

AUSTRALIAN *PSYLLIDÆ*.

BY WALTER W. FROGGATT, F.L.S.

(Plates xi.-xiv.)

## INTRODUCTION.

The insects of this family of the Homoptera, like those of several other groups of the order, are very interesting because of the remarkable larval and pupal transformations they exhibit in the course of the metamorphosis, as well as for the curious protective coverings—lerps or scales,—which many of the tiny larvæ commence to fabricate as soon as they emerge from the egg. The lerp or scale is added to as the insect increases in size up to that of the full-grown pupa; then crawling from beneath it, it casts the final pupal shell, and emerges as the perfect insect.

The best known Australian species are those that form the leaf manna upon the foliage of Eucalypts. As far back as 1849 Anderson (1) described the chemical composition of some “manna” (lerp) that had been obtained in the Mallee-gum scrubs in the north-western part of Victoria. This paper was reprinted by Dobson (2), who added a description of an insect which forms similar sugar-like lerp on the foliage of Eucalypts in Tasmania, under the name of *Psylla eucalypti*. He gave a careful account of the way in which the larvæ construct the scales; and he figured two other species besides the one he named.

Another interesting paper dealing with the structure of the lerp-scales was written by Wooster (3) who watched the larvæ of the same or an allied species lifting the sides of the scale while they raised the walls to form an addition to it from below.

Tepper (4) has also given a general account of the so-called “manna” upon the leaves of *Eucalyptus gracilis* and *E. leucoxydon* in South Australia.



Beveridge (5) in a paper on the Aborigines of the Lower Murray and Darling Rivers has also referred to it under the heading of "Laarp," which, he says, "is the excrement of a small green beetle wherein the larva thereof is deposited." He gives a very remarkable account of how the natives collected and fed upon the lerp-scales during the summer months; and he adds that it is so plentiful "that a native can easily gather from 40 to 60 pounds weight of it in a day." But this must be a slip, for old residents of the Wimmera, where it was very plentiful before the Mallee scrub was cleared off, have informed me that 2-3 lbs. was quite as much as any one could obtain in a day; and that the blacks used to gather it for food in winter, rolling it up in bark and hiding it in the trees; when they wanted to eat it they first moistened it with water.

Many species form regular galls and blisters upon leaves, chiefly those of Eucalypts. These first appear as little pits, which swell into either bubble-like excrescences or thickened rounded masses enclosing the larva. This emerges from an opening either on the upper or under surface of the leaf.

Others again hide under loose bark on the trunk or branchlets of a tree, enveloping themselves in a mass of flocculent matter, which exudes and forms white spots dotting the trunk all over. These species are so diligently looked after by several kinds of ants which sometimes form galleries over them that it is difficult to collect specimens.

Most of the naked species are more common upon Acacias and other scrub trees than upon Eucalypts, and swarm in such numbers on the under surface of the leaves or over the young branchlets, as at first sight to be easily mistaken for aphides.

Some of the true lerp-producing species present very curious examples of insect architecture. The lerp-scales are sometimes like little cockle shells with delicately crenulated edges, semi-transparent or opaque, black or richly tinted with yellow or red; some are smooth and flattened, others convex and covered with fine hairs; sometimes they are closely attached to the leaf, but



the more delicate ones are simply fixed to it by a hinge at the apex, the larva being free to crawl in or out.

All the lerp-scales are fabricated by the larvæ and pupæ from the excess of sap or juice sucked up through their sharp bills from the food-plant. This is ejected in small globules from the anus, but it is quite different from the excrement. It is another form of honey-dew, which when drawn out into fine threads by the feet and spun into the net-like sugar lerps, solidifies and hardens in the sun. In the naked species the larvæ expel the sap which forms a real honey-dew as in the case of the European pear-tree Psylla (*P. pyricola*), in which it is so excessive that the whole foliage and trunk of the tree become smothered with the exudation; this in turn is attacked with a fungus which covers it with a smutty black coat (fumagine) seriously injuring the tree.

The Australian fauna is very rich in species of Psyllidæ, but from their small size and active habits in a country so rich in larger and more conspicuous insects they have been naturally rather overlooked, for they are seldom to be met with except by sweeping among the brush with a net, or by breeding them from the larvæ and pupæ upon infested foliage. In the British Museum Catalogue of the Homoptera (1850-51), Walker records five species, all from Tasmania. Another species also from Tasmania was added to the list by the same author in his Descriptive Catalogue of Saunders' Collection of Insects published in 1855.

Nothing further was done until Maskell (6) published his paper on the species in New Zealand, in which he described four new species. One of these, *Rhinocola eucalypti* lives upon the young shoots of the "blue gum" (*Eucalyptus globulus*), and is common in New South Wales, so that it may have been introduced into New Zealand.

Scott studied the types in the British Museum Collections in 1882 (8), and redescribed Walker's species, *Livia longipennis*, which he placed in the genus *Creiis*. It was described from Tasmania, but I have a fine series of it both from Victoria and New South Wales. The larvæ make one of the finest golden-ellow lerp-scales.



In 1895 Tryon (9) gave a brief description of the eggs and larvæ of a species which is very plentiful in the spring and autumn upon the foliage of the "Moreton Bay Fig" (*Ficus macrophylla*). The larvæ prick the leaves with their sharp rostra, and live in social groups protected by masses of coagulated sap.

In 1898 a paper by Maskell was published shortly after his death in which three species from Australia were described (9).

The last paper dealing with Australian species is that by S. A. Schwarz (10), who redescribed Dobson's *Psylla eucalypti*, placing it in Signoret's genus *Spondyliaspis*; and added a new species.

The above is a summary of all that has been written on Australian *Psyllidæ*; but the foreign species have had many admirers, and have been well worked out.

In a group of Micro-Homoptera like the *Psyllidæ*, where the largest are hardly over two lines in length, there is a very great difference in examining carded or mounted specimens, sometimes many years old, in Museum Collections, and series of living insects of the same species, with a knowledge of their life-histories. Therefore, to describe them properly, there is no doubt that the correct mode of studying them is upon the spot and in relation to their food-plants. Fortunately they are very easily bred out, and in most cases when the food-plant is obtained specimens in all stages of development, from the egg to the perfect insect, may be found and worked out upon the same branch of foliage, the whole life-history being under review at once.

I have to tender my thanks to the following gentlemen for their kindness in sending me specimens and notes:—Messrs. C. French and C. French, Jr., of Victoria, Mr. H. Tryon of Brisbane, and Mr. A. M. Lea of Tasmania. To Dr. Horváth of Hungary and Dr. Howard of America I am indebted for papers dealing with the family, and to Mr. J. H. Maiden of Sydney for notes and papers upon the subject of manna.

#### CLASSIFICATION.

The *Psyllidæ* form a very well defined family of the suborder Homoptera, closely allied to the *Aphidæ* in habits and form. I



have one species bred from the Kurrajong (*Sterculia heterophylla*) that, on a superficial examination, is wonderfully like a green-winged aphid. In their larval habits they are much more coccid-like, and some of the lerp-scales produced might very easily be mistaken for a coccus. They seem also to have some relationship, particularly in the larval stages, with the *Aleurodidae*. Most of the larvæ of *Aleurodes* form rounded disc-like shells or tests under which they pupate, but those of some of the Australian species pit the leaves of Eucalpyts exactly like some Psyllids; however in the adult stage *Aleurodes* shows a much closer relationship to the Coccids, and might be described as a higher type of this group, with both sexes winged, but with a very primitive venation. In the *Psyllidæ* the venation of the wings is very well-defined, and characteristic of the species. Sharp (11) places the *Psyllidæ* in the sixth family of the Homoptera after the *Jassidæ* and before the *Aphidæ*, a very natural position. In this he follows most of the later systematic entomologists who have placed them from their external characters.

A great deal has been written about the classification of the *Psyllidæ*. Réaumur named them Faux Pucerons from their relation to the *Aphidæ*. Linnæus placed them in the genus *Chermes* (now restricted to a group of the *Coccidæ*). Geoffroy, considering that the later name had been improperly used by Linnæus, gave them the very appropriate generic name *Psylla*, from the Greek for a flea, in reference to their jumping powers.

A number of later papers were written in which *Psyllidæ* were described, but it was not until 1848 that any regular classification of this family was undertaken. In this year A. Förster (12) defined the different genera, added several new ones, redescribed the old species, and described a great number of others. Dr. Franz Löw has been one of the most prolific writers upon this family. In 1878 (14) he divided them into four subfamilies; and in 1882 (15) he published a complete revision of all the described palæarctic species, with their synonymy, followed by a catalogue thereof in the same year, in which he listed over 170 species (16).



Most subsequent writers have followed Löw's classification. In the same year Scott (18) formed a fifth subfamily for Walker's two genera *Carsidara* and *Tyora*.

The members of the family have a wide geographical range. Europe is particularly rich in numbers; Southern Asia and the Northern parts of Africa have a fair supply. Riley and some of the earlier writers have described the North American species, and Scott several from South America. Buckton has dealt with three from India, and Schwarz with one from Japan. They appear to be more numerous in temperate climates, or dry semi-desert lands, than in the tropics, and the dry open ranges of Australia covered with stunted *Eucalyptus* shrubs are very rich in species.

The eggs are either bright yellow or brown, sometimes scattered all over the foliage; at others, particularly in the case of the lerp-producing species, clustered together in irregular rows from ten to forty in number. Their form is generally elongate-oval, sometimes pointed at the extremities; and sometimes there is a slight keel down the centre of the dorsal surface. The shell splits down the centre when the tiny larva emerges.

The larva is generally pale yellow, elongate in form, with the head and the abdomen rounded at the extremities; the antennæ short, stout, and pointed at the tip; the eyes red, small, and irregular in form; the legs stout and long, with the digitules of the tarsi long. During its successive moults it may change its colour several times; a bright yellow larva frequently changes to bright green or red before its final moult into the full grown pupa; the indications of the fuscous-brown or black dorsal marks become more distinct and defined at each ecdysis, so that these graduations of colour become very interesting to the observer. Several writers have noticed this variation of colours. Réaumur observed it as far back as 1773 (17), when studying species. The larva at a very early stage of development shows two rounded pads or projections upon the sides of the thoracic segments, which afterwards form the wing-covers of the pupa, the transformations being so gradual that it is difficult to define the borderland



between the larva and pupa, or where one stage ends and the next commences. In dealing with their development, when all stages have been obtainable, I have taken the smallest form to be found as the larva, and defined the pupa from the largest, frequently just as it is ready to cast its skin and emerge as the perfect insect. Though the changes are gradual, each moult brings some alteration; first, the abdominal segments show the line of separation from the thorax, next the line between the base of the head and thorax, and the enlargement of the wing-covers. The antennæ, though not increasing much in length, show more joints; in the earlier stages the 3rd joint is very long, and the additional joints, until the normal number of nine is reached, appear to divide off from the apical portion of the elongated third joint, which, however, is generally the longest in the perfect *Psylla*. Many of the larvæ and pupæ are covered with fine hairs; most of the species that are naked (not forming lerps or galls) have the hairs upon the dorsal surface covered with tiny particles of white sugary secretion, with those on the sides converted into white filaments sometimes of considerable length.

The perfect insect might be compared to a minute cicada in general form, but there the actual resemblance ends. The head is generally broader than long, sometimes deflected, with large eyes; the ocelli three in number, the lateral ones placed on the summit of the head close to the hindmargin of the eyes, and the central one at the lower margin at the apex of the median suture. The face lobes are generally hairy, sometimes long and projecting in front of the head; in some species angular, rounded, short or ribbon-shaped and almost hidden; or exceptionally wanting in some groups; the form of the processes seems to be of considerable generic value. The antennæ are composed of ten joints, the first two shorter and thicker than the remaining generally filiform ones, and terminating at the apex with two short setæ.

The thorax is broad, the pronotum narrow, with the mesonotum divided into three unequal parts—the first the dorsulum, the second the mesonotum proper, large and broad, and the third or



scutellum rounded. The wings are fully developed in both sexes; the elytra or forewings longer than the abdomen, with stout nervures, the costal with or without a stigma; the venation is simple and constant, and of both generic and specific value. From the primary vein run the radius parallel with the costal, the cubitus which branches into an upper and lower arm, each again bifurcated into a more or less regular cell at the apex; the cubitus with or without a petiole; the hindwings simple. The legs are formed for jumping; the coxæ of the hind pair armed with a rounded spine; the apex of the tibiæ of the hind legs armed with a fringe of fine spines; the tarsi two, with large double claws. The abdomen is composed of six segments. The genitalia of the male comprise an upper and lower valve, two curved processes known as the forceps, and an enclosed penis. The female genitalia consist of two more or less elongate valves enclosing the ovipositor. The form and structure of the genital organs are also of use for specific characters, and are constant in each species.

The colouration and size are not constant. Löw says, with reference to the European species (18), that not only are there differences in the colour according to the age of the insects, but the same species on a different food-plant varies; and that the successive generations change with the seasons in both particulars. In Australian species so far I do not find any perceptible difference in the successive broods (many of which live all through the year), probably on account of the comparatively uniform climate; but the colouration is very variable in some species, particularly in those hiding under bark or crawling upon the foliage in their larval state, while the males are often the smallest. Though some do not vary in the least, being distinctly marked when they emerge from the pupæ, others often take several days to attain the dark markings upon the wings, and these vary and fade away to the faintest tinge of brown in individuals of the same brood; pale yellows become ochreous, and browns black. After a time many of the richest colours fade or change into darker tints.



All the species that I have examined appear to fall very naturally into the subfamilies defined chiefly upon the structure of the wings by F. Löw. Those forming lerp-scales or hiding under bark are referable either to the *Liviinæ* or *Aphalarinæ*; most of those living among flocculent matter upon foliage or forming rudimentary lerps to the *Psyllinæ*; and all the true gall-producing species (with a few exceptions) to the *Triozinæ*.

I have not proposed new genera for any species that I could at all reasonably refer to genera already well-defined; and if I have erred on the side of caution, specialists will be able to rectify this defect. This course appears to be preferable to forming new genera on such scanty material, as has been done in the past; one of Walker's genera, for instance, being based on the examination of a single specimen minus the head.

In a large series of specimens one frequently meets with examples possessed of an extra cell or cross nervure in the wings; such, if examined alone, would certainly not fit the genus to which the species belongs. It also appears to me that some of the latest genera established by Riley and others are so minutely defined that they can only take in the single species upon which they are founded, whereas if they had received more general treatment they might have included all allied forms.

In Schwarz's paper (10) he discusses the position of the genus *Spondyliaspis*, to which he refers the typical lerp-producing species, *Psylla eucalypti*, Dobson; and he comes to the conclusion that "the peculiar structure of the hind tibiæ and tarsi possesses more than a generic value"; and he accordingly proposes a new subfamily, *Spondyliaspinæ*. But as all the subfamilies previously established have been defined almost entirely upon the structure of the forewings, I should prefer to see it remain in the *Aphalarinæ*.

The following comprises a list of the genera placed in the first two subfamilies.

Family PSYLLIDÆ, Latr.

i. Subfamily LIVIINÆ, F. Loew.

Front of head not produced into conical processes; eyes not prominent. Stalk of cubitus shorter, as long as, or longer than



lower branch of cubitus; upper furcation very long and narrow; upper fork of lower branch of cubitus very long, more than twice as long as lower fork.

Genus i. — LIVIA, Latr., Hist. Nat. Ins. Vol. xii. p. 374, 1804  
(*Diraphia*, Illig.).

ii. — CREIIS, Scott, Trans Ent. Soc. Lond. p. 462, 1882.

iii. — LASIOPSYLLA, n.g.

Genus CREIIS, Scott.

Head: crown down the centre more than half the breadth between the eyes. In front of each eye a short angular tooth, front margin convex. Front lobes long, stout, vesicate. Antennæ long, slender. Eyes viewed from above hemispherical, placed on the side of the head.

Thorax: pronotum narrow, widest at lateral margins, within which is a small fovea; dorsulum moderately convex; mesonotum of an irregular hexagonal shape. Elytra elongate, rounded at apex; radius joining marginal nerve before apex, furcations of cubitus elongate.

Type *Livia longipennis*, Walker.

C. LONGIPENNIS, Walker.

(Plates xi., fig. 1; xii., fig. 17; xiv., fig. 8).

*Livia longipennis*, Walk., B.M. Cat. (Homoptera) p. 910, 1851;  
*Psylla livioides*, Walk., Ins. Saunders. Homop. pt. iii. p. 111;  
*C. longipennis*, Scott, Trans. Ent. Soc. Lond. 1882, pt. 3, p. 463.

*Lerp* formed upon the leaves of *Eucalyptus* sp., not more than one or two upon a leaf, rich canary-yellow, attached to the leaf by a regular flange from which it swells out, lobed on either side to a broadly rounded apex, convex, the edges in contact with the leaf somewhat flattened; formed of opaque threads running from the flange in a crescent pattern so close as to give it a granulated appearance, but the whole of the upper surface thickly clothed with long hair-like filaments, giving it a very beautiful appearance; the outer hairs easily abraded, and many specimens are more



or less denuded of the outer covering. Diameter through centre 5, across 6, height above surface of leaf 1 line.

*Larva* and *pupa* unknown.

*Imago*.—Length .27 inch, antennæ .13 inch.

General colour red, eyes dark brown, apex of central abdominal segments on dorsal surface banded with black, lower portion of genitalia yellow; wings pale brown, semiopaque, coriaceous and very finely wrinkled, nervures red. Head small, deeply cleft in front, with a median suture and shallow fovea on sides, truncate behind base of antennæ; a small angular tooth in front of eyes, arcuate behind. Face lobes large, rounded at apex and clothed with grey hairs. Antennæ very long, cylindrical, 1st and 2nd joints short and rounded, 3rd long, 4-5th shorter, 6th-8th longer, 9th short, 10th very short and rounded at tip. Eyes rounded on outer margins: ocelli—central ocellus large, oval, at apex of median cleft; lateral ocelli large. Thorax: pronotum narrow, depressed on sides; dorsulum large, rounded on both sides, coming to a point on sides; mesonotum very large, depressed in centre, swelling out on sides, with the scutellum almost cordiform. Legs short and stout. Wings thrice as long as broad, rounded at apex; primary stalk rather short, stalk of subcosta short; costal cell elongate, with a second or false costal nervure running to base of stigma in a line with the outer one; stigma small, running out into costal nervure; radius long, not reaching apex of wing, curving upward at extremity: stalk of cubitus longer than stalk of subcosta, upper branch long, upper and lower forks long, the latter coming down below apex of wing; lower branch of cubitus long, upper fork long, lower fork turning down. Clavus stout, clavical suture distinct. Genitalia (♂) large; lower genital plate angular, forceps small and shaped like half a lobster's claw, with the point turning upward; penis large, upper genital plate broad at base, reaching beyond tip of forceps and truncate at tip.

*Hab.*—Tasmania (one specimen; C. Hedley); Melbourne, Vic. (four specimens; C. French); Armidale, N.S.W. (two specimens; R. Etheridge, Jr.).



This is not a common species, and individuals are generally found singly upon leaves. Walker's two specimens in the British Museum come from Tasmania. Mr. Lea has lately sent me several worn lerp-scales from the neighbourhood of Hobart. When fresh the lerp is one of the most beautiful Australian forms, but the thick covering of filaments soon wears off when exposed to the weather.

Genus LASIOPSYLLA, n.g.

Head similar to that of *Creiis*, with a short tooth on sides of eye, and long slender antennæ. Thorax large, convex; pronotum short, sharply rounded in front; dorsulum large, arcuate in front, broadly rounded on sides. Wings nearly thrice as long as broad, with an inner or false costal nervure running close and parallel to costal nervure, merging into it at shoulder; stigma wanting; radius short, nearly straight, stalk of subcosta a little shorter than stalk of cubitus; upper fork of lower cubitus very long, curving in at centre. Apex of hind tibiæ dilated, and bearing three fine black spines on the edge.

LASIOPSYLLA ROTUNDIPENNIS, n.sp.

(Plates xi., fig. 2; xii., fig. 4; xiv., fig. 11).

*Lerp.*—Large, flattened, thin white scales, up to nearly  $\frac{1}{2}$  inch in diameter, irregularly rounded, arcuate at the hinge, attached to the leaf by a small hinge from which the scale grows in concentric rings, giving it a reniform shape; convex in centre, with outer margin pressed close to the leaf; on the leaves of *Eucalyptus melliodora*, *E. polyanthema* and several other allied species; sometimes single or half a dozen overlapping each other.

*Larva.*—General colour dull yellow, tinged with pink on abdomen and legs; antennæ barred with black; two large blotches on head, and a double row of impressed black spots running to tip of abdomen where they come to a v-shaped point; anal tubercle black. Head truncate, slightly rounded in front, forming with thorax a solid piece widest at base of abdomen; eyes very small;



antennæ very slender, short, mottled with black. Abdomen flat, swelling out from base, broadest in centre, outer edges of segments rounded; anal tip pointed.

*Pupa*.—General colour pale sea-green with blotches on head, two smaller ones in front; legs, antennæ, two spots at hind margin of head, and those on the thorax and abdomen as in larva black. Head large, lobed in front, arcuate behind; eyes swelling out, rounded behind; antennæ very long, curving round and tapering to tips, 1st-2nd joints short, stout, 3rd long, slightly elbowed; eyes projecting, slightly rounded. Thorax long, wing-cases large; legs long and stout. Abdomen as in larva.

*Imago*.—Length .23 inch, antennæ .09 inch.

General colour yellowish-brown deeply tinted with pink; antennæ reddish, with the apex of each of the last 8 joints dark brown; face red, shaded on the outer margin with chestnut; eyes dark reddish-brown: segments of thorax dull red shaded with pale brown, segmental divisions black, the red replaced in male both on head and thorax with black: legs yellow, tarsi brown; wings semiopaque, coriaceous, the apical portion in female thickly clouded or mottled with fuscous, nervures red; abdomen beautifully barred with red, edged on either side with green and a fine black band below. Head large, truncate in front, with a deep cleft in centre and a fine median suture with a broad fovea on either side; forehead folded above, sloping down on either side behind antennæ, arcuate behind. Face lobes short and broad, fringed with fine grey hairs. Antennæ long, slender, 1st and 2nd joints stout and broad, 3rd longest, 4th shorter than 5th and 6th, 9th very short, 10th not more than half as long, very small and truncate at tip. Eyes very large, occupying the whole side of head, angular on inner margins: ocelli—central ocellus very small, lateral ocelli large, bright red close to hind margin of eye. Thorax: pronotum rounded in front, arcuate behind, curved and rounded at extremities behind eyes; dorsulum short and broad, rounded in front, the side angular, with hind margins truncated; mesonotum very large, with a slight angular point on sides sloping



back to scutellum, truncate at apex; scutellum large, truncate in front, rounded behind. Legs long, femora of forelegs very stout and thickened; tarsi long. Wings large, very long, over thrice as long as broad; costal nervure rounded at base, slightly hollow in centre and curving round at tip to hind margin of wing, which is nearly straight; primary stalk long and stout; stalk of subcosta shorter than stalk of cubitus; costal nervure double at base, but without any true subcostal cell or stigma; the costal cell long and slender, tapering out into a tail between costal and subcostal nervures; radius long, turning up at tip of wing; stalk of cubitus longer than stalk of radius, upper branch short, bifurcated about centre of wing, upper and lower forks of equal length, running out at tip of wing and forming a very elongate slender cell; lower branch of cubitus shorter than upper, upper fork very long, curving down before reaching tip of wing; lower fork transverse, running out at a sharp point; clavus very thick and short, clavical suture running through centre of the long, slender, anal cell. Abdomen stout and rounded to tip. Genitalia (♂) short and broad; lower genital plate short, angular; forceps oval; penis hidden; upper genital plate long, slender: (♀) upper and lower genital plates short and pointed, clothed with fine hairs.

*Hab.*—Melbourne (on *E. melliodora*; Mr. C. French, Junr.), and Bendigo, Vic. (on *E. polyanthema*; W. W. Froggatt); Hobart, Tas., (lerp only, on *E. sp.*; Mr. A. M. Lea); Bathurst, and Tumut, N.S.W. (on *E. melliodora*, and *E. polyanthema*; W. W. Froggatt); Brisbane, Q., (lerp only, on *E. sp.*; Mr. H. Tryon).

