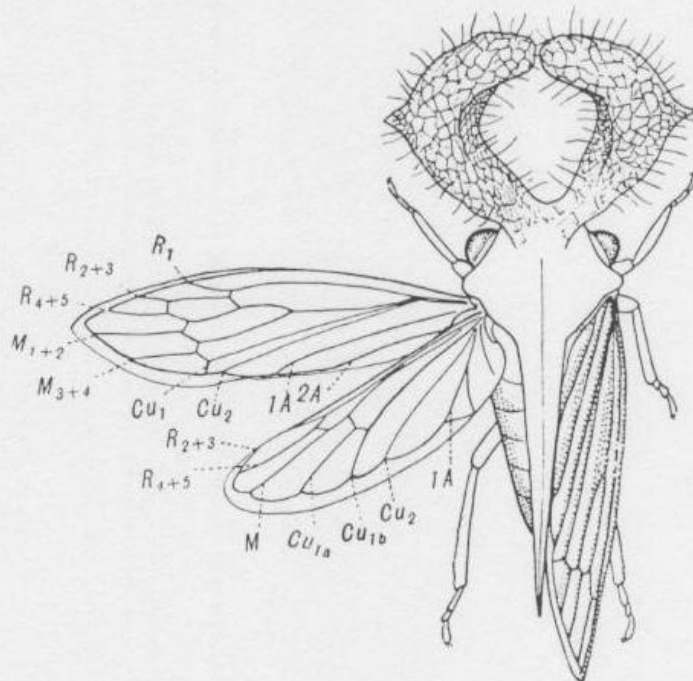


FIG. Q28. *Lubra regalis* Gdg., Australia. Fam. Membracidae. Length 7 mm. Lettering as in fig. A8, p. 22. See remarks on p. 142 (fossils).

[A. Tonnoir del.]

The Ledrinae are a peculiar group of large, brownish species with very prominent, flat, leaf-like head, often concave beneath, the ocelli placed dorsally, well away from the anterior margin of the head, the venation very complete. The principal Australian genera are *Ledra* and *Ledropsis*. The allied Stenocotinae are peculiar to Australia, and only differ in having the ocelli in pits on the angular margin of the head. Their larvae are very flattened, and are found on the bark of large trees. *Stenocotis planiuscula* Stal. and *St. caudata* Walk. (pl. 12, fig. 23) are the best known species.

Family 30. **Membracidae** (Tree-hoppers) [Aus. 40, N.Z. 0]. These bizarre insects may be at once recognized by the vertically placed head, with genae not dilated and ocelli placed between the eyes, and by the hypertrophied pronotum, which is generally prolonged backwards over the body so as more or less to hide the scutellum, and is often otherwise enlarged and ornamented. The larvae usually sit in rows along the twigs of trees and shrubs, and are attended by ants, which collect the sweet secretion or honey-dew discharged by them. Both larvae and adults have great jumping powers.

The family is absent from New Zealand, but well represented in Australia. Most of the species have the pronotum armed with a pair of dorsal horns or protuberances, as in the genera *Sertorius*, *Sextius*, *Eufairmairca* and *Daunus*. *Sextius virescens* Fairm. (fig. Q27) is the common green tree-hopper found on the Black Wattle (*Acacia decurrens*). *Eufairmairca fraterna* Dist. (pl. 11, fig. 14) is a fine dark brown species with bluntly-tipped, thorn-like dorsal processes. *Lubra regalis* Gdg. (fig. Q28) has remarkable, broad, laterally compressed, dorsal horns forming a complete circular arch. The species of *Acanthucis*, of which the commonest is *A. trispinifer* Fairm., have three dorsal projections. *Eutryonia monstrifera* Walk. has a single median process of bizarre form, transversely dilated at apex. *Terentius* and *Dingkana* have no dorsal processes, while *Eufroggattia* and *Porcorhinus* lack the usual posterior process of the pronotum. In all the Australian species the tegmen has an ambient vein and coriaceous border, as in the Cicadas.

Superfamily XIII. FULGOROIDEA

This superfamily contains a large number of very diverse forms, all of which are united by the form of the middle and hind coxae, the presence of a small hard piece or *tegula* between the base of the tegmen and the lateral angle of the pronotum, and by the two anal veins on the clavus generally forming a Y-vein. The ocelli are usually present and placed in the cavities of the cheeks. Fifteen families are known, of which all except three, the Tettigometridae, Achiloxiidae and Acanaloniidae, occur in Australia, giving a total of about 240 species. In New Zealand the twenty-two native species belong to the families Cixiidae, Delphacidae, Derbidae, Dictyophoridae and Achilidae; but species of Flatidae and Ricaniidae have been introduced from Australia. All the species are strong jumpers, and are generally termed Plant-hoppers. The larval forms develop tail-processes, or exude white, flocculent material around the anus. The twelve families found in Australia may be distinguished by the following Key*:

- | | | |
|---|--------------------------|---|
| 1. Ocelli three | Fam. 31. CIXIIDAE (part) | |
| Ocelli two or none | | 2 |
| 2. Hind tibiae with a movable spur at apex. | Fam. 32. DELPHACIDAE | |
| Hind tibiae without a movable spur at apex. | | 3 |
| 3. Posterior angle of mesonotum divided off by a groove or line. | | |
| | Fam. 33. TROPIDUCHIDAE | |
| Posterior angle of mesonotum not so divided off. | | 4 |
| 4. Tegmina folded flatly, or nearly so, when at rest, and partially overlapping. | Fam. 38. ACHILIDAE | |
| Tegmina held roof-wise, not overlapping. | | 5 |
| 5. Anal area or hindwing reticulate; lateral ridges of face continued on to clypeus. | Fam. 36. FULGORIDAE | |
| Anal area of hindwing seldom reticulate, or, if so, lateral ridges of face not continued on to clypeus. | | 6 |
| 6. Face transverse, or nearly as long as wide. | Fam. 37. EURYBRACHIDAE | |
| Face distinctly longer than wide. | | 7 |

*Adapted from F. Muir.

7. Tegmen with a definite precostal area, usually crossed by numerous veinlets. 8
Tegmen with precostal area absent or very small, without veinlets; rarely coriaceous. 10
8. Clavus granulate. Fam. 42. FLATIDAE 9
Clavus not granulate. 9
9. Head nearly as wide as, or wider than, pronotum. Fam. 41. RICANIIDAE
Head narrower than pronotum. Fam. 40. LOPHOPIDAE
10. Tegmina coriaceous, usually more or less convex, often shortened. Fam. 39. ISSIDAE
Tegmina not coriaceous, neither convex nor shortened. 11
11. Last segment of labium short, about as long as wide. Fam. 34. DERBIDAE
Last segment of labium longer than wide. 12
12. Sides of clypeus keeled. Fam. 35. DICTYOPHORIDAE
Sides of clypeus not keeled (median ocellus absent). Fam. 31. CIXIIDAE (part)

In using the above Key the term "face" is to be understood as including all the ventral frons down to the clypeus.

Family 31. **Cixiidae** [Aus. 25, N.Z. 17]. These are amongst the most primitive of Fulgoroids, and are the only ones in which all three ocelli are sometimes found, the median one being carried on the frontal ridge between

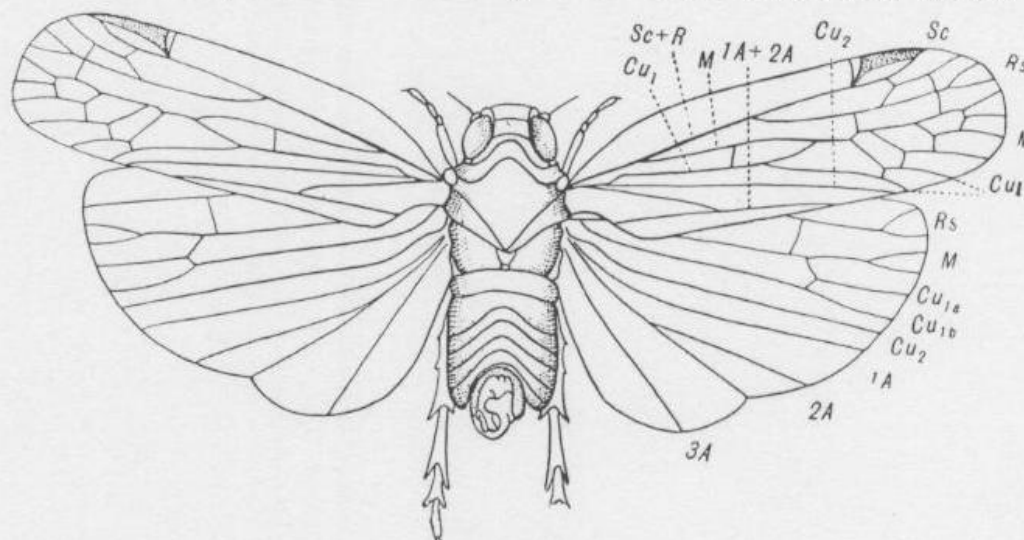


FIG. Q29. *Koroana helena* Myers, New Zealand. Fam. Cixiidae. Expanse of wings 10.5 mm. Lettering as in fig. A8, p. 22. See remarks on p. 142 (fossils). [A. Tonnoir del.]