This is a very common species where the particular species of Eucalypts enumerated grow, and has a very wide range over the eastern portion of Australia. I have seen bushes about Bathurst covered with the white lerp-scales in the early summer. I have another form of the lerp collected on the foliage of a low scrub Eucalypt growing on the river flats near Bourke, Darling River, that has puzzled me very much, for though I can see no specific differences in the pupa or perfect Psyllid, yet the lerp-scale, while of the same colour and shape as the more common coastal species, is



quite different in its structure. Instead of being formed in concentric rings, it is made up of close delicate parallel bars, which run from the base to the outer margins, giving it a beautifully striated appearance.

LASIOPSYLLA BULLATA, n.sp.

(Plates xi., fig. 3; xii., fig. 16; xiv., fig. 15).

*Lerp.*—Thin bubble-like galls or excrescences upon the upper surface of the leaves, produced by the attacks of the larvæ on the under surface of the leaves of several species of Eucalypts; narrow and constricted at base, but swelling out in an elongate-oval or rounded gall, from 4-8 lines in height and 4-5 in diameter; very variable in shape, and from 1-12 on a single leaf; when fully developed the general green colour is frequently brightly tinted with red and yellow. Basal orifice large, but closed with a circular cake of saccharine matter; the small larva crawls about in its spacious chamber until nearly ready to pupate; then it is enveloped in a mass of white flocculent wool, though in its earlier stages quite free from such filaments.

*Larva* bright canary-yellow, legs and antennæ semitransparent, eyes bright red, the dorsal surface showing traces of the fuscous marking of the pupa. Head short, broad, rounded in front, antennæ very long and stout, clothed with coarse hairs. Thorax short, broader than head; legs stout, covered with coarse hairs. Abdomen long, rounded and coming to a rather slender point, lightly clothed with coarse hairs.

*Pupa* dull ochreous-yellow, apical portion of thorax and abdomen pale green; dorsal surface of head, wing-covers, centre of thorax, and a double row of spots on abdominal segments fuscous. Head rounded; antennæ very long, of a uniform thickness, curving round to shoulders, pointed at tips; eyes large, not projecting. Thorax very broad; wing-covers large, long, rounded at tip. Abdomen short and broad, constricted at base, rounded to anal tip.

*Imago.*—Length .26 inch, antennæ .07 inch.



General colour light chestnut and bright yellow; wings coriaceous, light brown, with reddish-brown nervures; clavical suture bright pink, giving it a very distinctive appearance. Head small, curving down in front, truncate at base, deeply cleft in front, rounded to eyes, with a median ridge and large shallow depression on either side. Face lobes short and broad, rounded and clothed with long grey hairs. Antennæ long, slender, springing from below inner margin of eye; 1st-2nd joints very short, 3rd very long, 4th-9th slender, uniform in length, 10th short and slightly thickened at tip. Eyes large, reddish-brown, not projecting: ocelli large, central ocellus at the apex of frontal cleft, lateral ocelli close to hind margin of eyes. Thorax: pronotum very small, convex in front; dorsulum hexagonal, convex on summit, rounded at apex; mesonotum deeply arcuate in front, large, rounded on sides and behind. Legs short and thick. Wings thrice as long as broad, rounded to tip, but sharply turned down and somewhat straight on hind margin; primary stalk straight, rather short; stalk of subcosta shorter than stalk of cubitus; a distinct false or second costal vein running from base to apex of subcosta, forming a thickened costal band tapering to tip; stigma wanting; radius slightly curved upwards, not reaching extreme tip of wing; upper branch of cubitus short; upper and lower furcations very long, of equal length, forming a narrow uniform cell, and slightly curved up at tips, lower branch nearly as long as upper, upper fork very long, curving down in centre, rounded at tip; lower fork long, sloping inwards; clavus stout, clavical suture very distinct, bright red in sunlight. Genitalia (♂): lower valve short and angular; forceps arcuate on outer edge, coming to a point at apex; upper genital plate large, flask-shaped, swollen and rounded, apex nipple-shaped.

*Hab.*—Sydney (on *E. capitellata*) and Mittagong, N.S.W. (on *E. dives*; W. W. Froggatt).

This is a very remarkable Psyllid, allied to *Creiis longipennis*, but with the wing of a distinctly different shape. The larvæ living in the leaf-galls are quite different from the shield-shaped



*Trioza* larvæ found in various galls; and are much more like the sugar-lerp-forming Psyllids.

ii. Subfamily APHALARINÆ, F. Loew.

Front of head either swollen or prolonged into two conical processes, or roughly rugged; eyes prominent. Stalk of cubitus as long as, or longer than stalk of subcosta.

Genus i.—EUPHYLLURA, Först., Rheinl. u. Westphal. Verh., 1848.

ii.—RHINOCOLA, Först., *loc. cit.*

iii.—APHALARA, Först., *loc. cit.*

iv.—PSYLLOPSIS, F. Löw, Verh. Zool.-Bot. Gesell. Wien. xxviii., 1879.

v.—THEA, Scott, Trans. Ent. Soc. London, 1882.

vi.—PHYTOLYMA, Scott, *loc. cit.*

vii.—PHYLLOLYMA, Scott, *loc. cit.*

viii.—SPONDYLIASPIS, Sign., Ann. Soc. Ent. Franc. 1879.

ix.—CARDIASPIS, Schwarz, Proc. Ent. Soc. Washington, iv., 1896.

Genus RHINOCOLA, Förster.

Head with eyes prominent; front of head prolonged into two conical processes; central ocellus on inner border of vertex somewhat on the edge of the front. Forewings coriaceous, with a distinct stigma; stalk of cubitus longer than that of subcosta; radius quite or almost straight. Genitalia (♂) not produced posteriorly into slender processes.

RHINOCOLA EUCALYPTI, Maskell.

Trans. New Zealand Inst. Vol. xxii. (1889), p. 160, pl. x., figs. 3-16.

*Larvæ* forming no lerp but clinging close to the leaf, with a number of silky white filaments of considerable length trailing out from the sides and tip of the abdomen. They are found in fours or fives upon the tips of the foliage of young blue gums (*E. globulus*) in all stages of growth.



General colour pale yellow, with the tips of the antennæ, a broad patch on either side of the dorsal surface of the head, a double row of smaller markings on the thorax and basal abdominal segment, wing-covers and apical portion of abdomen slate-grey; eyes reddish-brown. Head almost globular, eyes prominent, well round on the sides of the head; antennæ thick, standing out on either side; wing-covers oval, large. Abdomen long, narrow, rounded at the tip, finely edged with short hairs. Dorsal surface flattened; under surface pale yellow.

Maskell has described and figured this species in detail in his paper (6), so that I need not again go over the same ground. He found this small, greyish-brown psyllid common upon the foliage of blue gums (*E. globulus*) growing in New Zealand; and he suggested that as this is an introduced tree in that country the insects might be Australian. My specimens were obtained in considerable numbers upon young seedlings in Purchase's Nursery, Parramatta, and also in the Botanic Gardens, Sydney.

RHINOCOLA REVOLUTA, n.sp.

(Plates xi., fig. 12; xii., fig. 8; xiv., figs. 19-19a).

The larvæ form a very remarkable, double-valved, opaque white lerp like a rounded, flattened oyster shell, about 2 lines in diameter, placed along the edges of the young leaves of several different Eucalypts; they are thin when first formed upon the surface of the leaves, but as the actions of the feeding larvæ cause the leaf to become discoloured and curl up, the lerp-scales assume a horizontal position and become packed in rows side by side, rolled up in the enveloping leaf, sometimes as many as twenty-four in a row; when few the lerp-scales are generally much larger. When the larvæ are ready to emerge the valves open at the apex.

*Pupa* short and broad, head thorax and abdomen yellow tinged with green, the last darkest and banded with interrupted black bars; legs and antennæ yellow; wing-covers chocolate-brown. Head broad, truncate in front; antennæ rather short, standing



out on either side, slightly hairy, pointed at the tips; eyes small. Thorax broad, rounded in front; wing-covers small, elongated, covered with fine white hairs. Legs short and thick. Abdomen broad, rounded, swelling out at the base, and rounded to the apex.

*Imago*.—Length 0·15, antennæ 0·045 inch.

General colour bright green, thorax mottled with reddish-yellow, tarsi brown; wings semi-opaque, finely granulated, tinged with pale dull yellow, darkest along hindmargin, the tips clouded with fuscous and black running into the cells; nervures light brown. Head not as broad as the thorax, deeply cleft in front, with a slight median suture and shallow fovea on either side, sloping down on either side behind the antennæ; arcuate at hindmargin; face lobes large, broad and rounded, thickly clothed with hairs; antennæ in front of eyes moderately long, basal joints thickest, each clouded with fuscous at apex, 3rd and 4th joints longest, 5th-6th shortest, 7th-8th long and slender, 9th shorter and broadest at apex, 10th oval, short and broad. Eyes very large, rounded, and contracted on inner edge: central ocellus small, pink; lateral ocelli large, vitreous. Thorax with pronotum very narrow, curving round; dorsulum very broad, convex, round in front, the sides produced into slender points, slightly arcuate on the sides to rounded apex; mesonotum large, convex, arcuate in front, tuberculate on sides, rounded behind; scutellum arcuate, rounded behind. Legs short, tarsi stout. Wings very long and slender, more than four times as long as broad, curved in the front margin, rounded at the tip, and hollow in the centre of the hindmargin; primary stalk short, stout, and thickened; stalk of subcosta short; stigma not reaching tip of wing, transverse nervure distinct; radius long, curving upward, not quite reaching to tip of wing; stalk of cubitus long, upper branch of cubitus long, curving upward, upper and lower forks swelling out, almost of the same length, forming an elongate cell; lower branch of cubitus moderately long, upper fork long, turning upward, curving round and forming a large cell with the lower fork, curving inward at apex;



clavus long and stout, clavical suture long and distinct. Abdomen stout, tapering to tip.

♂. Smaller than female; with the wings semitransparent, but without fuscous markings. Genitalia (♂) short and broad; lower genital plate short and rather angular; forceps short, thick, and turned downward; upper genital plate long, thick, and rounded at tip.

*Hab.*—Bendigo, Vic. (on *E. leucoxydon*); and Tumut, N.S.W. (on *E. macrorrhyncha*, and *E. hemiphloia*; W. W. Froggatt).

RHINOCOLA ASSIMILIS, n.sp.

(Plate xi., fig. 13).

Closely allied to the preceding species. The habits of both larvæ and pupæ are identical, except that the lerp-coverings within the curled leaf are very much more irregular in form, and somewhat larger. The minute larvæ do not at once commence to form a lerp-scale, but crawl about enveloped in white filaments, and take shelter in the first curl of the leaf. General colour pale yellow.

*Pupa* dull brown, with darker markings on the head, legs and antennæ; a row of spots down each side of thorax and abdomen black.

*Imago.*—Length 0·15, antennæ 0·03 inch.

General colour ochreous, eyes reddish-brown; wings coriaceous, light brown, nervures reddish-brown. Head narrow, curved down in front, arcuate behind, with front margin arcuate in centre and on either side at base of antennæ, with a short median suture and small rounded fovea on either side; face lobes small, hidden from above; antennæ short, apex of terminal joints clouded with chestnut, 1st and 2nd joints very stout and short, 3rd joint cylindrical, twice the length of the two preceding combined, 4th-9th shorter, 10th short, oval at the tip. Eyes not projecting, angular on the inner margin: central ocellus very small, lateral ocelli small, close to the eye. Thorax: pronotum angular in front, broadest in centre, with an impressed fovea, narrow and



rounded at extremities; dorsulum spindle-shaped; mesonotum large, almost truncate in front, rounded almost to a point on the sides, convex behind, scutellum small and angulated in front. Legs short, stout. Wings as in the preceding species but without the fuscous markings on the tips. Genitalia (♂) short and broad, details unknown.

*Hab.*—Cooma, N.S.W., (on *E. viminalis*; W. W. Froggatt).

It is very curious that this species constructs such a similar lerp in the earlier stages, and has the wings so exactly similar in shape and venation. The colours of the larva and perfect insect, however, are different. The head and thorax also are very different in their form and structure. A difference in colour might perhaps be due to seasonal variation; but the differences in shape of the different parts of the thorax are both distinct and pronounced.

RHINOCOLA CORNICULATA, n.sp.

(Plates xi., fig. 11; xiv., fig. 13).

*Lerp* common upon the slender leaves of *E. gracilis*, generally singly, but sometimes two or three close together; pale horn-colour to yellowish-brown, opaque and transversely striated; length 6, diameter at apex  $2\frac{1}{2}$  lines; commencing at a slender point, tapering to a broad rounded apex, convex on upper surface, undersurface resting on the leaf, forming a thin shell-like floor extending to the edge of the rounded apical portion which is open on the undersurface.

*Pupa* long and slender; general colour yellowish-brown tinted with red on head and thorax, antennæ and wing-covers black, legs brown, head and dorsal surface of abdomen marked with black. Head slightly lobed in front, broad and rounded behind. Thorax long and slender. Legs short. Wing-covers elongate. Abdomen narrow at base, swelling, rounded and terminating in a peg-like tip.

*Imago.*—Length 0.16, antennæ 0.065 inch. General colour reddish-brown tinted with brighter pink; abdominal segments red



barred with black; wings light brown, coriaceous, semiopaque; nervures ochreous. Head very short, turned down in front, not as broad as thorax, deeply cleft in front, with a median suture and elongate fovea on either side, arcuate behind. Face lobes very large, broad and round, fringed with long hairs. Antennæ with first joint very short and broad, 2nd short, rounded, 3rd slightly bent at base, cylindrical, 4th-8th increasing slightly in length towards apex, 9th much shorter, 10th short, oval. Eyes large, angulated on inner margins: central ocellus small, hidden from above; lateral ocelli large, close to inner edge of eyes. Thorax: pronotum almost angular in front, deeply arcuate behind, short, not reaching to outer margins of eyes; dorsulum convex in front, pointed at extremities, sloping on either side of hind margin to centre which is truncate; mesonotum very large, with both sides of front margin lobed, sides produced into a point, hind margin sloping round to the centre where it is truncate; scutellum large, rounded behind; the entire dorsal surface of thorax finely shagreened. Legs stout, tarsal claws black. Wings twice as long as broad, long and narrow, broadest and rounded towards tip; primary stalk moderately long; stalk of subcosta short, costal cell elongate, rounded; stigma moderately long, angular at base; radius short, running out on upper edge of wing; stalk of cubitus longer than subcosta; upper branch of cubitus long; upper fork longest, curving down just below tip of wing, lower fork curving inwards; lower branch of cubitus long, upper fork long, curving upwards, lower fork long, sloping outward; clavus stout, rounded, clavical suture very slight. Abdomen stout and thick set. Genitalia (♂) unknown; (♀) short and broad, valves rounded on sides.

*Hab.*—Bendigo, Vic. (on *E. gracilis*) and Wagga, N.S.W. (also on *E. gracilis*; W. W. Froggatt).

I have specimens of two lerp-scales which may be identical with those of this species, but I know nothing about the insects. The first came from Mr. J. H. Maiden, who received them upon botanical specimens of *E. largiflorens* growing near Bourke; these lerps are in clusters upon the leaves, and are of a darker yellow



tint, opaque and more robust in form. The second were sent to the late Mr. A. S. Olliff from Western Australia, covering the leaves of *E. rudis* in thousands; these are lighter-coloured than the former, and somewhat smaller. This is the lerp for which Mr. Olliff proposed to form a new genus *Xylolyma*, but he merely exhibited the specimens at one of the Society's meetings (Proceedings, 1894, p. 740), and did not publish anything in the shape of description, if he had the adult insects.

RHINOCOLA OSTREATA, n.sp.

(Plates xi., fig. 14; xiv., fig. 20).

Larvæ producing rounded lerp-scales upon the leaves of *E. gracilis*; lerp 2 lines in diameter, convex, commencing at an elongate flange at the base, swelling out and circular at apex, attached to the lerp by the flange, but the encircling edge also fitting close to the leaf-surface; semi-opaque, dull horn-colour, with a smoky tint produced in concentric rings from the flange, giving it a regular circular formation.

*Pupa*.—General colour bright red; antennæ, legs, wing-covers and markings on the dorsal surface of head, thorax, and abdomen black; eyes dark yellow. Head broad, rounded in front, eyes well back, on sides of head; antennæ short, stout, and pointed at tips. Thorax broad, flattened; wing-covers small, rounded at tips; legs short and stout. Abdomen large, flattened, marked with black spots on each segment, swelling out and rounded on sides, slightly pointed on anal segment.

*Imago*.—Length 0·16, antennæ 0·08 inch. General colour reddish-brown, thorax mottled with pink and ochreous tints, antennæ dark brown, abdomen banded with chestnut-brown, genitalia red. Head very broad, short and turned down, rounded in front, with median cleft and central suture, a deep parallel suture on either side. Face lobes hidden from above, short, broad, and rounded. Antennæ very long, rather thick, springing from a depression in front of eyes, 1st and 2nd joints short and broad, 3rd longest, 4th shorter and more slender, 5th-8th decreasing in



length towards tip, 9th-10th short and stout, forming a slight club. Eyes large, circular, flattened, not projecting: central ocellus small, silvery at apex of median suture; lateral ocelli vitreous, large, standing out from hindmargin of eyes. Thorax: pronotum narrow, curving round, raised in centre, arcuate behind, rugose behind eyes; dorsulum convex, rounded in front, coming to an obtuse point on either side, and broadly rounded behind; mesonotum broad, very much raised, convex, arcuate in front, rounded on outer margins into a short blunt point on either extremity, truncate behind; scutellum arcuate in front, convex, rounded behind. Legs stout, tarsi black. Wings coriaceous, thrice as long as broad, rounded at tip; primary stalk short and stout, stalk of subcosta a little shorter than stalk of cubitus; costal cell large, stigma long, slender; radius not reaching tip of wing, turning upward, then downward, and again curving upward at extreme tip; upper branch of cubitus long, upper and lower forks of nearly equal length forming a long slender cell, and both curving outwards at tip; lower branch of cubitus long, upper fork curving upwards, rounded; lower fork short, turning downward; clavus very stout, clavical suture very distinct. Abdomen short and stout, genitalia (♀) short, coming to a cylindrical point, clothed with fine silvery hairs.

*Hab.*—Bendigo, Vic. (on *E. gracilis*; W. W. Froggatt).

RHINOCOLA PINNÆFORMIS, n.sp.

(Plates xi., fig. 8; xiv., fig. 12).

*Lerp*-scales generally in clusters of three or four upon the surface of the leaves of *E. sp.*, mature specimens and others just forming side by side; 2 lines in diameter, a little longer than broad, light brown, opaque and very convex on the dorsal surface, undersurface white; attached by a flange at base to the leaves, irregularly rounded with the free edge produced into slender fingers forming a fringe right round. In immature *lerp*-scales these fingers appear to be the ends of the transverse ribs used in the construction of the scale, but in the perfect scales these marks



are obliterated and the upper surface is perfectly smooth and rounded.

*Larva* and *pupa* unknown.

*Imago*.—Length 0·16, antennæ 0·025 inch.

General colour chestnut-brown marbled with ochreous-yellow; wings hyaline, nervures dark brown. Head short, curving down in front, slightly rounded in front, with median suture and dark brown fovea on either side, rounded on sides and arcuate behind. Face lobes hidden from above, very short and broad, clothed with fine hairs. Antennæ short and slender, yellow, apical joints black, 1st-2nd short and broad, 3rd-8th slender, 9th-10th shorter and thickened. Eyes large but not projecting: central ocellus at apex of median suture; lateral ocelli small, on hindmargin of head. Thorax: pronotum convex in front, broadest in centre, arcuate behind, extremities curved up behind eyes; dorsulum broad and angulated, extremities of front margin pointed, hindmargin with an angulated point on either side; mesonotum large, arcuate in front, rounded on sides and hindmargin; scutellum elongate, arcuate in front, rounded behind. Legs short, stout. Wings large and broad, twice as long as broad, primary stalk moderately long, straight; stalks of subcosta and cubitus of equal length, costal cell broad; stigma distinct, stout, angular; radius short, curving upward and coming out above tip of wing; upper branch of cubitus long and straight; upper fork long, curving upward, and coming out at tip of wing; lower fork shorter, turning downwards; lower branch of cubitus slanting, upper fork curving round, long, lower fork transverse; clavus stout and long, clavical suture distinct. Abdomen short, stout, banded with chestnut and yellow. Genitalia (♀) very short and broad; (♂) unknown.

*Hab.*—Yass, N.S.W. (on *E. sp.*; rare; W. W. Froggatt).

RHINOCOLA LITURATA, n.sp.

(Plates xii., figs. 4 and 9; xiv., fig. 10).

*Larvæ* plentiful upon the leaves of *E. robusta*, singly or in twos and threes, producing a semi-opaque lerp-scale.



*Lerp* shaped like the valve of a mussel shell, attached to the leaf by a scale-like hinge;  $2\frac{1}{2}$  lines in diameter, round, convex. When freshly formed the colours and outline of the larva can be distinguished through the lerp, but later on it becomes browner and opaque.

*Pupa* variable in colour; when full grown, pale greenish-yellow with the wing-covers dark brown, upper surface of the thorax blotched with bright red; eyes, centre of the head, and abdomen of a similar colour. Two large blotches between eyes, blotches on lower half of thorax, and interrupted bars across abdominal segments black.

*Imago*.—Length 0·09, antennæ 0·03 inch.

General colour ochreous, antennæ banded with brown; front of thorax, a patch on either side behind wings, and scutellum black; abdomen pink, with a slender black band on apical edge of each segment; wings light brown, thickly mottled with irregular brown spots; nervures light brown. Head narrow, convex behind, rounded on the sides, with a deep median suture and fovea on either side. Face lobes broad, short, hairy. Antennæ short and slender, 1st joint very short, thick, 2nd slightly longer than 1st, 3rd longest, 4th much shorter, 5th-9th joints of about the same length, 10th short and rounded at the tip. Eyes very large, rounded on outer margin: central ocellus small, at apex of median suture; lateral ocelli large, circular, bright red, close to hindmargin of eyes. Thorax: pronotum narrow, convex in front; dorsulum large, rounded in front, coming to a flange at extremities, sloping down and truncate behind; mesonotum large, arcuate in front, rounded behind, sides armed with a rounded spine in a line with forewings; scutellum arcuate in front, rounded behind. Legs short and stout; apex of thighs, base of tibiæ, and tarsi brown. Wings short and broad, rounded at tips, slightly more than twice as long as broad, broadly rounded from base to tip and slightly arcuate in centre of hindmargin; primary stalk short, thickened at apex, stalk of subcosta short, costal cell large, with a stout transverse nervure between it and the long slender stigma; radius short, curving upward to front



margin of wing; stalk of cubitus longer than subcosta; upper branch of cubitus short, upper and lower forks coming out on either side of tip of wing, and forming a long slender cell; lower branch of cubitus moderately long, upper fork long, curving round, lower fork transverse, short; clavus stout and thickened, clavical suture very distinct. Abdomen short, stout, wedge-shaped. Genitalia (♂) viewed from above forming a pair of pincer-like projections.

*Hab.*—Sydney (Botanical Gardens), Botany, and Tumut, N.S.W. (in each case on *E. robusta*; W. W. Froggatt).

RHINOCOLA VIRIDIS, n.sp.

(Plates xi., fig. 9; xiv., fig. 17).

Larvæ forming a lerp-scale upon the foliage of *E. robusta*; a rare species, the scales always single.

*Lerp*  $2\frac{1}{2}$  lines in length, about 2 in diameter at apex; glassy, opaque, semitransparent, the structure indistinct but apparently transversely striated; commencing at a finger-like hinge, from which the lerp rapidly swells out into a rounded, somewhat fan-shaped convex scale, not unlike the scale of the adult female of several typical coccids of the genus *Chionaspis*.

*Larva* pale yellow, with a broad red mark in centre and at tip of abdomen.