the eyes. The commonest genera are *Koroana* (fig. Q29) in New Zealand, *Oliarus* both there and in Australia. *O. asaius* Kirk. occurs around Sydney, and *O. oppositus* Walk. in New Zealand. The larvae are found in ants' nests.

Family 32. **Delphacidae** [Aus. 52, N.Z. 6]. These are mostly very small insects easily recognized at once by the large mobile spur at the end of the hind tibiae. Most of the species belong to the genus *Delphacodes*. The most notorious species is the Sugar-cane Hopper, *Perkinsiella saccharicida* Kirk. (fig. Q31) a native of N. Queensland, which was accidentally introduced into the Hawaiian plantations, and did immense damage until it was controlled by the introduction of its natural enemies. *Micromasoria caelata* F.B.W. (fig. Q30) New Zealand species.

Family 33. **Tropiduchidae** [Aus. 5, N.Z. 0]. The Australian species of this family are confined to Queensland, and include the beautiful and delicately formed *Ossa venusta* Kirk. and *O. formosa* Kirk.

Family 34. **Derbidae** [Aus. 30, N.Z. 1]. The species of this family are mostly tropical or subtropical; they are all beautiful insects, many with a delicate colour pattern of yellow, brown, or cream-colour on the tegmina, and having a rather specialized venation. The New Zealand species is *Eocenchrea*

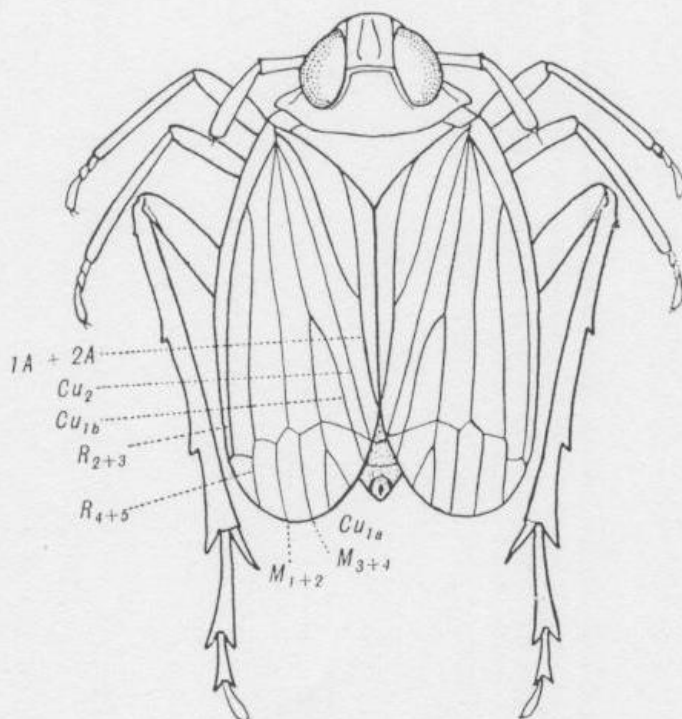


FIG. Q30. *Micromasoria caelata* F.B.W., New Zealand. Fam. Delphacidae. Length 4.5 mm. Note the movable spurs on hind tibiae. Lettering as in fig. A8, p. 22. See remarks on p. 142 (fossils). [A. Tonnoir del.]

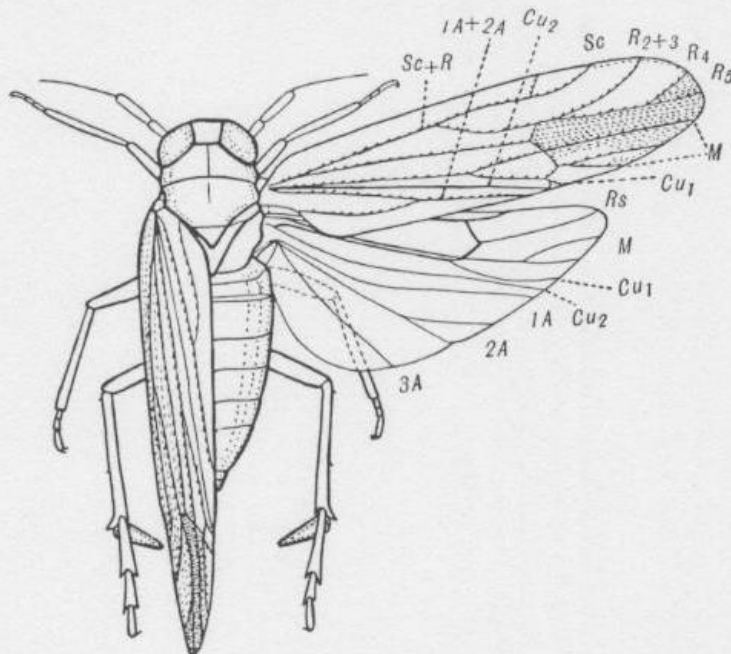


FIG. Q31. *Perkinsiella saccharacida* Kirk., the Sugar-cane Hopper. Fam. Delphacidae. Length of forewing 5 mm. Note the movable spurs on hind tibiae. Lettering as in fig. A8, p. 22. See remarks on p. 142 (fossils). [A. Tonnoir del.]

maorica Kirk. (pl. 12, fig. 24); it may be beaten from the undersides of tree-fern fronds. The commonest Australian species is the pretty *Rhotana chrysonoe* Kirk. (fig. Q32) with rather broad, yellowish wings; it may be beaten in numbers from trees or bushes near water. The genus *Zoraïda*, containing several Australian species, has exceedingly long, narrow wings, but the abdomen is very short.

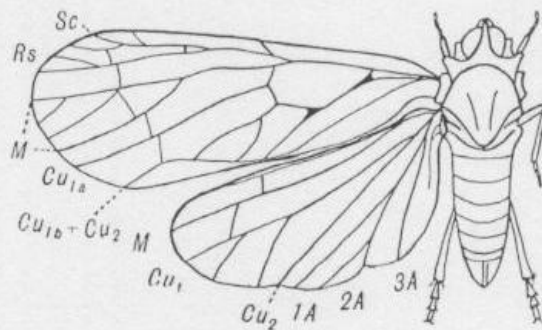


FIG. Q32. *Rhotana chrysonoe* Kirk., Australia. Fam. Derbidae. Length of body 2.5 mm. Lettering as in fig. A8, p. 22. See remarks on p. 142 (fossils).

Family 35. **Dictyophoridae** [Aus. 8, N.Z. 1]. In this family the wings are rather narrow and the head is prolonged greatly forward. Five of the Australian species belong to the genus *Thanatodictya*, *T. hebe* Kirk. being the best known. *T. tillyardi* Myers (pl. 2, fig. 11) recently discovered near Nelson, is the only known New Zealand species.

Family 36. **Fulgoridae** [Aus. 15, N.Z. 0]. Though not as large as the species of this family found in other countries, the Australian representatives are of fair size, mostly expanding from 1 to 1½ inches. The clavus is open distally, running the full length of the wing, and carries numerous cross-veins between the anal veins. Of these, the six beautiful species of *Desudaba* are the best known. *D. maculata* Dist. (pl. 11, fig. 15) has the tegmina a dark brown colour with numerous large spots, and the bases of the hindwings a brilliant crimson; it expands about 1½ inches. *D. psittacus* Walk. is somewhat smaller, with a green abdomen, unspotted tegmina and less crimson on the hindwings. *Eurynopsyche doddi* Dist. (pl. 12, fig. 25) is a peculiar brownish species with a projecting process in front of the head, like an elongated snout. All the species come from Queensland, except *Eurystheus dilatatus* Wwd., which is found in Western Australia around Perth.

Family 37. **Eurybrachidae** [Aus. 28, N.Z. 0]. The members of this family are broad, squat insects of fairly large size and mottled brown and orange colouration, peculiar to Australia, where they live on the trunks of eucalyptus trees.