*Pupa* bright green, with legs, antennæ, and wing-covers hyaline; tips of antennæ and spots upon the segmental divisions of abdomen black. Head small, lobed in front, arcuate behind; antennæ long and slender, pointed at extremities; eyes large; prothorax narrow; wing-covers long, legs stout; abdomen large, swelling out, broad and rounded to a peg-like tip.

*Imago.*—Length 0.15, antennæ 0.075 inch.

General colour pale green; wings hyaline, with a tinge of brown, nervures ochreous. Head narrow, turned down in front, slightly cleft, with a slight median suture and fovea on either side, truncate behind. Face lobes very large, broad, rounded, and clothed with fine hairs. Antennæ long and slender, 1st joint



stout and broad, 2nd much smaller, 3rd longest, 4th-9th of uniform length, 10th short, elongate-oval. Eyes round, large, projecting: central ocellus at apex of median suture; lateral ocelli small, vitreous. Thorax: pronotum narrow, forming a rounded knob at extremities behind eyes; dorsulum large, rounded in front, slightly angulate on sides, rounded behind; mesonotum large, arcuate in front, rounded behind; scutellum arcuate, rounded behind. Legs short, stout; tarsi broad, rounded. Wings not quite thrice as long as broad, slender, rounded at tip; primary stalk stout, long; stalk of subcosta short, cross-nervure forming a long slender stigma nearly reaching tip of wing; radius long, not reaching extreme tip of wing, curving upward slightly; stalk of cubitus long, upper branch of cubitus short, upper fork long, emerging in centre of tip of wing; lower fork shorter, curving down, forming a moderately long slender cell; lower branch of cubitus long, not as long as upper, upper fork long, turning downward, lower fork short, curving in at extremity; clavus stout. Abdomen large, coming to a regular point. Genitalia (♂) short and broad at base; lower genital plate short, truncate at tip; forceps short, broad, and rounded at tip; upper genital plate long and slender; penis hidden.

*Hab.*—Botany, N.S.W., (rare; two specimens on *E. robusta*; W. W. Froggatt).

RHINOCOLA MARMORATA, n.sp.

(Plate xii., fig. 3).

Early stages and life-history unknown; imago caught by sweeping a scrub of *Leptospermum* bushes.

*Imago.*—Length 0.14, antennæ 0.125 inch.

General colour: head pale green, basal joints of antennæ and legs yellow, apical portion of former dark brown; thorax reddish-brown and yellow tinted with green; abdominal segments black with apical edge bright red; genitalia red; under surface reddish-yellow tinted with green; wings hyaline, richly clouded with dark brown at tips and with yellow on hindmargin; nervures



reddish-brown. Head very broad between eyes, rounded and lobed in front, truncate at base of antennæ, with a distinct median suture and no fovea on sides, deeply arcuate behind. Face lobes short and broad, thickly clothed with fine hairs extending over the face. Antennæ very long and slender, clothed with fine hairs, standing out in front of eye; 1st joint very short and stout, 2nd short, cylindrical, 3rd longest, 4th-9th shorter than 3rd, 10th elongate-oval, not half length of preceding ones. Eyes very large, reniform, angulated on hindmargins; projecting: central ocellus very small, well up from base of median suture; lateral ocelli red, small, close to hindmargin of eyes. Thorax: pronotum small, narrow, terminating in a rounded knob at extremities at inner margin of eyes; dorsulum short, broad, round in front and behind, tuberculate on sides; mesonotum large, arcuate in front, rounded behind; scutellum small. Legs and undersurface lightly clothed with hairs; tibiæ long and slender, tarsi large. Wings long, slender, nearly thrice as long as broad, deeply curved at base of costa, rounded at tip; primary stalk long; stalk of subcosta short; costal cell short, elongate-oval, slightly angular at apex; stigma long and slender; radius long, curving upward and then downward at tip; stalk of cubitus longer than subcosta; upper branch long, curving upward, upper fork longer than lower, both turning down below tip, forming a short angular cell; lower branch of cubitus long, upper fork curving sharply upward, long; lower fork short, turning outward; clavus short, clavical suture very slight. Abdomen short, broad. Genitalia (♀) short, conical.

*Hab.*—Katoomba, Blue Mts., N.S.W., (caught by sweeping; W. W. Froggatt).

RHINOCOLA FUCHSIÆ, Maskell.

Trans. N. Zealand Inst. Vol. xxii p. 162, 1889, pl. x. f. 1325.

This species was described from New Zealand, but I include it in this paper as another species, *R. eucalypti*, described therefrom, is common in New South Wales, and the former may also range into Australia.



The pupæ of this species do not protect themselves with any kind of lerp-scale, but are found in a naked state, more or less covered with filaments, upon the twigs and foliage of *Fuchsia excorticata*, a New Zealand shrub.

The adult insect is pale yellow, with the head and dorsal surface mottled with black. Wings hyaline.

Genus APHALARA, Förster.

Head either swollen or produced into conical processes. Thorax broad, wings rounded at tip, membranous; stigma wanting; radius curved; stalk of cubitus in the forewing longer than stalk of subcosta. Genitalia: male genital valves prolonged into two slender processes encircling the penis.

APHALARA TECTA, Maskell.

Trans. Roy. Soc. S. Australia, 1898, p. 6, pl. ii., figs. 5-10.

This species was described from specimens from Victoria, the exact locality not being given. I am unable to identify it, though I have a number of Victorian species. Maskell's figures of the lerp or "pupal shield" are unlike any specimens in my collection; and the lerp-scales may be peculiar to *E. stuartiana*, the food plant.

"General colour yellow with the dorsal surface of the thorax and abdomen marked with a few black patches; antennæ yellow with brown tips; wings hyaline." Maskell figures the head with long face lobes like those of *Spondyliaspis*, and gives the wing with a distinct stigma and a subcostal cell. The latter character should remove it from this genus, which Förster defined as without a stigma. The lerp-scale is narrow at the flange or hinge, swelling out and rounded at the apex, transversely striated; yellow and opaque.

APHALARA CARINATA, n.sp.

(Plates xii., fig. 7; xiv., fig. 16).

The larvæ attack the extreme tips of the leaves of *E. capitellata*, forming half rounded galls through the tips of the leaves swelling out and curving round.



*Lerp gall* as much as  $4\frac{1}{2}$  lines in diameter, red to brown in colour, general form rounded, turning up, and narrow at base; under side curving upward to the leaf, being open but covered with an opaque horn-coloured lerp, 2 lines in diameter, curled upward with a rim on the lower edge so that it is half gall, half lerp.

*Pupa*.—General colour: head pale green, thorax and abdomen deeper green; antennæ, legs, front of head, and centre of thorax yellow; two elongate spots between eyes, wing-covers, and a double row of spots on abdominal segments black.

*Imago*.—Length 0·20 inch, antennæ (?)

General colour pale green, legs yellow, antennæ and thorax marked with yellow; scutellum black; wings semiopaque, horn-colour, nervures ochreous. Head small, not as broad as thorax, lobed in front, and sloping down to eyes, median suture ridged with a very large fovea on either side occupying the whole of the forehead, arcuate behind. Face lobes very large and broad, slightly truncate at tip. Antennæ slender, 1st joint stout, cylindrical, 2nd joint half as long as first, 3rd longest, 4th-9th uniform in length, 10th shorter, swelling out and rounded to a pointed apex. Eyes large, hemispherical, projecting on the sides: central ocellus at apex of median suture; lateral ocelli large, well up on hind margin of head. Thorax: pronotum narrow, wrinkled; dorsulum very large, rounded and convex, produced into a point on sides, and slightly truncate behind; mesonotum deeply arcuate in front, rounded on sides to hind edge which is truncate; scutellum truncate in front, rounded behind. Legs short and stout. Wings nearly thrice as long as broad, rounded on front margin and at extremity; primary stalk moderately long, stalk of subcosta short; subcosta long, running close beneath costal nervure past middle of wing; no transverse nervure or stigma; radius long, curving round and coming out near tip of wing; stalk of cubitus long, upper branch long, upper and lower forks turning downward, upper longest; lower branch short, upper fork long, curving sharply upward and then downward, lower fork curving outward forming a long cell; clavus short, stout, clavical suture



very distinct, long and slender. Genitalia (♂) short, stout [too much damaged for details].

*Hab.*—Mosman's Bay, near Sydney (on *E. capitellata*; W. W. Froggatt).

Genus PHYLLOLYMA, Scott.

Head with crown broad, length down centre about equal to half width between eyes. Face lobes narrow, ribbon-shaped. Antennæ short. Eyes moderately large, on side of head, their inner margins separated from lateral margin of crown on its outer half by a lunate or cuneate plate. Thorax: pronotum narrow, convex, lateral margins convex, scarcely reaching beyond middle of posterior margin of eyes; mesonotum across insertion of elytra not wider than head and eyes together; dorsulum transverse, semihexagonal. Elytra rhomboidal; stigma wide at mouth; radius terminating in upper apical angle; cubitus petiole shorter than upper arm, longer than lower one.

Type *Psylla fracticosta*, Walker.

PHYLLOLYMA FRACTICOSTA, Walker.

*Psylla fracticosta*, Walk., B.M. Cat. (Homoptera) p. 275, 1850-1; *Phyllolyma fracticosta*, Scott, Trans. Ent. Soc. Lond. 1882, 457, pl. xviii., figs. 5-5e.

This species was described from Tasmania by Walker; and was again described by Scott after examining the specimens in the British Museum collections. The latter author figures the elytron, a front view of the head, the antennæ, and the genitalia.

It is a large species, measuring  $1\frac{1}{2}$  lines in length; fuscous-brown in colour, with broad rounded wings clouded with brown; a remarkable broad angular pale blotch in the centre of elytra, and three similarly coloured marks on the tips. These characters should render the species easily recognisable. I have not so far seen it.

Genus CARDIASPIS, Schwarz.

Head emarginate posteriorly, vertex flat, narrowing to base of antennæ; frontal processes sharply separated from vertex;



antennæ slightly longer than width of head; eyes large, globular, projecting, occupying the whole side of head. Thorax: pronotum greatly convex transversely, lateral impressions large and deep; dorsulum less than twice the length of pronotum, sharply rounded in front; mesonotum very little convex in front; side-pieces of pro- and mesosternum prominent. Wings elongate-oval; veins fine, none of them curving much; stalk of cubitus longer than that of subcosta; a distinct large pterostigma; tip of wing at termination of fourth furcal. Epimera of mesosternum greatly developed, transverse; spiniform processes very small, vertical. Legs short and robust, hind tibiæ without a broad tooth; tarsi normal.

Type *Cardiaspis artifex*, Schwarz.

CARDIASPIS ARTIFEX, Schwarz.

(Plates xi., fig. 10; xii., fig. 9; xiv., fig. 14).

*C. artifex*, Schwarz, Proc. Ent. Soc. Washington. Vol. iv. p. 72, 1896.

*Lerp* convex, 3 lines in diameter; singly upon the leaves of *E. robusta*, attached to the leaf by a brown hinge from which comes an opaque-whitish angular piece, rounded at the apex, convex and curving upward, from which on all sides radiate a number of slender parallel ribs, which just touch, but are not attached to the leaf at their extremities, the ribs being bound together by a number of transverse, more slender bands or filaments; the whole forming a beautiful pecten-like shell of open net-work; at the base above the opaque centre the filaments are bright red, below this pale semi-transparent tinted with yellow, right round the outer half bright pink.

*Larva* and *pupa* moving about freely under the lerp; with a few short white filaments on sides of abdomen.

*Imago*.—Length 0·105; antennæ 0·015 inch.

General colour yellowish-brown, face lobes red, eyes brown, front of dorsulum reddish, mesonotum banded with a slender central dorsal stripe and two parallel chestnut-coloured bars on



either side; abdomen dark brown to blackish, with the apical edges of each segment barred with reddish-yellow; wings hyaline, finely granulated, nervures reddish-pink. Head short, as wide as thorax, rounded in front, with a very slight cleft; median suture and large flattened fovea on either side arcuate behind. Face lobes very large, broad, rounded at tips. Antennæ short, stout, 1st-2nd joints short and stout, 3rd longest, 4th-8th uniform, 9th-10th slightly thickened. Eyes large, prominent, rounded: central ocellus very large, situate in cleft just behind face lobes; lateral ocelli large. Thorax: pronotum very narrow, rounded in front, deeply arcuate behind, with a dark impressed fovea towards the extremities; dorsulum small, sharply rounded, and almost angulated in front, truncate behind; mesonotum very large, slightly arcuate in front, rounded to a conical point at extremities, rounded behind; scutellum long and narrow. Legs short, robust. Wings more than twice as long as wide, broad and rounded to tip; primary stalk long, straight; stalk of subcosta short, costal cell elongate; stigma angular at base, moderately long; radius short, nearly straight, coming out at upper edge of wing; stalk of cubitus long, upper branch long, upper fork long, curving downward; lower fork much shorter; lower branch of cubitus long, upper fork rounded, curving down, lower fork short curving inwards at apex; clavus stout, clavical suture very distinct. Abdomen short, stout. Genitalia: (♂) lower genital plate stout, forceps broad, rounded, upper genital plate slender.

*Hab.*—Manly, near Sydney, and Termiel, N.S.W. (on *E. robusta*; W. W. Froggatt); S. Australia (on *E. leucoxydon*; A. Koebele).

The lerp-scales were very numerous upon the foliage of saplings or shoots springing up where trees of swamp mahogany (*E. robusta*) had been cut down near Manly in the summer of 1892, but have never appeared there since. The extraction of the sap by the larvæ in feeding and in constructing their beautiful scales causes a large brown blotch to appear wherever one was formed, and it was the curious spotted appearance of the foliage so caused that first attracted notice.



This species was described by Schwarz from South Australian specimens. He says that, "It is distinguished from all other described genera of this tribe by its vertical head and the form of the frontal processes." The venation of the wings is similar to that of the genus *Rhinocola*, in which I had placed it before seeing Mr. Schwarz's definition of *Cardiaspis*. He supposes that the large size of the lerp-scale in comparison with the larva is accounted for by the fact that the latter is enveloped in a mass of woolly secretion. But none of our lerp-producing Psyllids are remarkable for this excretion which is unusually scanty in comparison with that present in the naked forms of larvæ.

CARDIASPIS PLICATULOIDES, n.sp.

(Plates xi., fig. 7; xii., fig. 18; xiv., fig. 9).

*Lerp* chocolate-brown,  $1\frac{1}{2}$  lines in diameter, massed together in clusters of 30-40 or sometimes singly, upon the leaves of *E. rostrata* and several other Eucalypts. General form like that of the valve of the bivalve shell, *Plicatula cristata*, Lam.; attached closely to the leaf, curving upward, banded with five distinct parallel ribs, with shorter ridges between them to the margin; the crystalline secretion between the ribs finely striated.

*Pupa* very small in proportion to the size of the lerp; general colour dull white; head, antennæ, legs, wing-covers and apical half of abdomen light brown; a pale parallel bar running through centre of head and thorax, the latter also dotted with black forming a square.

*Imago*.—Length 0·14, antennæ 0·05 inch.

General colour of head and thorax ochreous to brown; behind eyes, antennæ, base of wings, and basal portion of abdominal segments red; antennæ and apical edge of abdominal segments black; wings semitransparent, slightly clouded, nervures pinkish-brown. Head short, as wide as or wider across than thorax, with a deep median suture, much wrinkled, rounded on sides, arcuate behind. Face lobes projecting, broad and rounded, clothed with fine hairs. Antennæ very long and slender, 1st-2nd joints small,



3rd much longer than 4th, 4th-6th of uniform length, 7th-8th longer, 9th shorter, 10th short and rounded at tip. Eyes large and prominent: central ocellus small, lateral ocelli situated about middle of hindmargins of eyes. Thorax: pronotum very narrow; dorsulum large, rounded in front, arcuate on sides, truncate behind; mesonotum convex, broad, rounded behind; scutellum arcuate in front, rounded behind. Legs short and thick, with a row of fine black spines at apex of tarsi of hind legs. Wings nearly thrice as long as broad, rounded on front margin, somewhat pointed at tip; primary stalk short; stalk of subcosta short, costal cell separated from the slender stigma by a sloping cross-nervure; radius short, running out above tip of wing; stalk of cubitus very long, upper branch long, upper and lower fork long, of equal length, forming an elongate cell in centre of wing; lower branch of cubitus long, upper fork long, curving round; lower fork curving outward; clavus stout, clavical suture long, distinct. Abdomen short and stout. Genitalia (♂) large, upper genital plate forming two conical processes, lower genital plate small; forceps large, rounded to a conical point at tip.

*Hab.*—Melbourne, Vic. (on *E. rostrata*, in Botanical Gardens; C. French, Jr.); Ryde, near Sydney, Tumut, Yass, and Mittagong, N.S.W. (in each case upon *E. sp.*; W. W. Froggatt).

The little shell-like lerp is very plentiful, but it is one of the most difficult from which to obtain the perfect insects on account of the many parasitic Chalcids which infest them; out of a great number collected by Mr. French, only half-a-dozen specimens of the perfect insects were bred. I had the same difficulty with my own specimens; fully half of them when found were punctured with a small circular hole on the side by which a small wasp had emerged. In Newman's Entomologist for 1841 (Vol. i. p. 88), a woodcut of this lerp is reproduced, with the following note from Mr. A. H. Davis, of Adelaide, S.A.:—"I have now by me the leaf of a Eucalyptus, covered with little habitations, perfectly like shells, the form even of the ribs being faithfully represented as in the annexed drawing; there are a dozen on one leaf, and they are scarcely half the size here depicted; the shell is of a



dirty brown colour; some species of the same family make white shells, and the shell fabricated by one species resembles that of a limpet."

One of the figures in Dr. Dobson's paper, previously noted, appears to represent the lerp of this Psyllid.

Genus COMETOPSYLLA, n.g.

Head curved sharply down in front; eyes as broad as thorax. Face lobes very short, truncate at apex, broad. Antennæ very short, slender to the tips; a rounded pad between base of antennæ and eyes. Thorax: pronotum widest in the middle, rounded at extremities, reaching to outer edge of eyes; dorsulum elongate at extremities, rounded in front; mesonotum large. Elytra short, acute at apex; costal nervure swelling out and forming a rounded knob in front of stigma; stigma large; subcostal nervure running nearly to tip of wing; radius emerging at tip of wing; stalk of cubitus much longer than stalk of subcosta; upper branch of cubitus long, both furcations short and broad. Genitalia (♂) short, broad.

COMETOPSYLLA RUFA, n.sp.

(Plates xii., figs. 6 and 21; xiv., fig. 18).

*Lerp* crystalline white;  $1\frac{1}{2}$  lines in diameter, clustering together in such numbers as to completely encrust and quite whiten the smaller branches of *E. melliodora*. Circular, convex, closely attached to the bark, and fitting close to the imprisoned larva; when freshly formed showing a transverse ribbed structure, but as they are enlarged becoming irregularly rounded brittle crystalline lumps that break very easily.

*Larva* dark brownish-yellow; antennæ, legs, blotches on head, marks and spots on thorax, the interrupted bars on upper surface, and the whole of apical portion of abdomen black. Slightly hirsute on front of head; apex of abdomen thickly fringed with long hairs. Head very broad, large, slightly rounded in front and on sides. Antennæ thickened, standing out on either side.



Eyes large. Thorax a little broader than head at junction of wing-covers. Abdomen narrow at base, with tip sharply rounded to a point.

*Pupa* lighter brown, with the darker markings of the larva much broader, so that the colour of the dorsal surface is much darker. General form very short and broad in proportion to length, with apical portion of abdomen showing a granulated surface; the long hairs of the larva produced into soft downy tufts. Head short, broad, slightly lobed in front, rounded to eyes, and curving in behind them, deeply arcuate behind; antennæ stout, moderately long, standing out on side of head; eyes flattened, not projecting. Thorax much broader than head, swelling out, rounded to tip of abdomen; wing-covers very broad, rounded, projecting; five black dots between wing-covers; legs short, stout. Abdomen pointed at tip.

*Imago*.—Length 0·125, antennæ 0·0125 inch.

General colour bright reddish-orange, marked with light brown, eyes dark brown; hindmargin of head black; antennæ mottled with brown; thoracic segments mottled with light brown, upon the mesonotum forming a dainty scroll work; abdomen marked with black; legs pale ochreous; wings pale fuscous to smoky brown, finely granulated, nervures pale brown. Head very wide, forehead very narrow, rounded in front, with a slight median suture, deeply arcuate behind. Face lobes very short, broad, hidden from above. Antennæ very short, slender, 1st joint very stout, 2nd more rounded, 3rd-10th short, rounded at both extremities. Eyes elongate, as wide as forehead: central ocellus large, situated in a fovea in centre of face, hidden from above; lateral ocelli large, at the extreme hindmargin of head. Thorax: pronotum rather large, curved in front, marked with a black spot in line with eyes, angular at tips; dorsulum irregularly rounded in front, extremities produced into two angular teeth, rounded on apical margin; mesonotum very large, arcuate in front, swelling out and rounded on sides of scutellum, the latter truncate in front, rounded behind. Legs short, thick. Wings a little more than twice as long as broad, rounded to apex of costal cell,



then straight to tip, coming to a regular point at apex of marginal cell; primary stalk long, stout; stalk of subcosta short; stigma rounded in front and running to a long slender point; costal cell short, broad; radius long, curving upward, emerging at tip of wing; stalk of cubitus very long, curving downward, upper branch of cubitus long, upper and lower fork curving downward, forming an angular cell, lower branch of cubitus very short, upper fork long, curving round, lower fork short, curving in at apex; clavus stout, clavical suture thick. Abdomen short, stout. Genitalia (♂) short, broad, turned upwards; lower genital plate short, rounded; upper genital plate long, elongate, oval; forceps short, rounded at base, conical at tip; penis slender, straight: (♀) sabre-shaped, nearly as long as the rest of abdomen, fringed with stiff hairs on the underside, and regularly toothed along upper valve.

*Hab.*—Liverpool, Wagga, N.S.W. (on *E. melliodora*; W. W. Froggatt).

I have also found the larvæ and pupæ of this psyllid common upon the foliage of *E. hemiphloia*, and several undetermined Eucalypts in the neighbourhood of Penrith and Mittagong, but in all cases they were free upon the twigs and constructed no lerp-scales. As the structure of the lerp is very crystalline and brittle, this is probably accounted for by the fact that in damp weather the secretion will not set to form a protective covering, so that the larvæ are compelled to pupate without. The unprotected larvæ above mentioned were smothered with numbers of red mound ants (*Leptomyrmex purpureus*) which came to feed upon the secretion, and protected them to a certain extent.

Genus SPONDYLIASPIS, Signoret.

Head hardly deflexed, surface flattened, vertex gradually narrowing to base of antennæ; face lobes very long, cylindrical; eyes large, convex, projecting laterally; anterior ocellus visible from above; antennæ long, filiform, 3rd joint longest. Thorax: pronotum large, slightly convex; dorsulum transverse, not longer than pronotum, lobed in front and behind. Forewings mem-



branous, very long, narrow, angulated at tip, veins fine, stalk of cubitus longer than subcosta; a long but narrow pterostigma; radius long, curving downward to tip of wing; stem of second fork parallel with radius. Legs short, anterior and middle tibiæ simple, posterior tibiæ not dentate at base, but dilated at apex and produced near the outer (posterior) apical angle into a stout mucro; anterior and middle tarsi with first joint short, simple, and much longer than claw-joint; posterior tarsi with first joint as long as claw-joint and dilated beneath into a broad, flattened, membranous, cushion-like disc; metasternal epimera very large; as long as wide, without spiniform processes. Abdomen: sixth ventral segment of ♂ broadly divided for the reception of the genitalia; genital plate and forceps without lateral appendages; genitalia of ♀ not beak-shaped, the outer valve consisting of two short plates.

Type *Psylla eucalypti*, Dobson.

SPONDYLIASPIS EUCALYPTI, Dobson.

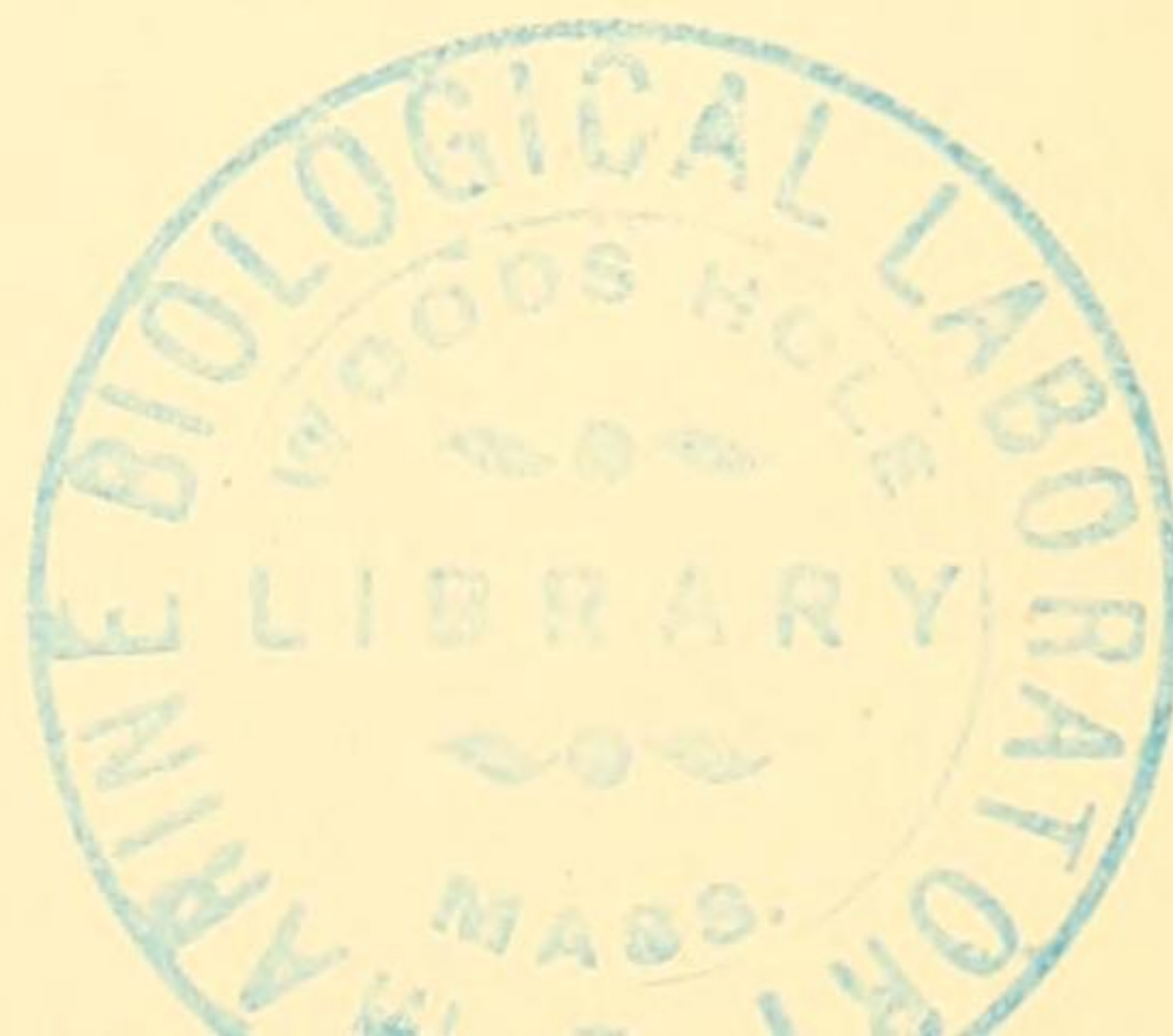
(Plates xii., figs. 1 and 12; xiii., fig. 5; xiv., fig. 7.)

*Psylla eucalypti*, Dobs., Proc. R. Soc. V. Diemen's Land, 1851, Vol. v. Pt. iii. p. 235; *Spondyliaspis eucalypti*, Schwarz, Proc. Ent. Soc. Washington, Vol. iv. p. 69, 1896.

*Lerp* convex, circular, opaque white, coming to a rounded point,  $1\frac{1}{2}$  lines in diameter, generally covering the surface of the leaves in clusters of forty or more close to but seldom overlapping each other; irregular and rugose on the outer surface, attached to the leaf right round the edge, but peeling off when dry. If enclosed in a tin the lerps liquefy to a certain extent.

*Larva* differing very slightly from pupa.

*Pupa*: general colour red; antennæ semitransparent, outer margins from sides of head to tip of abdomen pale green; two spots on head, two on pronotum, wing-covers and a double row of elongate marks coming to a point at tip of abdomen black; undersurface of head and abdomen bright green, legs, thorax, and sides of head yellow. Head short, arcuate in front, rounded behind; antennæ long, third joint bent; eyes large, rounded.





Thorax large, rounded in front, wing-covers long, narrow, rounded at tips; legs short, stout. Abdomen very broad, swelling out from base, rounded, and slightly crenulated on sides to a tuberculate anal process.

*Imago*.—Length 0·18, antennæ 0·055 inch.

General colour light olive-green; mesonotum, dorsulum (also marked with parallel brown bars) and some of abdominal segments bright orange-red; all the segmental divisions marked with brown, those upon abdomen forming black bands; antennæ and legs light brown, apex of joints and tip of former clouded. Wings delicate, transparent, nervure light brown. Head large, wider than pronotum, deeply angulated in centre, with deep median suture, and small fovea on either side, arcuate behind, truncate behind antennæ and eyes. Face lobes very large, long, cylindrical, projecting in front of head, covered with fine hairs, rounded at tips, with a deep cleft between them. Antennæ long, slender; 1st joint short, broad, 2nd short, truncate, 3rd very long, 4th shorter, 5th-8th uniform in length, slightly shorter towards the tip, 9th short, 10th very short, pointed. Eyes very large, somewhat reniform, prominent: central ocellus very small, at apex of median suture; lateral ocelli round, small, very close to hindmargin of eyes. Thorax: pronotum angular in centre, arcuate on sides of front margin, with a small circular fovea on either side terminating at tips in a rounded knob, hindmargin arcuate; dorsulum small, rounded in front, extreme tip on sides truncate, hindmargins straight in centre, with sides sloping down to apex; mesonotum broad, arcuate in front, rounded on sides and behind, scutellum covering hindmargin; scutellum slightly spined on sides, irregularly rounded behind, flattened on summit. Legs long, stout. Wings nearly thrice as long as broad, long, slender, with apex angulated; primary stalk long, curving upward; stalk of subcosta rather short, subcostal nervure curving upward and running close along costal but forming no regular subcostal cell or stigma; radius long, slender, running close to costal and turning down below tip; stalk of cubitus very short, upper branch curving round close to radius, upper fork long,



curving downward; lower fork curving downward, shorter than upper, lower branch of cubitus short, upper fork long, arching round, lower fork short, curving in at tip; clavus short, clavical suture slender. Abdomen short, stout. Genitalia (♂) long, curved over the back, shaped somewhat like a duck's head when closed, lower genital plate short, broad, rounded, with a short tubercle at tip; forceps slender at the base with a rounded knob on the inner edge, flattened and slender above, rounded at tip; penis slender, upper genital plate stout, cylindrical at base, sloping to tip on inner edge: (♀) forming a short angular hairy tip tapering to a point.

*Hab.*—Tasmania (on *Eucalyptus* sp.; A. M. Lea); Victoria (on *E.* sp.; C. French, Jr.); New South Wales, widely distributed (on *E.* sp., &c.; W. W. Froggatt); Townsville, Queensland (on *E.* sp.; H. Tryon).

This species is our commonest "sugar-lerp" which has a very wide range over eastern Australia. It does not confine its attention to one species of Eucalypt, but is found upon *E. capitellata*, *E. piperita*, *E. leucoxydon*, *E. gracilis*, and several other species.

As children we used to gather and eat the scales of this species, but it is those of the larger species that were collected and eaten by the natives in the Mallee scrubs, and which were described as "manna." In the venation of the wings this species could come under the genus *Aphalara*, but Schwarz has examined some specimens of this species and redefined Signoret's genus *Spondyliaspis* for its reception on account of the peculiar spiny structure of the hind legs, differences that have not been used very much as generic characters in this group of the Homoptera. Signoret defined the genus upon the lerp-scales only, and had never seen the perfect insects.

SPONDYLIASPIS MANNIFERA, n.sp.

(Plates xii., figs. 2 and 10; xiv., fig. 6).

*Lerp* white, 4 lines in diameter, circular, convex; generally singly upon the surface of the leaves of *E. polyanthema*, *E. hemi-*



*phloia*, and other species; attached all round the lower edge to the leaf, and thickly clothed with numbers of looped filaments giving it a woolly appearance.

*Pupa* light yellow, darker on abdomen; legs and antennæ semitransparent, except the tip of the latter, which is blackish; a brown mark on either side of head, a broad stripe on either side of thorax, a number of irregular spots, and inner edges of wing-covers brown, sides of abdomen clouded with brown, with a double row of spots as in the former species. Head large, lobed in front, straight on sides, swelling out behind eyes, arcuate at base; antennæ rather stout, standing out on sides; eyes rounded, rather prominent; thorax a little broader than head, longer than broad; wing-covers slender, oval, pointed at apex; legs short, stout; abdomen large, globular, constricted at base, swelling out and rounded to an anal tubercule, with an angular projection on either side. The whole insect is fringed with fine hairs which are covered with minute particles of manna.

*Imago*.—Length 0·16, antennæ 0·07 inch.

General colour bright yellow marked with light brown, eyes reddish-brown, legs and antennæ fuscous, darker markings on thorax and apical segments of abdomen, wings semitransparent, outer nervures light brown, inner nervures yellow. Head as broad as thorax, short, deeply cleft in front, with a rounded lobe on either side, a deep median suture and fovea, arcuate at base of antennæ and behind. Face lobes long, slender, widely divided, reaching to base of 3rd antennal joint, rounded, and clothed with fine hairs. Antennæ long, slender, 1st joint very thick, 2nd small, truncate, 3rd very long, nearly as long as 4th and 5th combined, 4th-8th of uniform length, 9th-10th very short, rugose, and rounded at tip. Eyes very large, as long as head, rounded on outer edge: central ocellus at apex of median cleft; lateral ocelli large, well back from eyes. Thorax: pronotum not as wide as head, arcuate in front, forming a fold of lighter colour along hind margin; dorsulum elongate-oval; mesonotum very large, broad, arcuate in front, rounded on sides and behind, truncate at junction with large rounded scutellum. Legs long,



slender. Wings long, slender, more than thrice as long as broad; primary stalk long; stalk of subcosta short, costal cell long and slender, with costal nervure thickened, no true stigma; radius very long, slender, curving round at tip; stalk of cubitus longer than subcosta; upper branch of cubitus long, turning upward; upper fork turning down, longer than lower fork, lower branch of cubitus long, turning downward, upper fork long, curving round, lower fork curving outward forming a long cell; anal cell lanceolate, with a fine clavical suture. Abdomen stout, slender at junction with thorax. Genitalia (♂) showing a black patch on either side; lower genital plate short, rounded, coming to a point at tip; forceps large, elongate, curved inwards; penis hidden, upper genital plate elongate-oval.

*Hab.*—Tumut, N.S.W. (on *E. polyanthema* and *E. hemiphloia*; W. W. Froggatt); Wimmera, Vic. (on *E. gracilis*; W. W. Froggatt.)

This species has a wide range, and is closely allied to *S. eucalypti*.

Genus *DASYPSYLLA*, n.g.

Head short, turned down sharply in front, deeply arcuate behind; eyes large, angulated on the inner margin. Face lobes large, broad, close together, truncate at apex. Antennæ very short. Thorax: pronotum very narrow; dorsulum coming to a point at extremities; mesonotum large. Elytra broad, rounded at apex, with a double costal nervure forming a narrow cell, inner nervure running into upper before reaching the wedge-shaped stigma; primary stalk short; radius short, not reaching apex of wing; stalk of subcosta not as long as stalk of cubitus; upper cubital furcation elongate, both nervures curving outward at apex. Genitalia (♂) short; lower genital plate broad, angular; forceps broad.

Type *D. brunnea*.

*DASYPSYLLA BRUNNEA*, n.sp.

(Plates xii., figs. 5 and 11; xiv., fig. 21).

*Lerp* chocolate-brown; 2 lines in diameter, formed singly upon the leaves of *E. polyanthema*; irregularly rounded, undersurface



forming a thin brown shell or lower valve attached to the leaf; upper valve commencing with a small hinge, swelling out to lower edge; curving round in concentric rings, forming a convex rounded shell fringed on summit and outer margin with short filaments.

*Pupa* dark red; legs, two spots on head, wing-covers and the spots between them, and two rows of spots down centre of abdomen black; ventral surface of head and thorax light red. Head short, broad, rounded on sides; antennæ very long, slender, curving round to centre of wing-covers; eyes small. Thorax short, wing-covers short, rounded; legs short, thick. Abdomen short, constricted at base, swelling out, rounded to tip, broader than long.

*Imago*.—Length 0·185, antennæ 0·045 inch.

General colour ochreous, with creamy-white and pink tints; head and thorax finely shagreened, thickly covered with small black spots; abdominal segments dark brown to black, with lower margins ochreous; wings thickly mottled with fine spots and larger blotches of black and brown, nervures white at base, black in clouded portions, pink in clearer portions. Head as wide as thorax, short, face turned downward, slightly cleft in centre, arcuate behind antennæ and basal margin. Face lobes large, broad, rounded, thickly fringed with white hairs. Antennæ very short, 1st joint short, black; 2nd short, cylindrical; 3rd slender, as long as 4th and 5th combined; 4th-8th uniform in length, apex of each fuscous; 9th-10th forming rounded tip. Eyes very large, rounded on sides, angular behind: central ocellus large, situated at apex of median suture; lateral ocelli large, red, close to outer margin of eyes. Thorax: pronotum creamy-white, with a brown spot in centre, very narrow; dorsulum broad, short, rounded in front, produced into a conical point at tips, hind margin truncate at apex; mesonotum very large, convex, arcuate in front, rounded behind except in front of scutellum, where it is arcuate and flattened; scutellum creamy-white, tinted with pink, arcuate in front, broadly rounded on sides. Legs long, ochreous with dark markings on femora, tibiæ, and basal joint of tarsi. Wings broad, a little more than twice as long as broad, rounded



on front margin, broad at tip, costal nervure very stout at base forming a double or secondary costal nervure to stigma; primary stalk short; stalk of subcosta not as long as stalk of cubitus; costal cell short; stigma short, angular; radius short, curving upward, emerging on upper edge of wing; stalk of cubitus long; upper branch straight, upper and lower forks long, curving in at centre and turning outward at tips; lower branch of cubitus long, straight, upper fork long, curving round, lower turning outward at apex; clavus stout, clavical suture slender. Abdomen short, stout. Genitalia (♂) long, stout; lower genital plate short, angular at apex; forceps long, formed of two broad-tipped processes closing down over the penis; upper genital plate slender, conical, truncate at apex, projecting beyond forceps.

*Hab.*—Tumut, N.S.W. (on *E. polyanthema*; W. W. Froggatt).

Genus THEA, Scott.

Head twice as broad between eyes as length down centre; crown with posterior margin almost straight, sides straight from base to front of eyes, where they are produced into a short triangular tooth. Face lobes narrow, ribbon-shaped. Antennæ long. Eyes on sides of head projecting nearly their whole width beyond pronotum. Thorax: pronotum narrow; mesonotum convex, as wide as head and eyes at the insertion of forewings. Elytra elongate, apex acute; stigma short; radius long, terminating at apex; cubitus upper furcation longer than arm, petiole a little longer than lower arm.

Type *Psylla triguttata*, Walker.

THEA FORMICOSA, n.sp.

(Plate xi, fig. 4).

*Larva* dull white, eyes pink, faintly marked with light brown; apex of abdomen darkest, apical segment fringed with hairs. *Second stage*: Head, thorax, and base of abdomen creamy white; legs, antennæ, and wing-covers light brown; eyes dark brown, two large blotches on head dark brown; small, black, angular spots



forming a regular pattern on thorax; basal segments of abdomen marked with fine black interrupted bars; apical portion light chocolate-brown, rugose, flattened, and marked with irregular punctures. Legs, antennæ, and outer edge of abdominal segments fringed with coarse hairs.

*Pupa* with white colour of larva changing into opaline-blue, brightly spotted with red, bands upon abdominal segments thickened. Head truncate between antennæ, sloping down to eyes, arcuate behind; eyes very large; antennæ long, thick, very stout at base. Thorax broad, legs thick, stout; wing-covers small, pointed at apex. Abdomen large, flattened at apex, and irregularly rounded to tip.

*Imago*.—(♀) Length 0·21, antennæ 0·08 inch.

General colour pale opaline-blue; ocelli, edges round eyes, spots on head, and outer margins of abdominal segments bright red; first and second joints of antennæ black; terminal joints, legs, and ventral surface ochreous; thorax barred with light chestnut; abdominal segments black, with apical margins banded with blue and red, genitalia red; wings semi-opaque, the transverse nervure at base of subcostal and outer edge of wing blotched with black, nervures bright reddish-brown. Head short, as broad as thorax, slightly lobed in front, rounded, arcuate at base of antennæ, with shallow median suture, rounded on sides, arcuate behind. Face lobes very narrow. Antennæ very long, 1st joint very broad, rounded on sides, 2nd joint globular, 3rd-5th uniform, cylindrical, 6th more slender, 7th-8th very long, slender, 9th shorter, thickened towards apex, 10th short, truncate at tip. Eyes large, reniform, projecting: central ocellus large, at base of median suture, hidden from above; lateral ocelli large, close to hindmargin of eyes. Thorax: pronotum narrow, lobed at extremities, and marked with black spots; dorsulum short, broad, rounded on either side, truncate and slightly serrate at extremities; mesonotum large, arcuate in front, sloping to a point on either side, rounded, truncate at apex; scutellum large, truncate in front, arcuate on sides, rounded behind. Legs long, stout, fringed with fine hairs, apex of tibiæ and tarsi clouded with fuscous. Wings



thrice as long as broad, rounded in front to a sharply curved tip, broadest at second cubital cell, primary stalk long; stalk of subcosta short; costal cell short, broad; stigma short, angular, rounded in front; radius long, curving downward, emerging at tip of wing; stalk of cubitus longer than subcosta, upper branch of cubitus curving upward, upper and lower forks forming a short broad cell, lower branch of cubitus very short, upper fork curving upward, lower fork very short, turning sharply downward, forming a very short, broad cell; clavus stout, clavical suture very distinct. Abdomen short, stout. Genitalia (♀) very long, stout, sabre-shaped, rounded at base, upper valve longest, slightly truncate at tip.

♂. Smaller than ♀, with no black markings upon wings, and of a uniform brown colour with pale reddish tints. Abdomen very short. Genitalia (♂) very large, lower genital plate elongate, rounded at apex; forceps large, curved upward; upper genital plate longer and more slender than forceps.

*Hab.*—Thornleigh, Botany, Mittagong, N.S.W. (on *E. piperita*; W. W. Froggatt).

The larvæ form no lerp but hide under loose bits of bark on the trunks of several white-stemmed gums, thickly enveloped in white flocculent matter, thickest round the abdomen, which exudes from beneath their shelter and reveals their hiding place, and when abundant dots the trunks all over with white blotches. Other colonies are found congregated on the stems of small trees, where they are frequently covered by ants with a thick felted sheath of woody débris, sometimes extending for four or five feet from the ground and completely sheltering them. The ants, *Iridomyrmex nitidus*, Mayr, swarm over them in this covered gallery, and evidently protect them for the sake of the honey-dew that is secreted.

THEA OPACA, n.sp.

(Plates xi., fig. 5; xii., fig. 14; xiii., figs. 1-4).

*Larva* similar in appearance to that of *T. formicosa*, but of a more uniform ochreous colour; thoracic markings similar.



*Pupa*.—Head broad, slightly lobed in front; antennæ long, slender, tapering to tips; wing-covers short, broad, darker-coloured than legs; abdomen tufted with hair on either side.

*Imago*.—Length 0·24, antennæ 0·07 inch.

General colour reddish-pink, marbled with brown and black. Head in form as in the former species. Pronotum a little broader; dorsulum more elongate at extremities, with a deep impressed fovea on either side towards front margin; mesonotum larger, more rounded at extremities. Legs similar. Wings of same shape and colouration; primary stalk longer and straighter; stigma not rounded in front, but transverse: forks of upper branch of cubitus of equal length, forming a long slender cell; lower branch of cubitus moderate, upper fork longest, curving round, lower fork curving in at apex. Abdomen short, stout. Genitalia (♂): lower genital plate short, broad, rounded beneath; forceps short, broad, slightly pointed at apex; upper genital plate very long, pointed at tip; penis hidden.

*Hab*.—Canterbury, Croydon, Sydney, N.S.W. (on *E. sp.*; W. W. Froggatt).

This is not so plentiful as *E. formicosa*, but is found in similar localities, and is always covered with ants.

#### THEA LEAI, n.sp.

(Plates xi., fig. 6; xii., fig. 20.)

*Larva* and *pupa* unknown.

*Imago*.—Length 0·21, antennæ 0·09 inch.

General colour light green, legs yellow, prothorax and base of abdomen shaded with red, genital plates red; wings transparent except subcostal cell which is ochreous, nervures ochreous. Head very broad between eyes, flattened, sloping down in front, arcuate in centre, median suture with a large shallow fovea on either side, sides of face produced into an angular point in front of eyes, hindmargin deeply arcuate. Face lobes short, broad, rounded, hidden from above. Antennæ long, slender, 1st joint short, broad, 2nd short, truncate, 3rd thrice the length of 2nd, 4th-9th



increasing in length towards tip, 10th short, elongate-oval. Eyes rounded, projecting very slightly: central ocellus small, at extreme apex of median suture; lateral ocelli small, about centre of hind-margin of eyes. Thorax: pronotum broad, rounded in front, arcuate behind, a small fovea on either side; dorsulum convex, rounded in front, pointed at tips, sloping to a truncate apex at junction with mesonotum, the latter broad, arcuate in front, running to a blunt point on sides, rounded behind, broad and nearly square. Legs long, stout. Wings more than twice as long as broad, rounded in front, pointed at apex, rounded to base; primary stalk long; stalk of subcosta short; stigma short, rounded at base, pointed at apex; radius long, curving upward, then turning down above tip of wing; stalk of cubitus longer than subcosta, upper branch of cubitus long, upper and lower forks nearly equal in length, forming a long slender cell, lower one curving downward; lower branch of cubitus moderately long, upper fork short, curving round, lower fork very short, turning outward, forming a short, broad cell; clavus stout, clavical suture long, slender. Abdomen short, stout. Genitalia: (♂) ochreous, broad, short; lower genital plate round, broad; forceps short, broad, rounded at tip; upper genital plate long, slender: (♀) sabre-shaped, long, slender.

*Hab.*—Tamworth, N.S.W. (on *E. sp.*; A. M. Lea).

Four specimens in the collection of the Department of Agriculture, Sydney, pinned and labelled "Tamworth, collected by Mr. Lea."

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#### EXPLANATION OF PLATES.

##### Plate xi.

- |   |    |
|---|----|
| Fig. 1.— <i>Creiis longipennis</i> , Walk.; elytron.        |    |
| Fig. 2.— <i>Lasiopsylla rotundipennis</i> , n.sp.; elytron. |    |
| Fig. 3.————— <i>bullata</i> , n.sp.                         | ,, |
| Fig. 4.— <i>Thea formicosa</i> , n.sp.                      | ,, |
| Fig. 5.————— <i>opaca</i> , n.sp.                           | ,, |
| Fig. 6.————— <i>Leai</i> , n.sp.                            | ,, |
| Fig. 7.— <i>Cardiaspis plicatuloides</i> , n.sp.            | ,, |
| Fig. 8.— <i>Rhinocola pinnæformis</i> , n.sp.               | ,, |
| Fig. 9.————— <i>viridis</i> , n.sp.                         | ,, |



Fig. 10.—*Cardiaspis artifex*, Schw.; elytron.

Fig. 11.—*Rhinocola corniculata*, n.sp. „

Fig. 12.————— *revoluta*, n.sp. „

Fig. 13.————— *assimilis*, n.sp. „

Fig. 14.————— *ostreata*, n.sp. „

Plate xii.