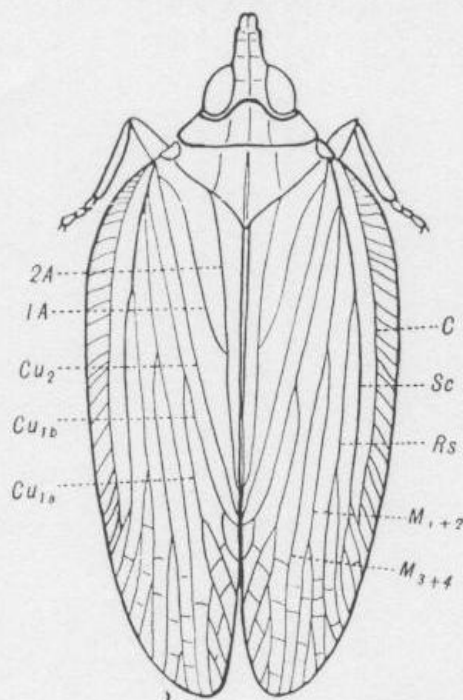


FIG. Q33. *Lophops saccharicida* Kirk., Australia. Fam. Lophopidae. Length from tip of snout to apex of tegmen 12 mm. Lettering as in fig. A8, p. 22. See remarks on p. 142 (fossils). [A. Tonnoir del.]

Most of the species belong to *Eurybrachys* and *Platybrachys*; the species have been badly described, and are much in need of revision. *P. leucostigma* Walk. is common around Sydney.

Family 38. **Achilidae** [Aus. 14, N.Z. 1]. This family is peculiar in having the tegmina folded flatly when at rest and partially overlapping; the clavus is rather short, ending up little beyond half-way along the tegmen, and making a distinct angle with it. The bright red *Achilus flammeus* Kby. (pl. 11, fig. 17) is the best known Australian species. The only New Zealand species is *Agandecca annectens* F. B. W.

Family 39. **Issidae** [Aus. 20, N.Z. 0]. This family contains dull-coloured species, mostly found in Queensland, with peculiar tegmina of tough consistency, often shortened or convex. The principal genera are *Issus*, *Lollius*, *Gelastissus*, and *Chlamydipteryx*.

Family 40. **Lophopidae** [Aus. 1, N.Z. 0]. The well known *Lophops saccharicida* Kirk. (fig. Q33), a prettily marked species with the tegmina yellowish-brown with darker stripes, is the only recorded Australian species; it is found in Queensland on sugar-cane and grasses.

Family 41. **RicanIIDae** [Aus. 9, N.Z. 0]. The only common species is *Scolypopa australis* Walk. (fig. Q34 and pl. 12, fig. 26) the Passion-vine Hopper, which sometimes does considerable damage to passion-vines. It sits in rows along the stems with the wings forming a broad triangle; the tegmina are hyaline, heavily barred along costal and distal margins with black. This species

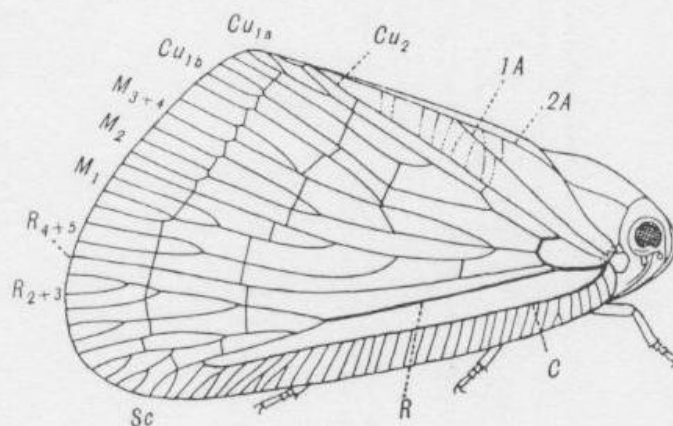


FIG. Q34. *Scolypopa australis* Walk., the Passion Vine Hopper, Australia and New Zealand (introd.). Fam. RicanIIDae. Total length 10 mm. (See also pl. 12, fig. 26). Colour-pattern omitted. Lettering as in fig. A8, p. 22. See remarks on p. 142 (fossils). [R. J. T. del.]

has been accidentally introduced into the North Island of New Zealand, in parts of which it now exists on all the native vegetation in countless swarms, besides doing damage to orchards.

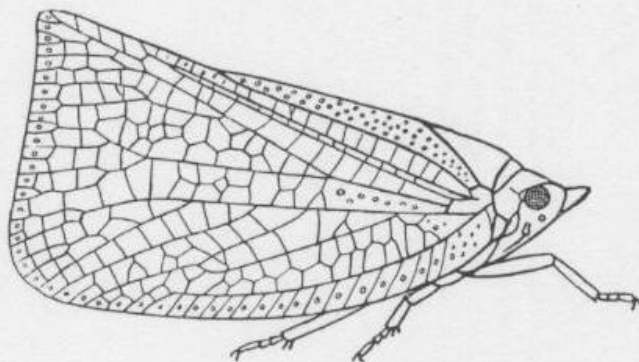


FIG. Q35. *Siphanta acuta* Walk., the Green Eucalyptus Hopper, Australia and New Zealand (introd.). Fam. Flatidae. Total length 9 mm. (See also pl. 6 fig. 8). Colour-pattern (pale venation on opaque green tegmen) omitted. [R. J. T. del.]

Family 42. **Flatidae** [Aus. 40, N.Z. 0]. These graceful insects are the most highly evolved of all Fulgoroids. Their broad triangular tegmina, generally opaque and coloured, are folded closely against the body so as to form a very high roof over it. The principal Australian genera are *Siphanta*, *Euphanta* and *Sephena*. The bright green *Siphanta acuta* Walk. (fig. Q35 and pl. 6, fig. 8)

is the commonest species; it feeds on the leaves of eucalypts. This species is common in some parts of New Zealand, where it has been accidentally introduced. *Colgar peracuta* Walk. is a fairly common, pale green species with a pink border to the tegmen. Another species of a bluish grey colour, *Sephena cinerea* Kirk. (pl. 6, fig. 9), has also got into the North Island of New Zealand, and is now very abundant; it has been proved to carry fireblight (*Erwinia amylovora*) amongst apple and pear trees.

Division STERNORRHYNCHA

In this division are placed only small, highly specialized forms, in which the venation is reduced, with never more than six veins ending around the distal half of the forewing, which is seldom of true tegminous type; the hindwings are much reduced, with *R*, *M* and *Cu*₁ unbranched. The antennae appear to be more primitive than in the Auchonorrhyncha, being clearly segmented and possessing up to 25 segments. The part of the head capsule carrying the beak is detached from the rest and appears as if arising from between the forelegs. The tarsi never have more than two segments. There are four families, which are best arranged into two superfamilies as follows:—

Tarsi with two segments, the basal segment sometimes reduced, and with two claws; wings, when present, four in number. XIV. PSYLLOIDEA
Tarsi with only one segment and a single claw; males with only the forewings present; females always wingless. XV. COCCOIDEA

Superfamily XIV. PSYLLOIDEA.

The three families comprising this group may be easily distinguished as follows:—

1. Jumping insects, with femora thickened; empodia present, bilobed.
Fam. 43. PSYLLIDAE
Non-jumping insects, with slender femora; empodia, if present, not bilobed. 2
2. Wings opaque, whitish; body covered with meal; the two tarsal segments nearly equal in length; empodium present, in the form of a pad or spine. Fam. 45. ALEURODIDAE
Wings transparent, sometimes coloured; body not mealy; tarsi with the basal segment sometimes much reduced; empodium greatly reduced or absent. Fam. 44. APHIDIDAE

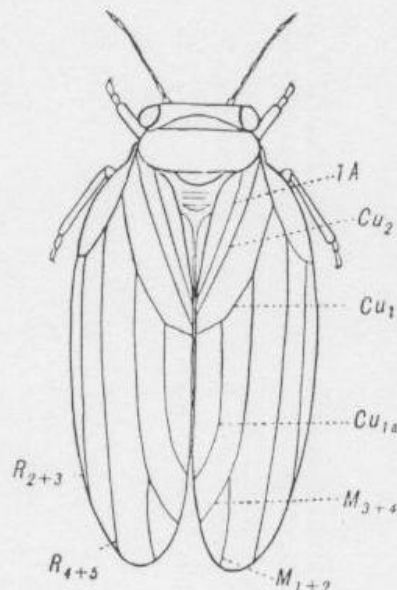


FIG. Q36. *Rhinocola fuchsiae* Mask., New Zealand. Fam. Psyllidae. Length to apex of tegmen 2 mm. Lettering as in fig. A8, p. 22. See remarks on p. 142 (fossils). [A. Tonnoir del.]

Family 43. Psyllidae (Jumping Plant-lice, Lerp-insects) [Aus. 80, N.Z. 6]. In both countries this family takes the place of the true Plant-lice or Aphididae, their larvae clustering in immense numbers on the young foliage of eucalyptus, wattles and other plants. The larvae of many of the species secrete waxy tests or scales, or produce galls on leaves. A large number of the Aus-