Fig. 1.—*Spondylia sp. eucalypti*, Dobs.; elytron.

Fig. 2.————— *mannifera*, n.sp. „

Fig. 3.—*Rhinocola marmorata*, n.sp. „

Fig. 4.————— *liturata*, n.sp. „

Fig. 5.—*Dasypsylla brunnea*, n.sp. „

Fig. 6.—*Cometopsylla rufa*, n.sp. „

Fig. 7.—*Aphalara carinata*, n.sp. „

Fig. 8.—*Rhinocola revoluta*, n.sp.; genitalia (♂).

Fig. 9.—*Cardiaspis artifex*, Schw. „

Fig. 10.—*Spondylia sp. mannifera*, n.sp. „

Fig. 11.—*Dasypsylla brunnea*, n.sp. „

Fig. 12.—*Spondylia sp. eucalypti*, Dobs. „

Fig. 13.—*Thea formicosa*, n.sp. „

Fig. 14.————— *opaca*, n.sp. „

Fig. 15.—*Lasiopsylla rotundipennis*, n.sp. „

Fig. 16.————— *bullata*, n.sp. „

Fig. 17.—*Creiis longipennis*, Walk. „

Fig. 18.—*Cardiaspis plicatuloides*, n.sp. „

Fig. 19.—*Rhinocola liturata*, n.sp. „

Fig. 20.—*Thea Leai*, n.sp. „

Fig. 21.—*Cometopsylla rufa*, n.sp. „

Plate xiii., Figs. 1-4.—*Thea opaca*, n.sp.

Fig. 1.—Pupa enlarged.

Fig. 2.—Imago (♀). 1a. Face lobes. 2a. Prothorax. 3a. Mesonotum.  
4a. Dorsulum. 5a. Scutellum.

Forewing (Elytron). 1b. Costal nervure. 2b. Primary stalk.  
3b. Clavus. 4b. Clavical suture. 5b. Stalk of subcosta.  
6b. Stalk of cubitus. 7b. Subcosta. 8b. Lower branch of  
cubitus. 9b. Upper branch of cubitus. 10b. Lower fork of  
lower cubitus. 11b. Stigma. 12b. Upper fork of lower branch  
of cubitus. 13b. Radius. 14b. Lower fork of upper cubitus.  
15b. Upper fork of upper cubitus.

Fig. 3.—Genitalia (♂). 1. Apex of abdomen. 2. Lower genital valve.  
3. Forceps. 4. Penis hidden. 5. Upper genital valve.

Fig. 4.—Genitalia (♀). 1. Upper valve enclosing ovipositor. 2. Lower valve.



Plate xiii., Figs. 5, 5a.—*Spondyliaspis eucalypti*, Dobs.

Fig. 5.—Head; 5a. face lobes.

Plate xiv.

Fig. 6.—*Spondyliaspis mannifera*, n.sp.; lerp-scales.

Fig. 7.————— *eucalypti*, Dobs.                   ,,

Fig. 8.—*Creiis longipennis*, Walk.                   ,,

Fig. 9.—*Cardiaspis plicatuloides*, n.sp.                   ,,

Fig. 10.—*Rhinocola liturata*, n.sp.                   ,,

Fig. 11.—*Lasiopsylla rotundipennis*, n.sp.                   ,,

Fig. 12.—*Rhinocola pinnæformis*, n.sp.                   ,,

Fig. 13.————— *corniculata*, n.sp.                   ,,

Fig. 14.—*Cardiaspis artifex*, Schwarz.                   ,,

Fig. 15.—*Lasiopsylla bullata*, n.sp.                   ,,

Fig. 16.—*Aphalara carinata*, n.sp.                   ,,

Fig. 17.—*Rhinocola viridis*, n.sp.                   ,,

Fig. 18.—*Cometopsylla* (?) *rufa*, n.sp.                   ,,

Fig. 19.—*Rhinocola revoluta*, n.sp.                   ,,

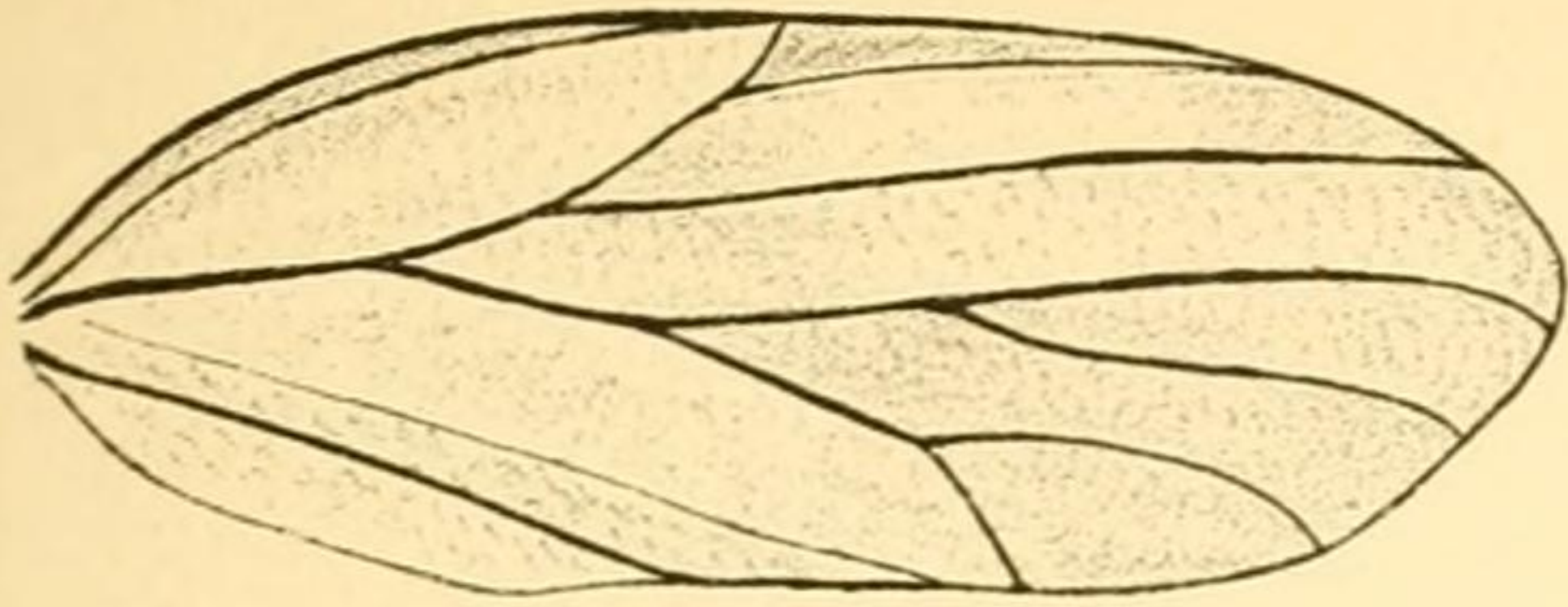
Fig. 19a.————— (open leaf)                   ,,

Fig. 20.————— *ostreata*, n.sp.                   ,,

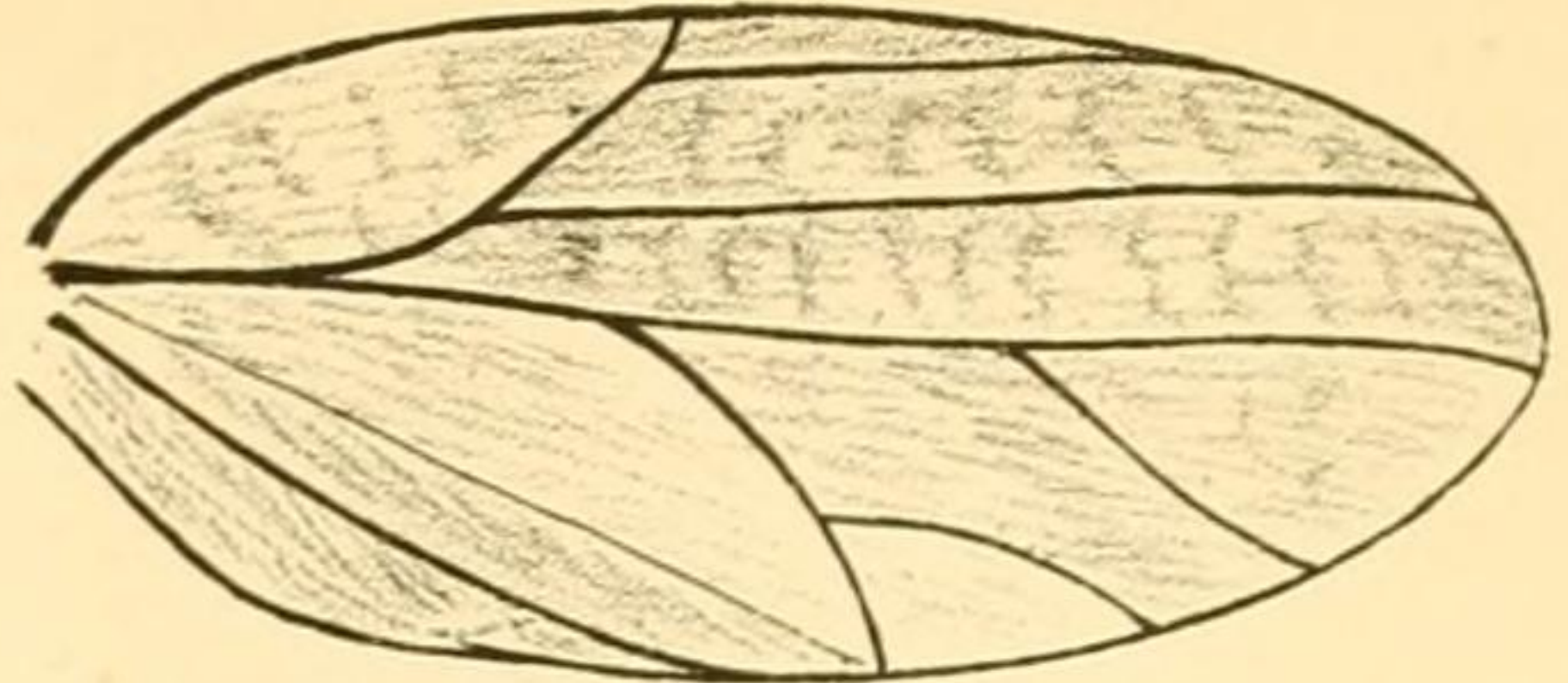
Fig. 21.—*Dasypsylla brunnea*, n.sp.                   ,,

(Natural size or enlarged).

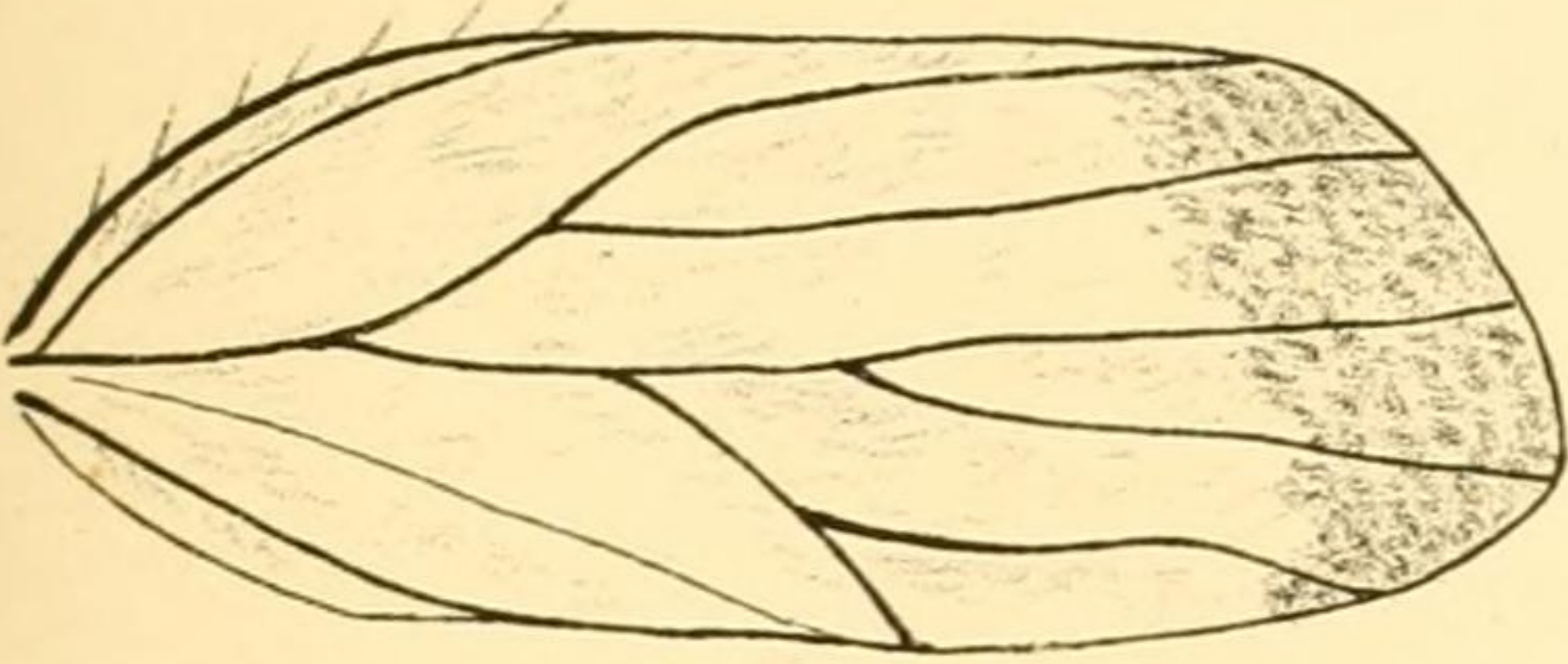




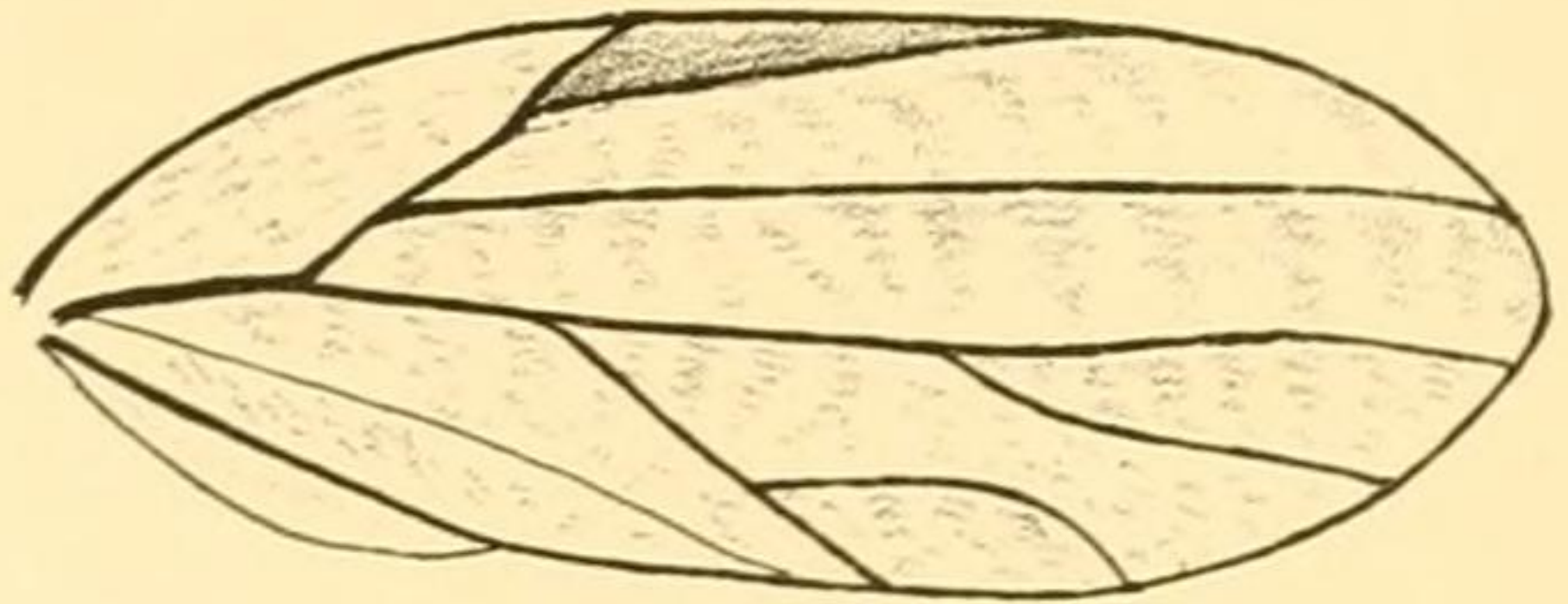
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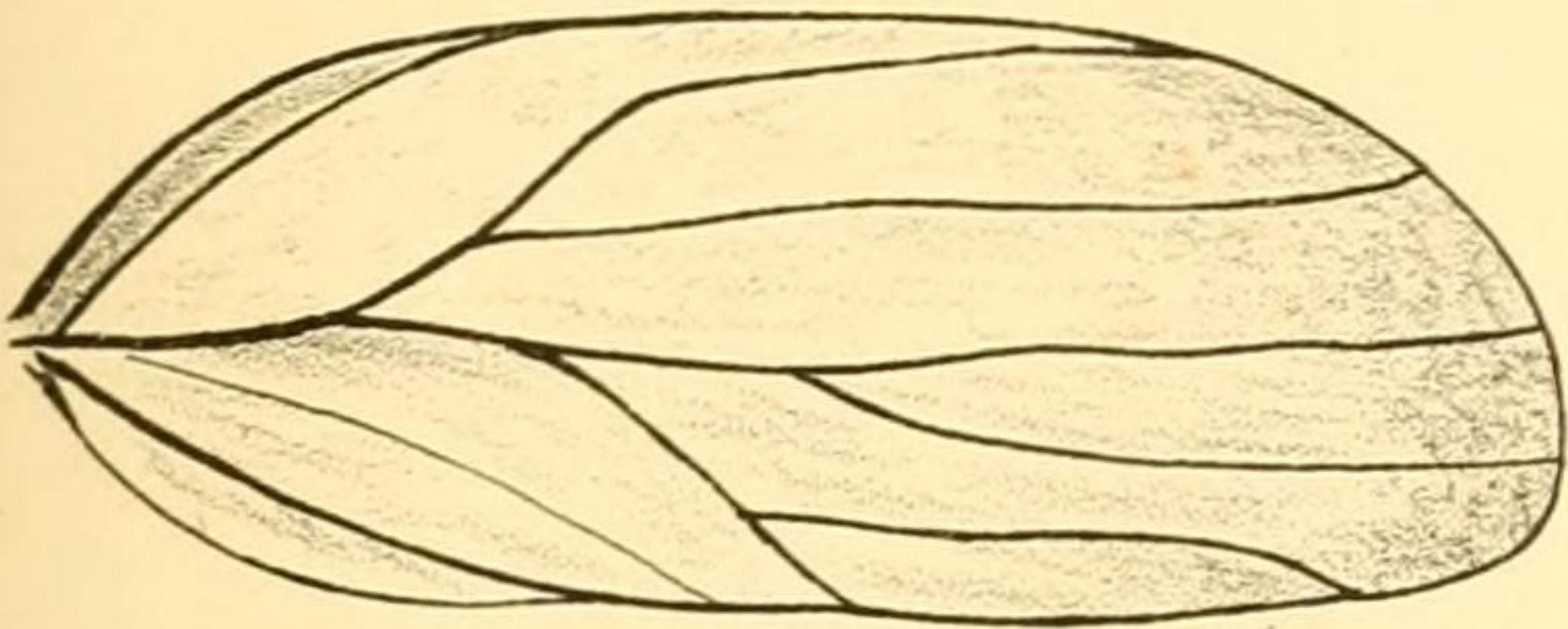
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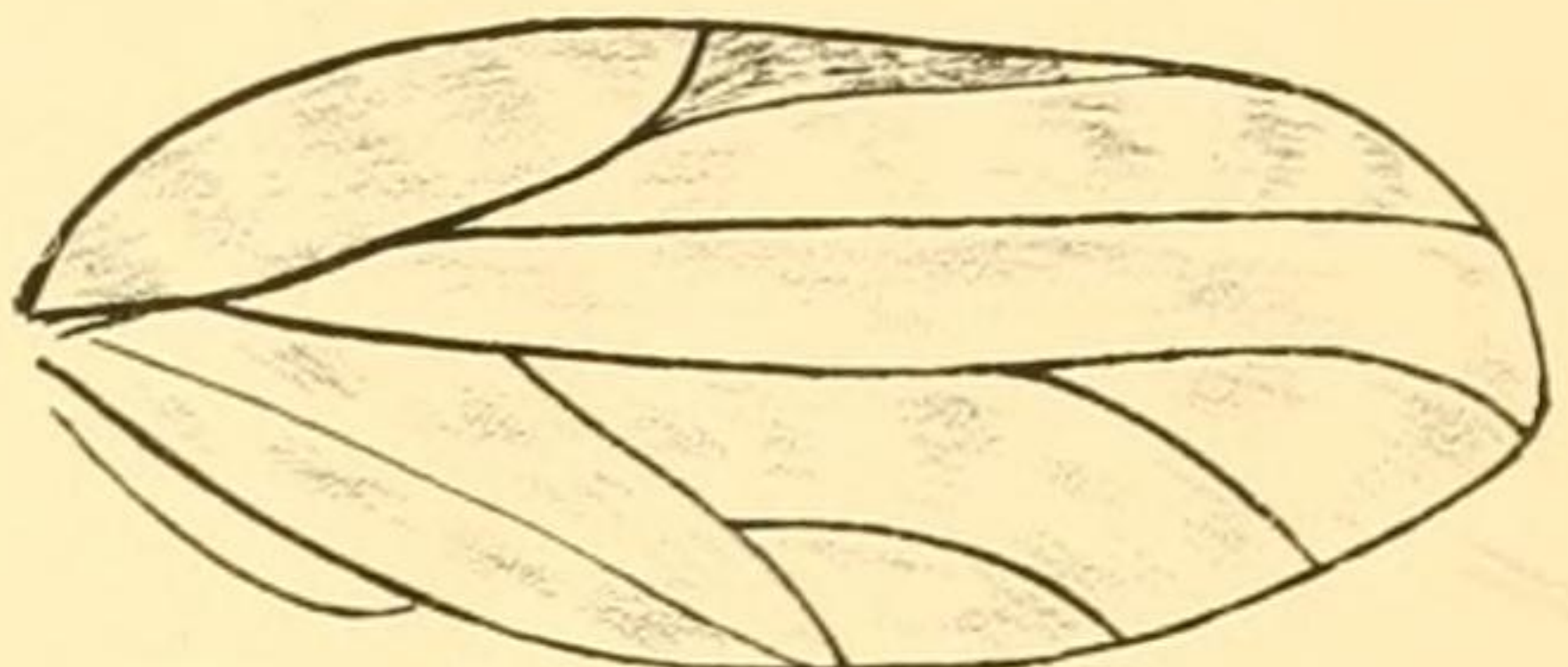
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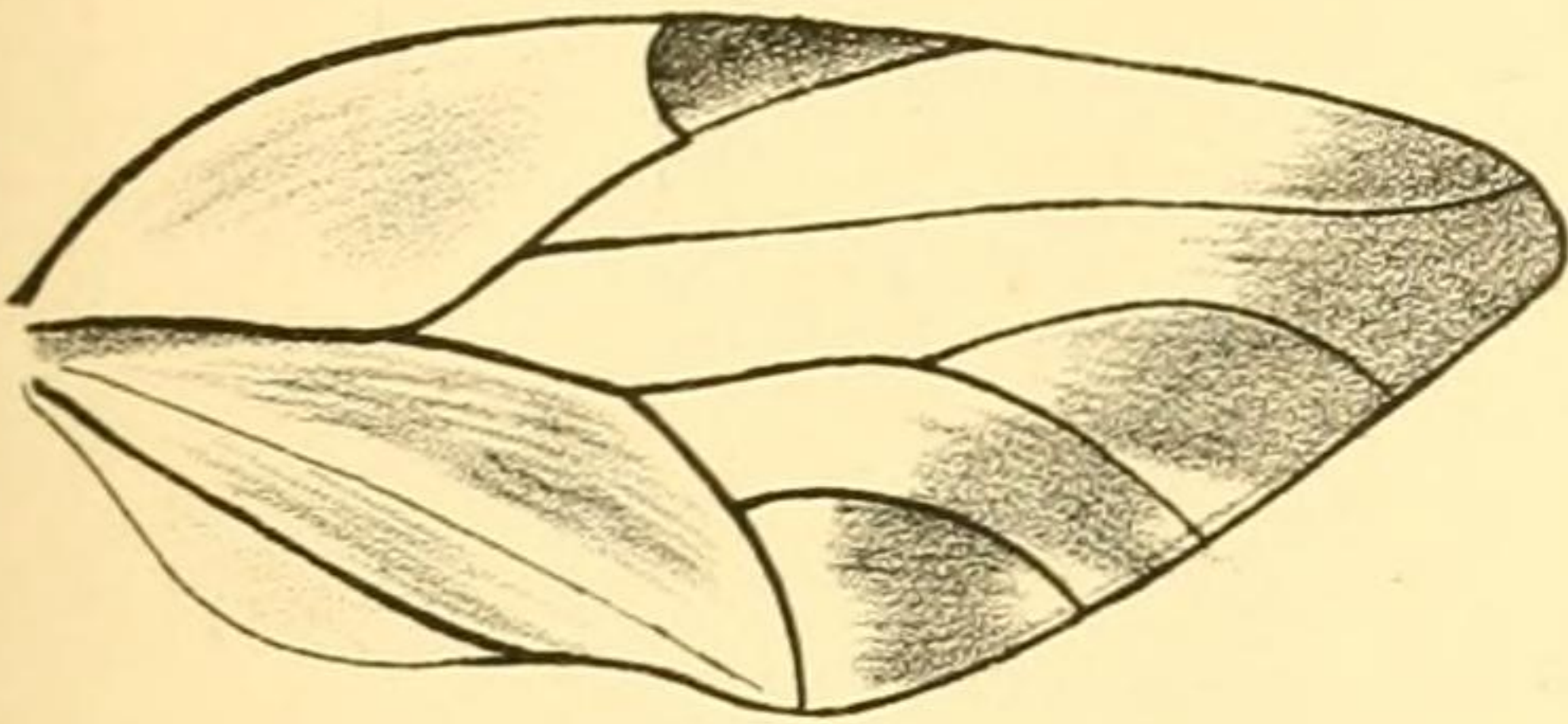
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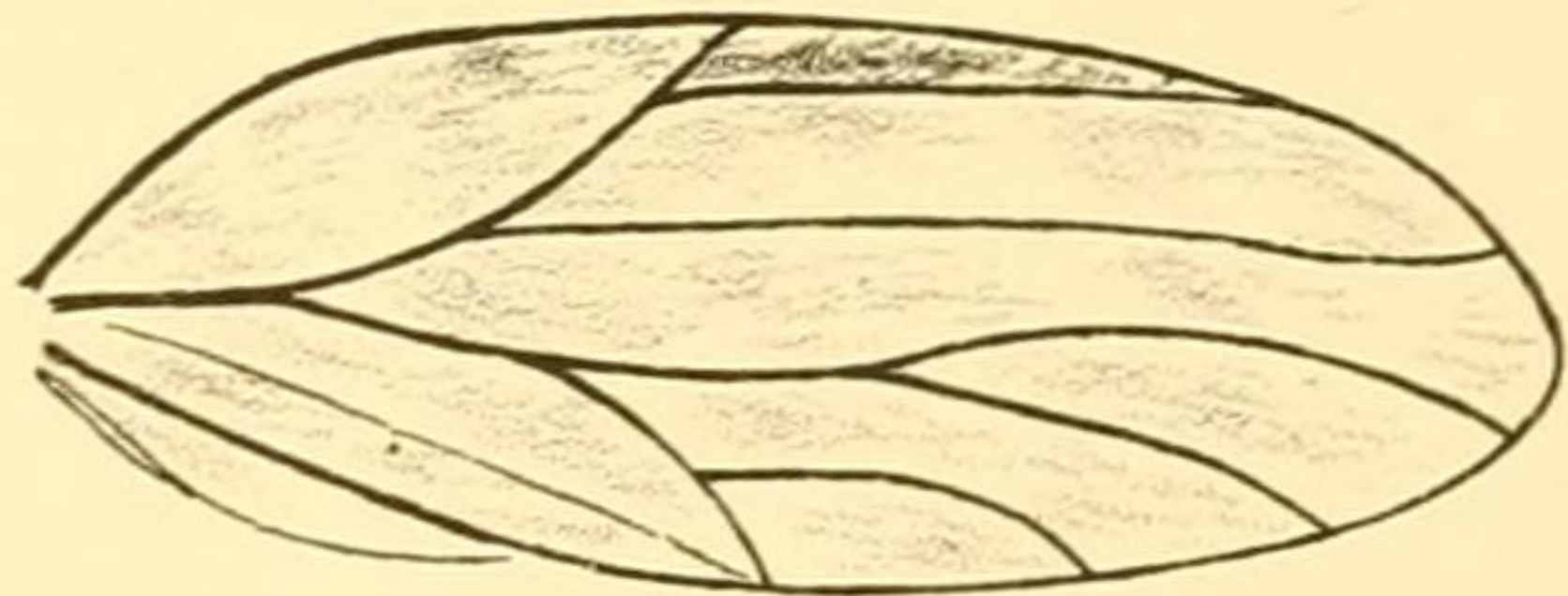
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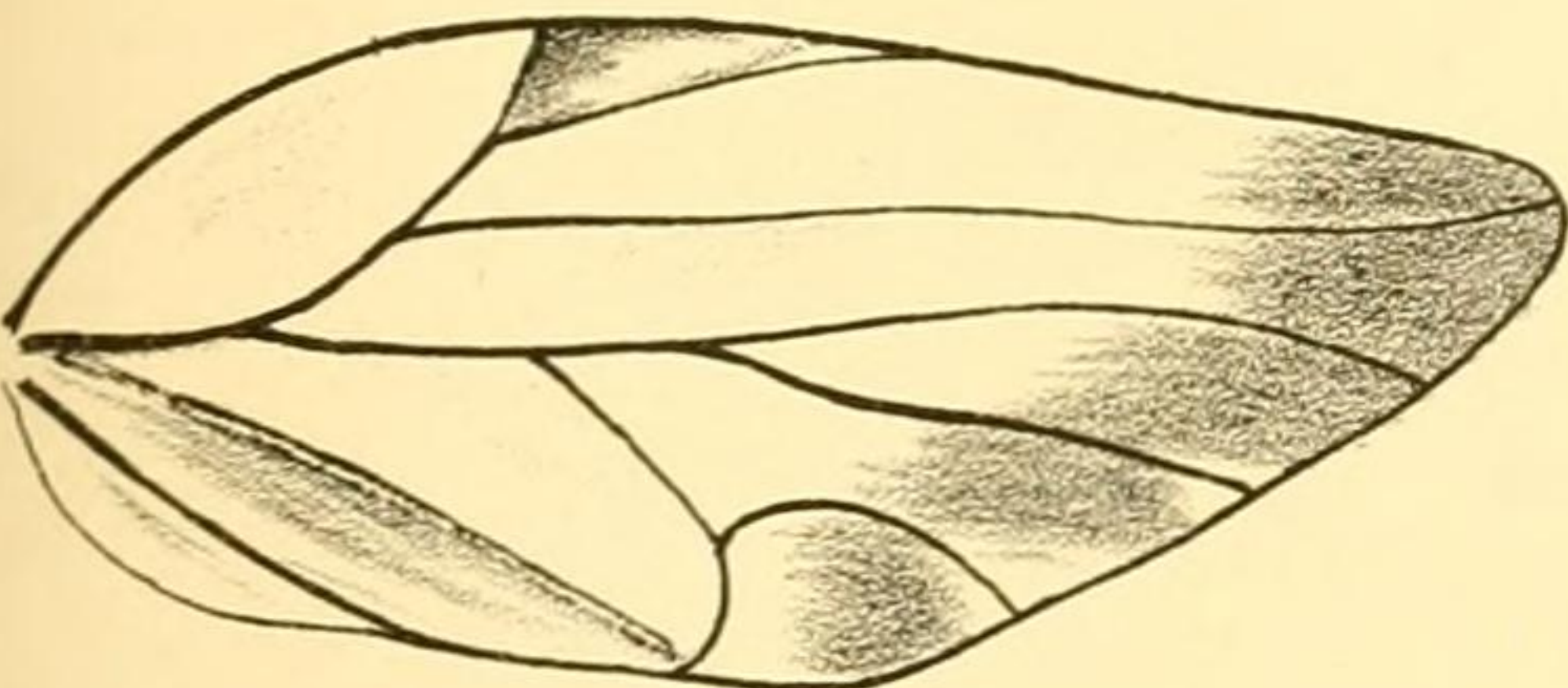
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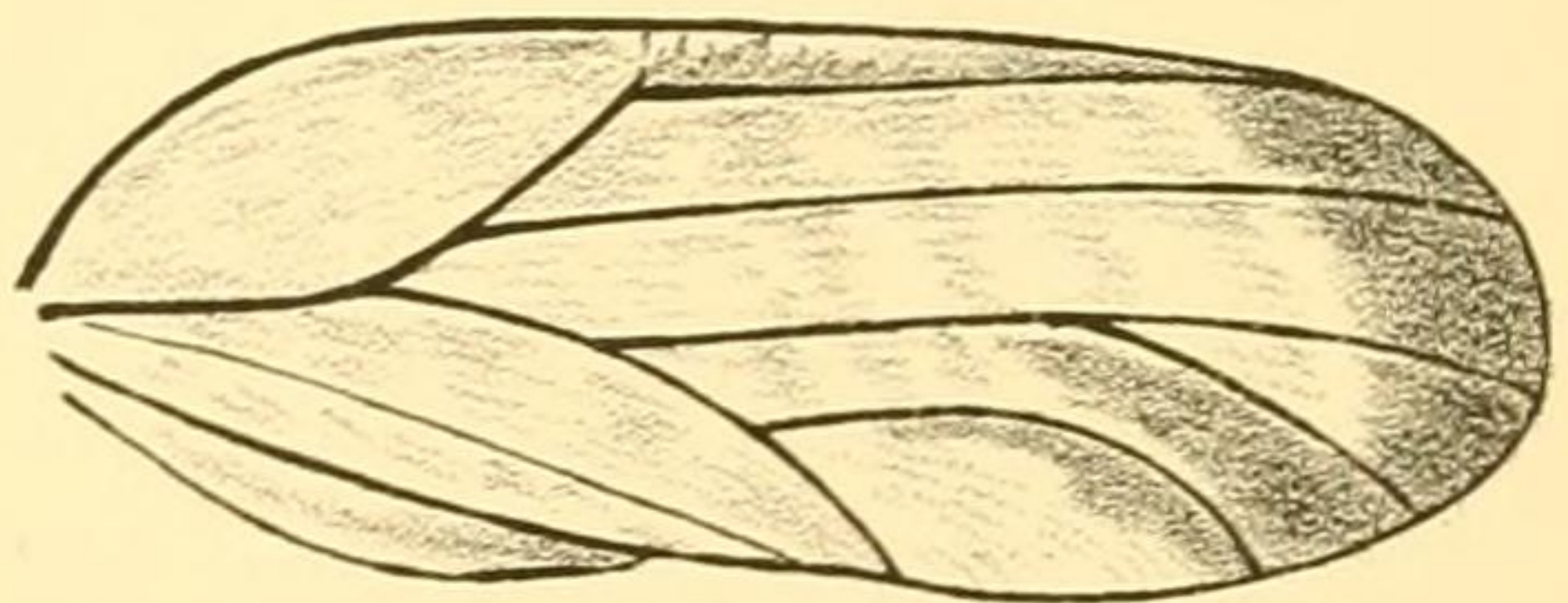
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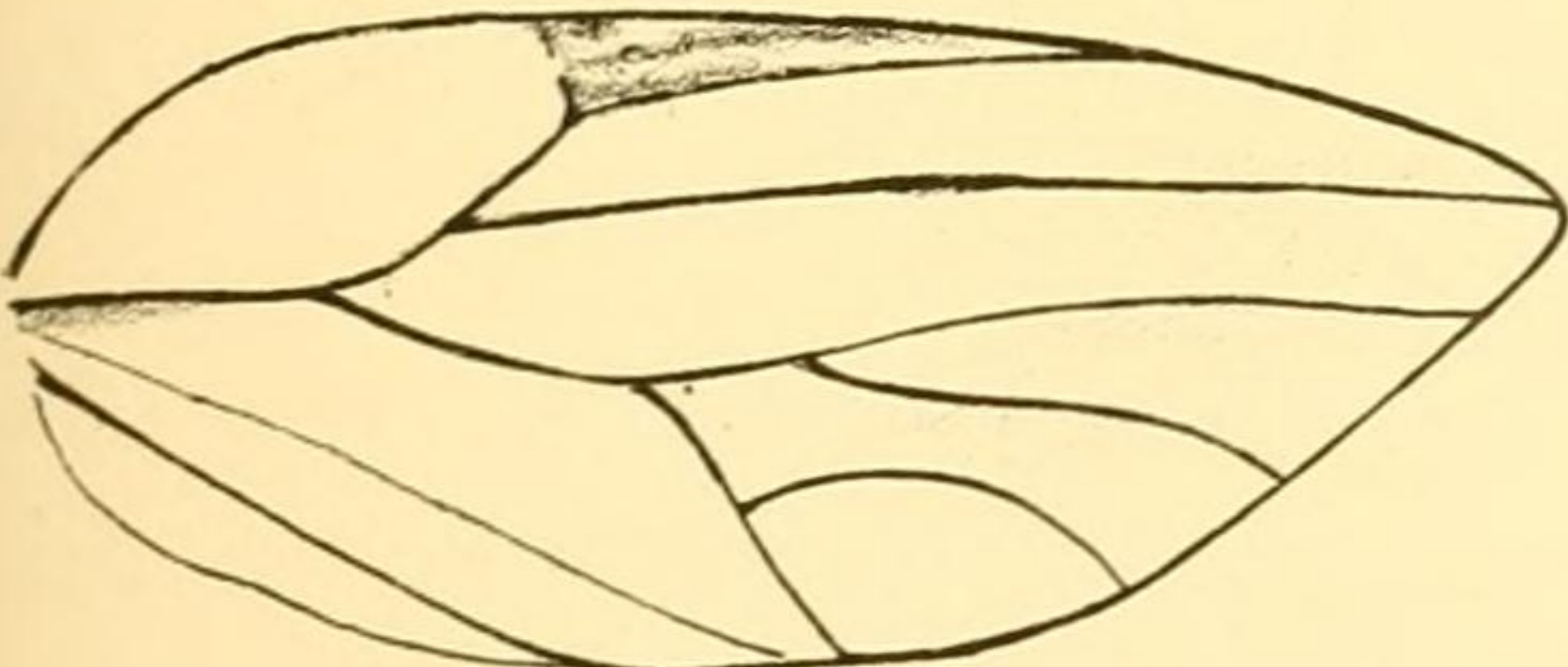
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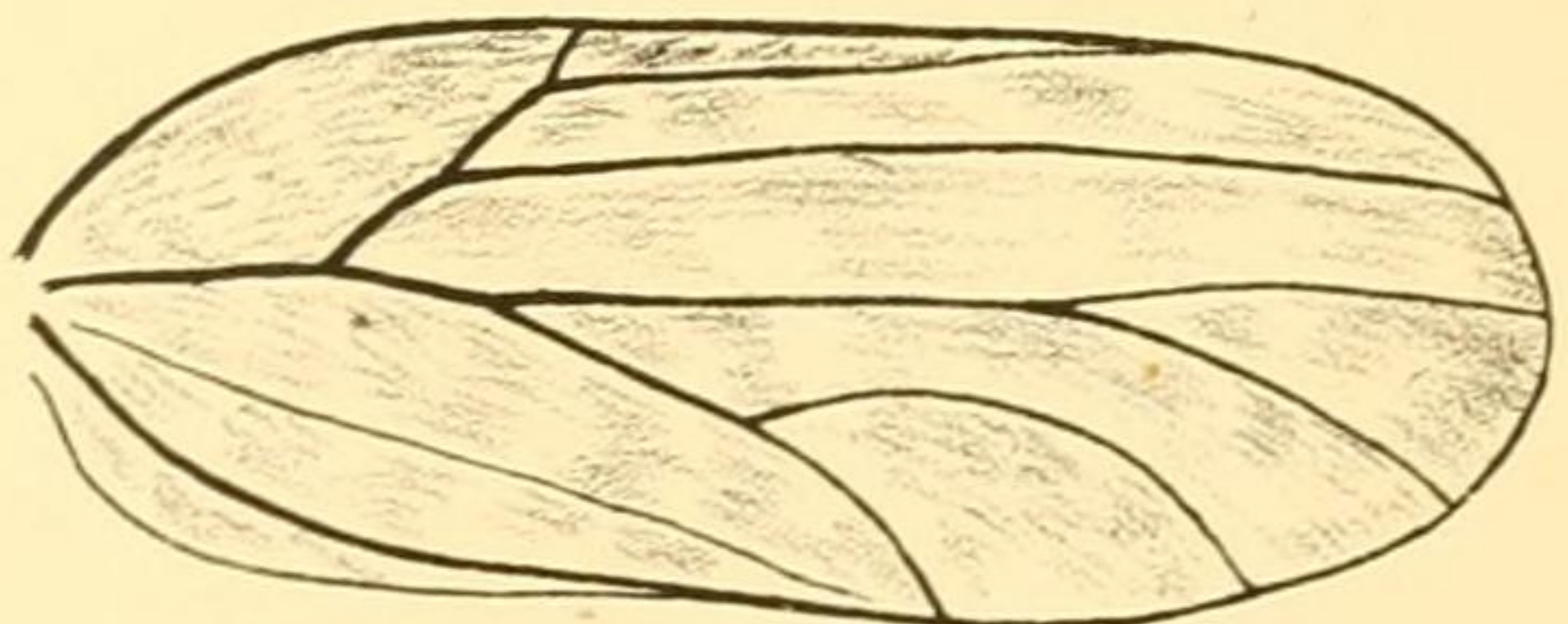
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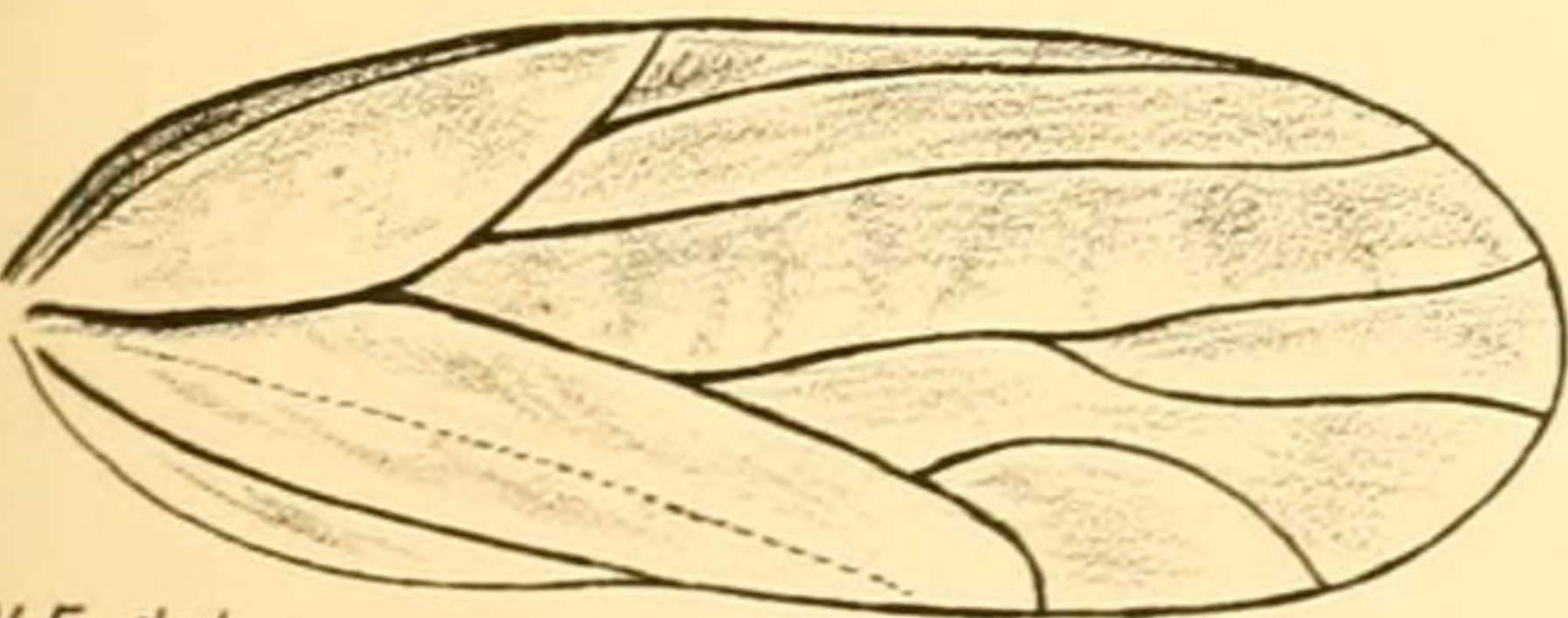
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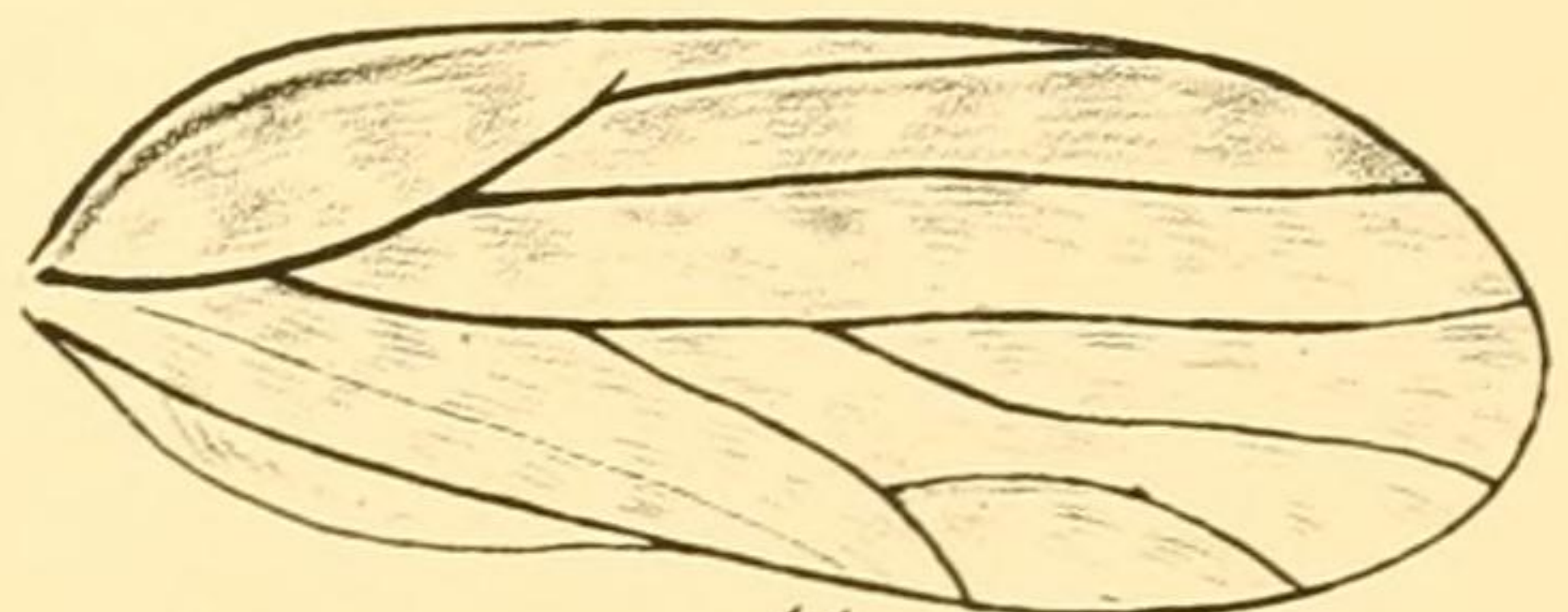
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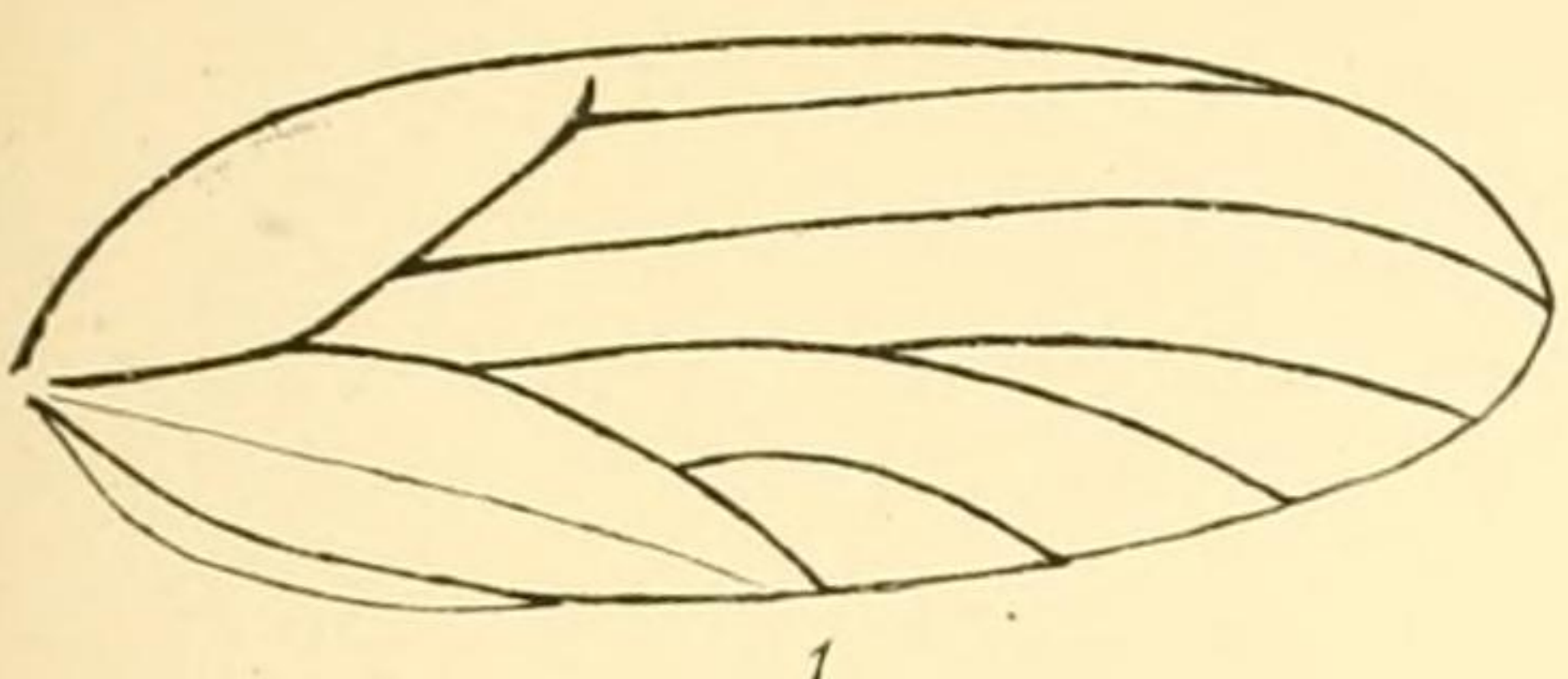
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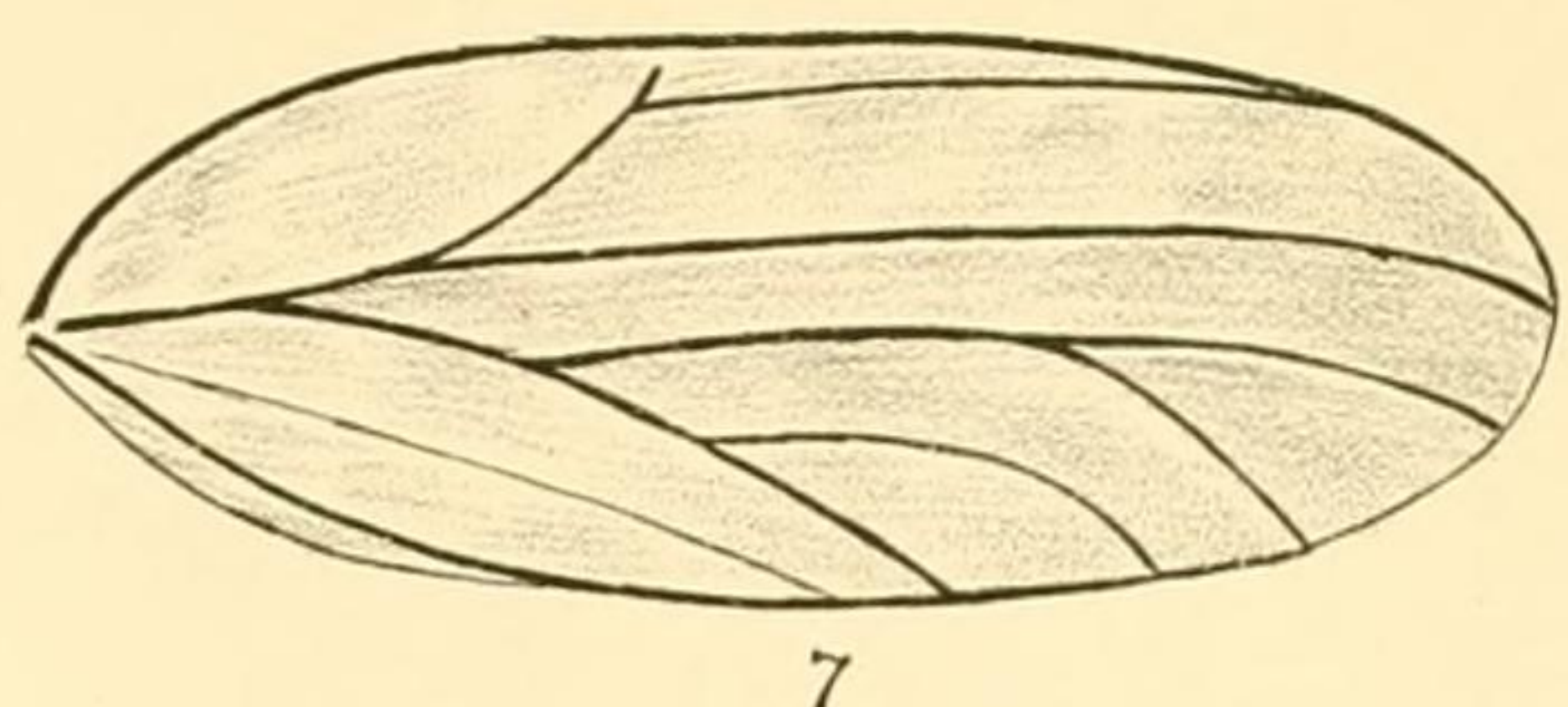
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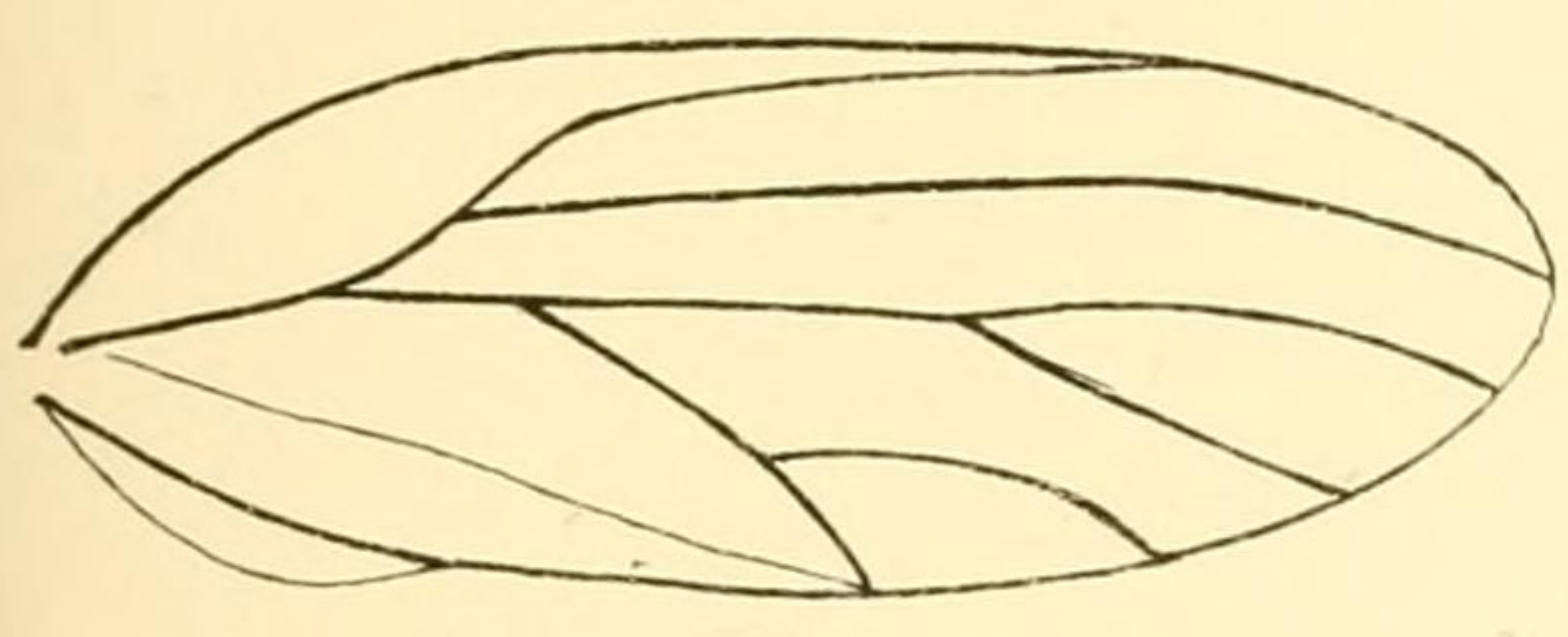




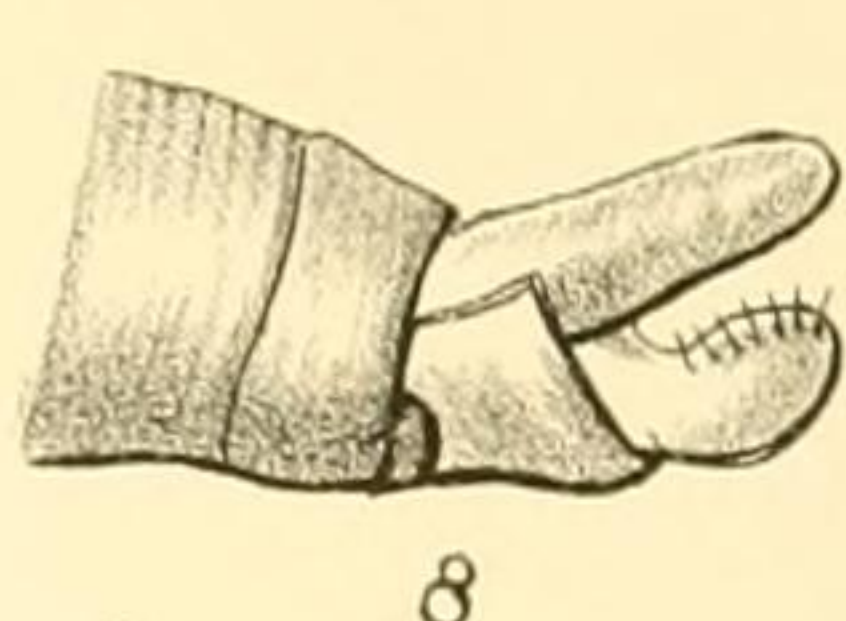
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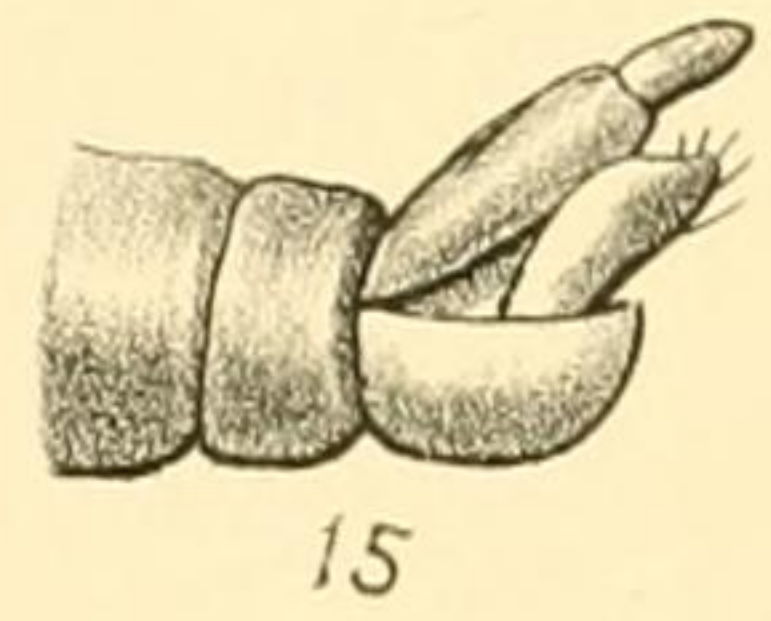
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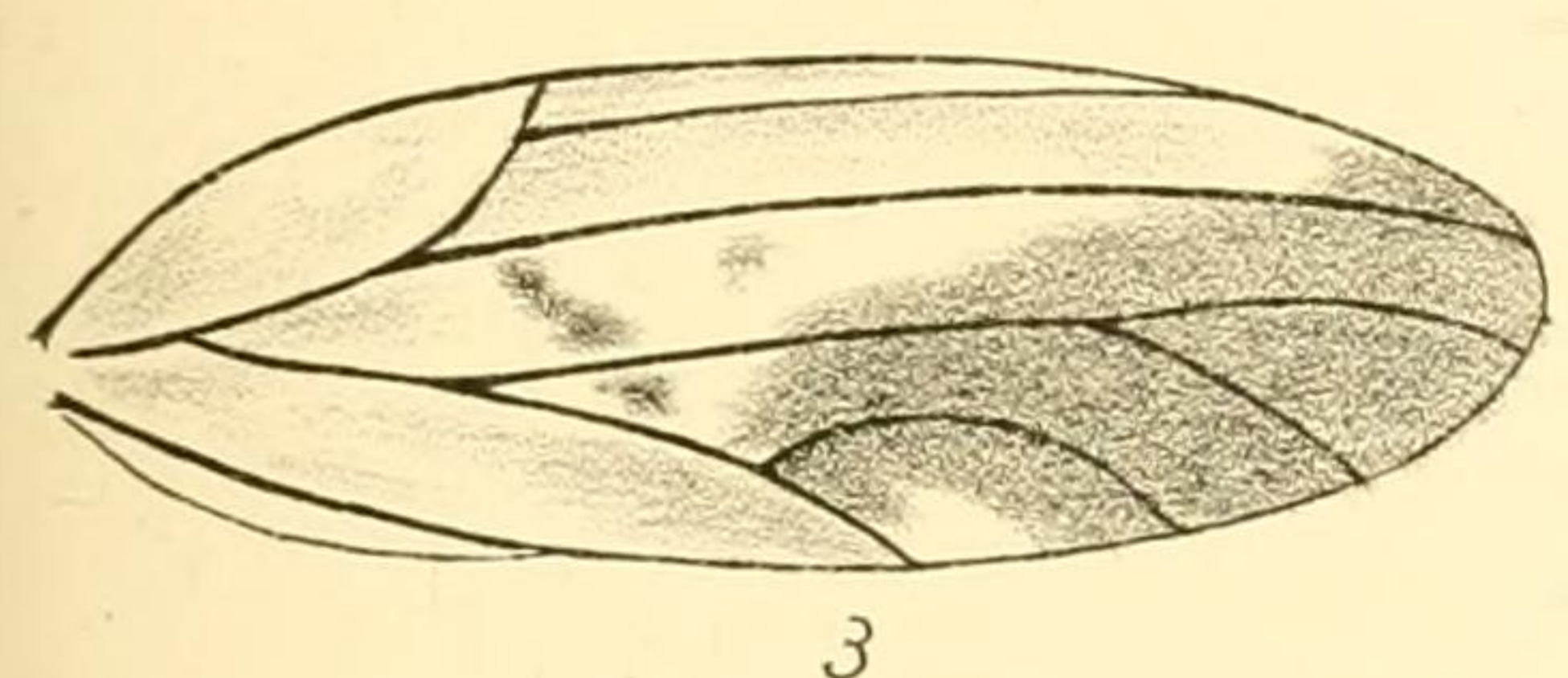
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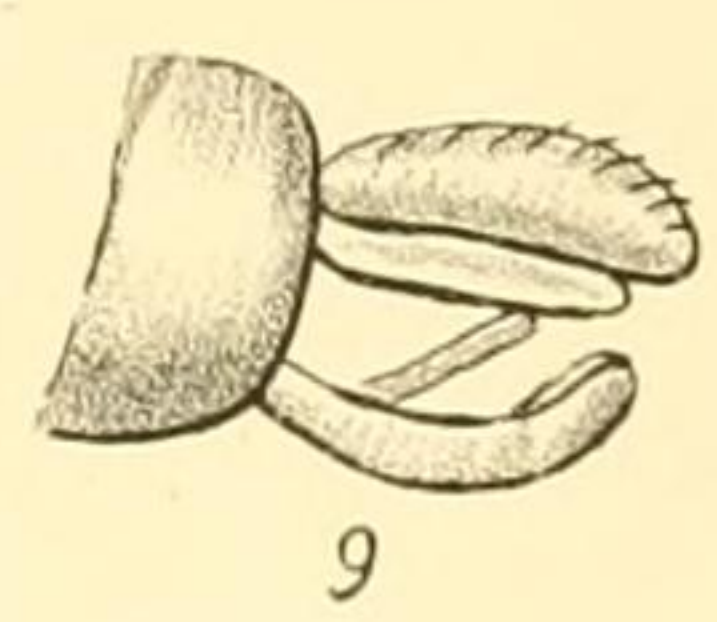
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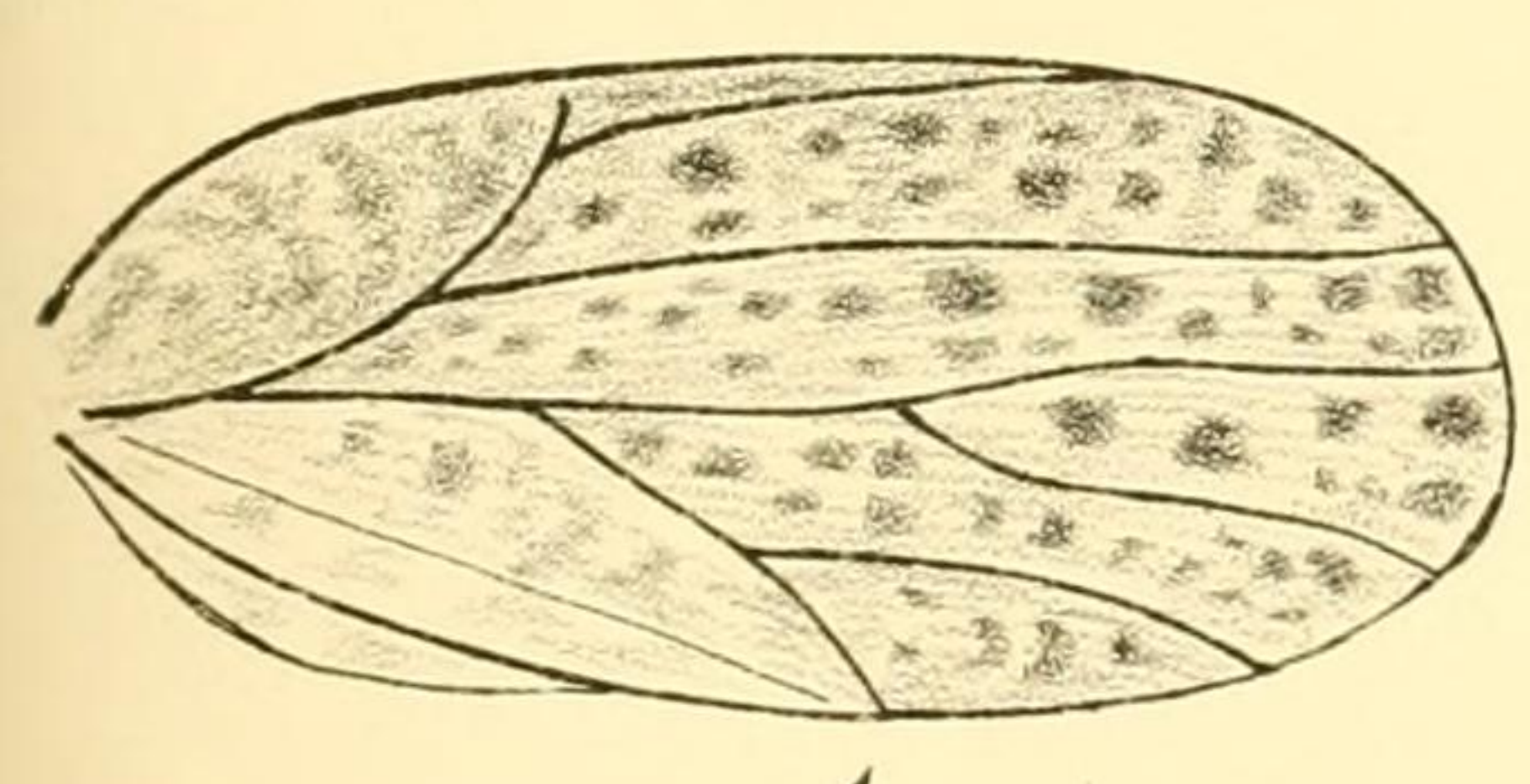
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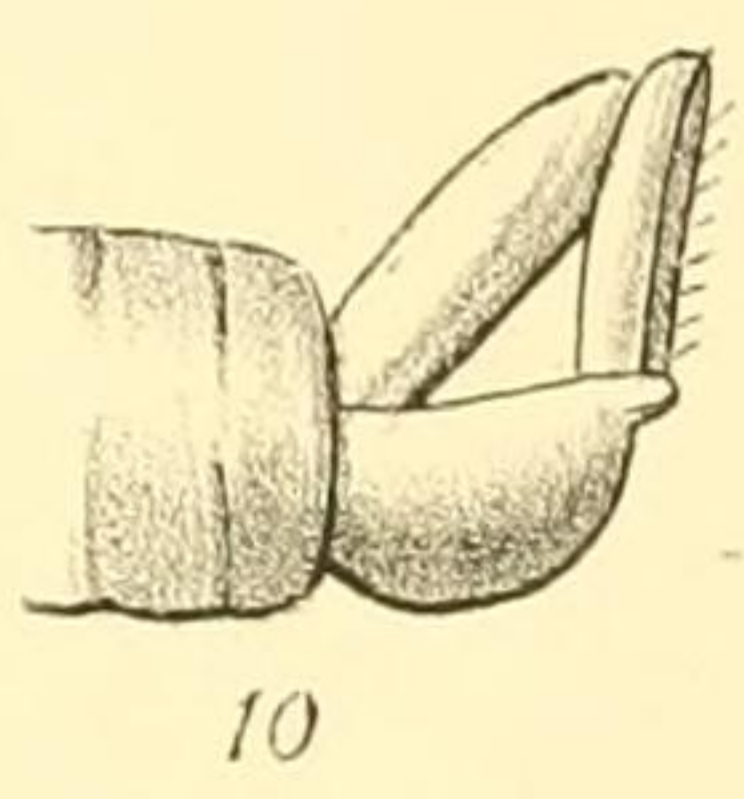
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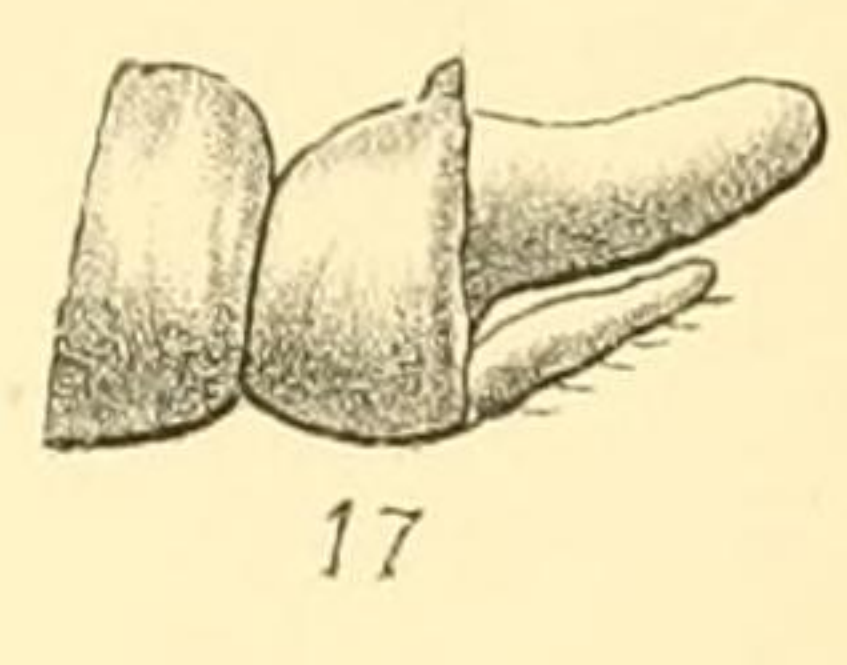
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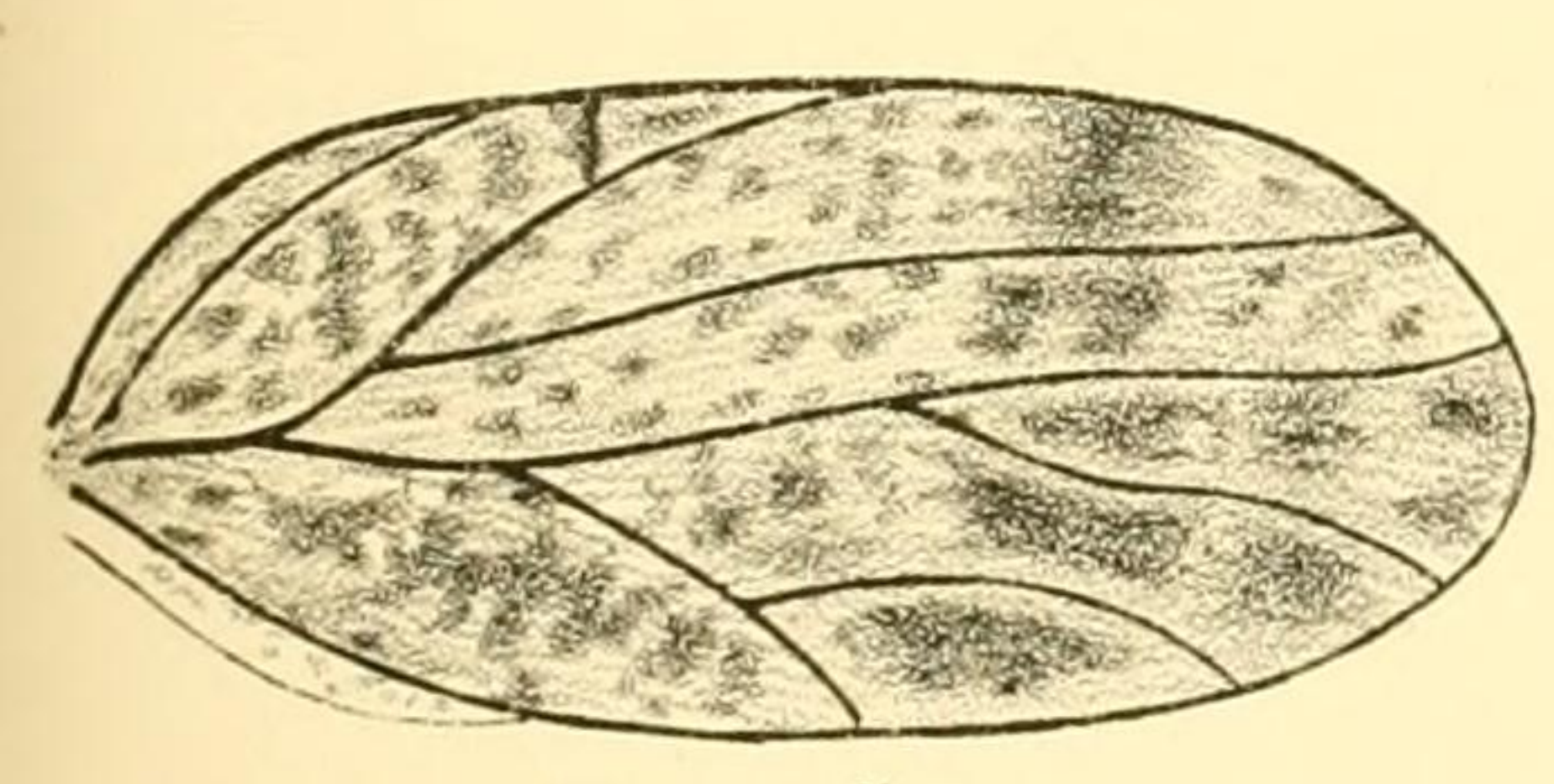
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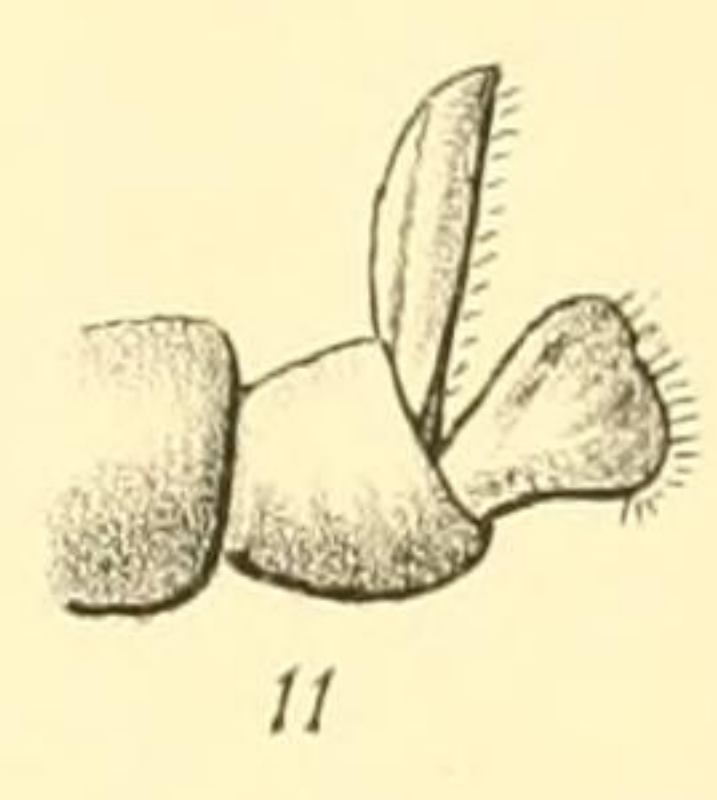
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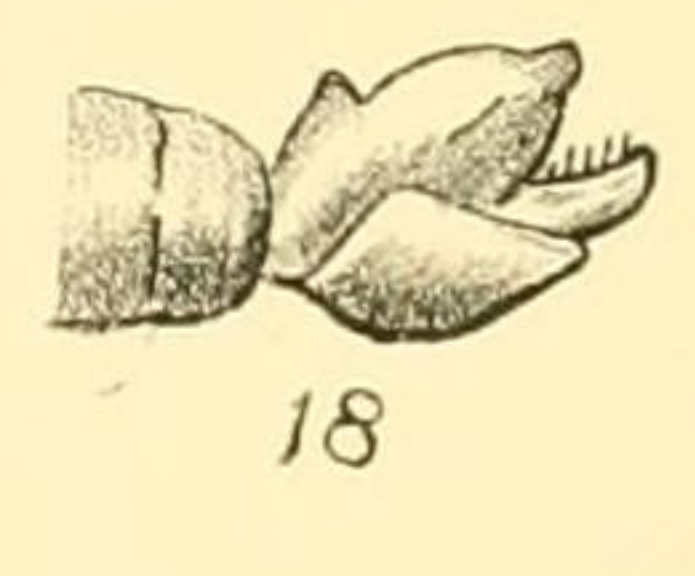
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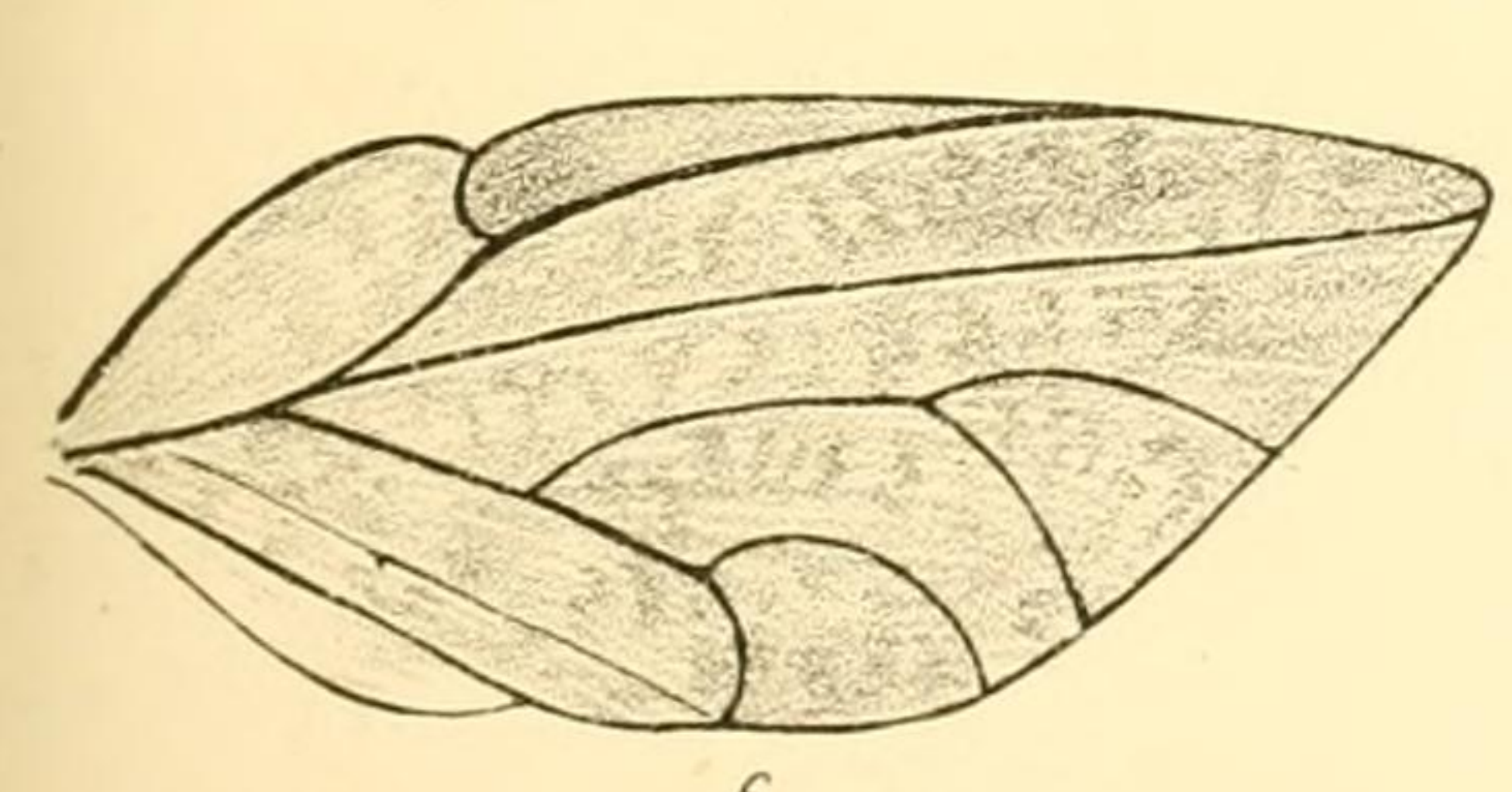
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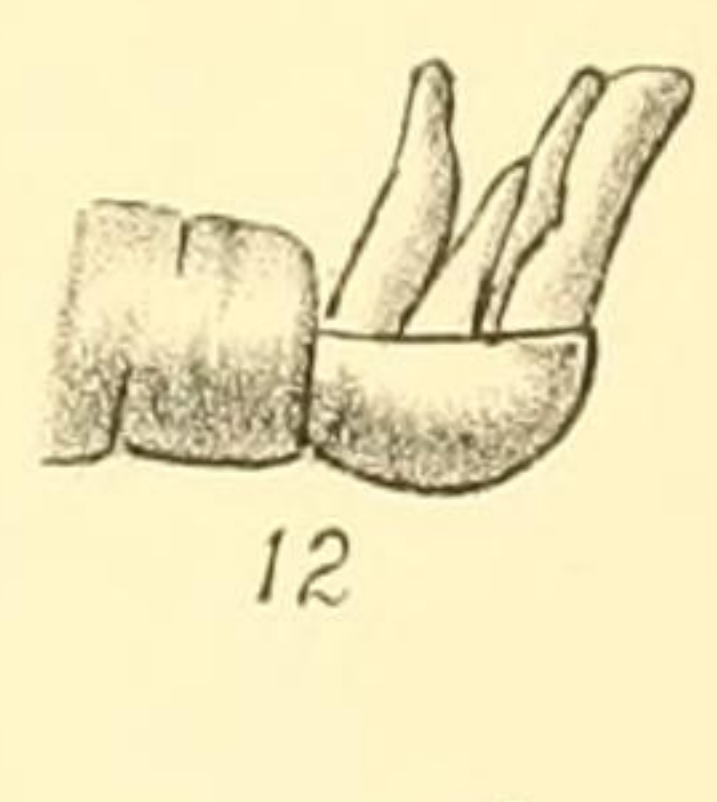
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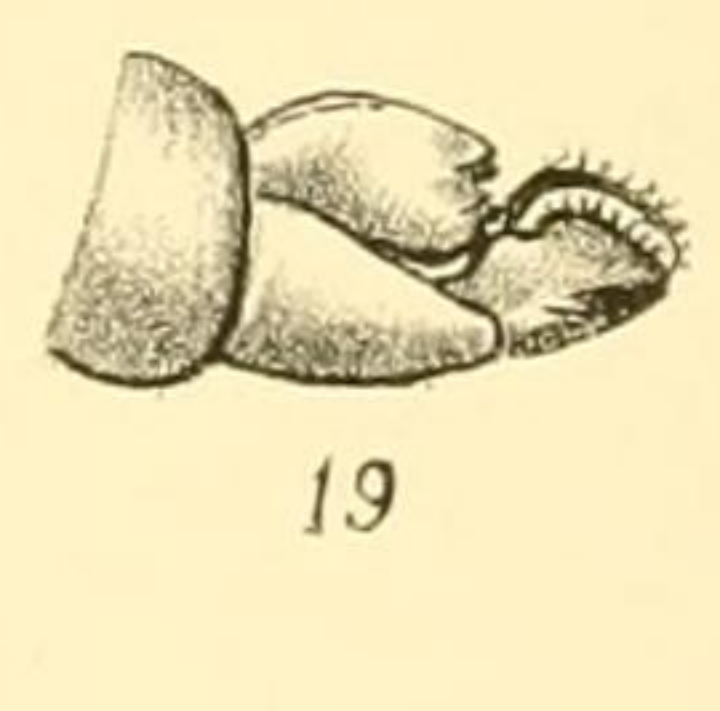
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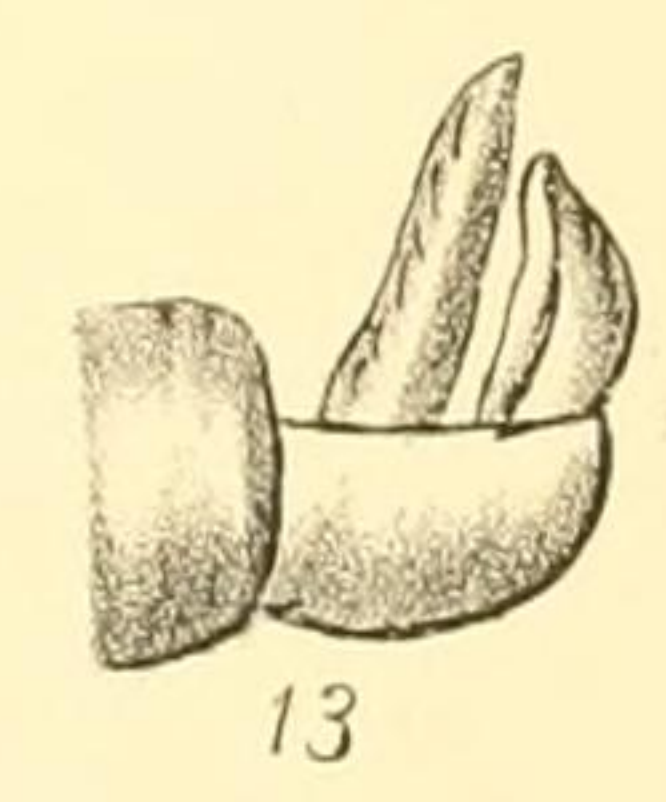
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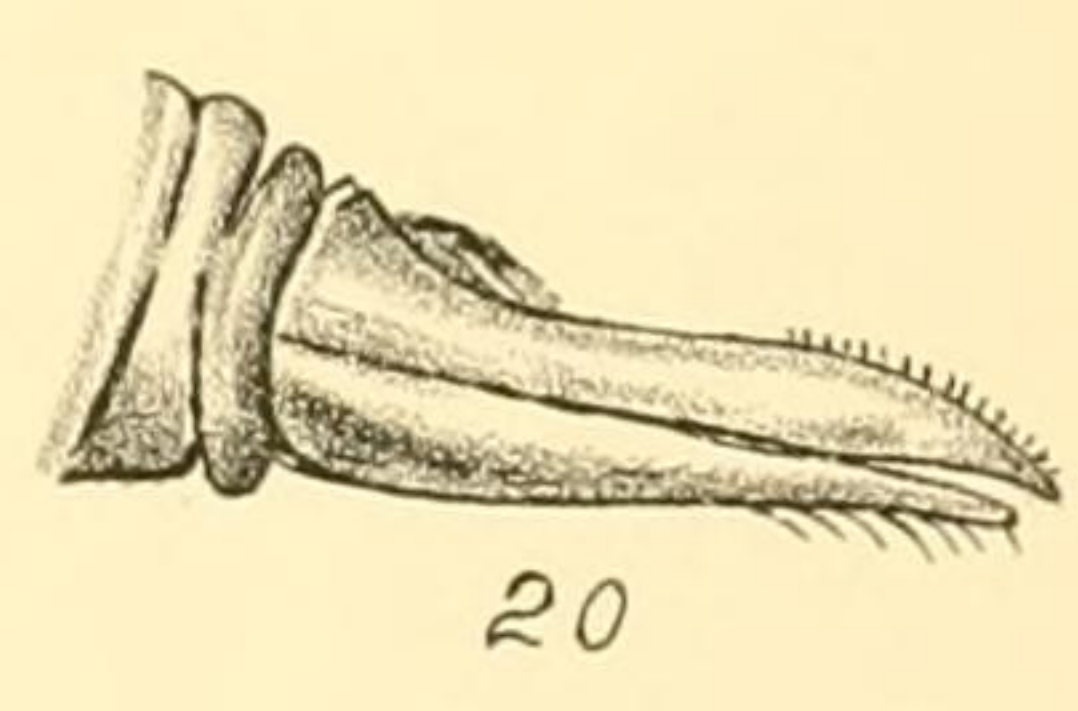
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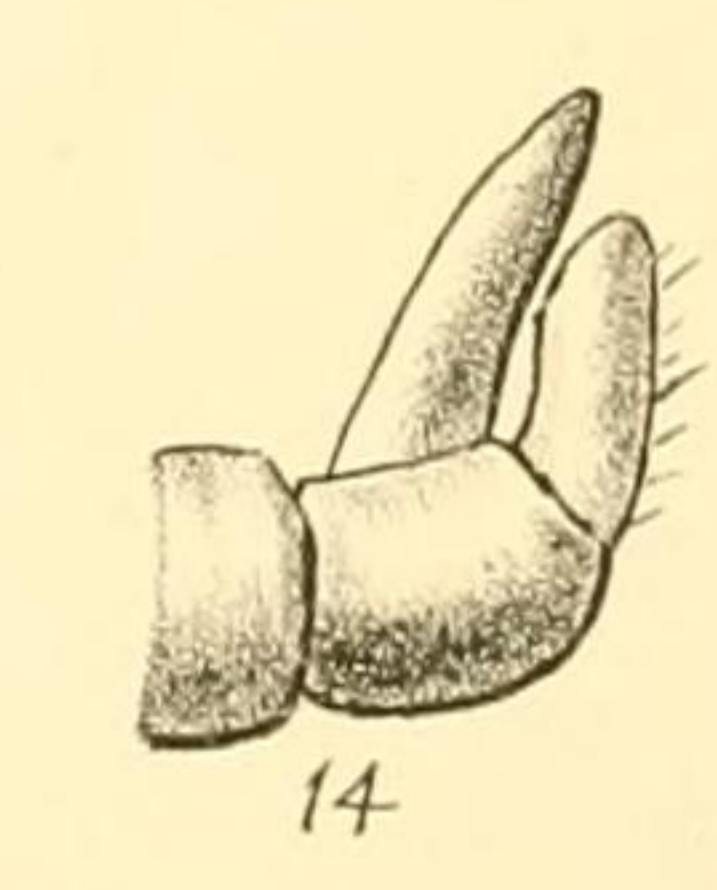
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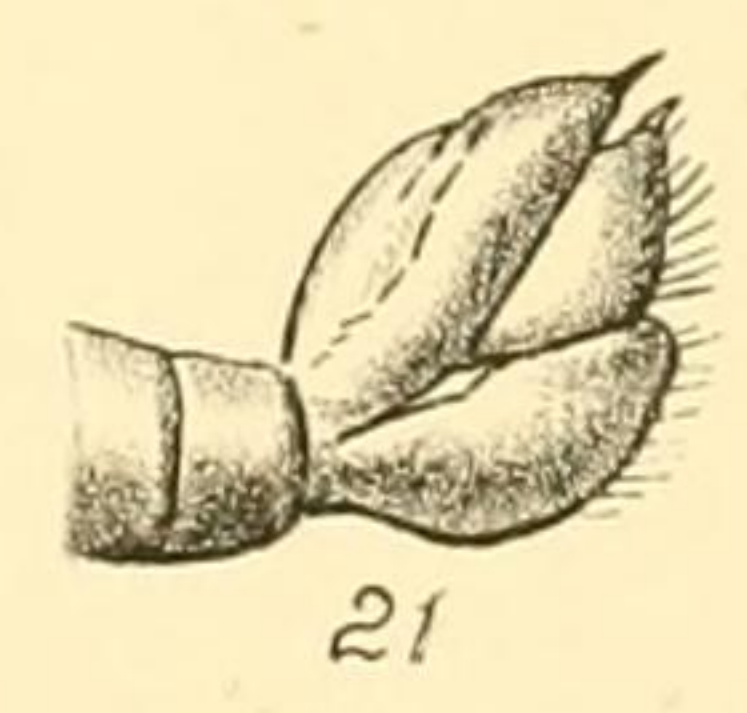
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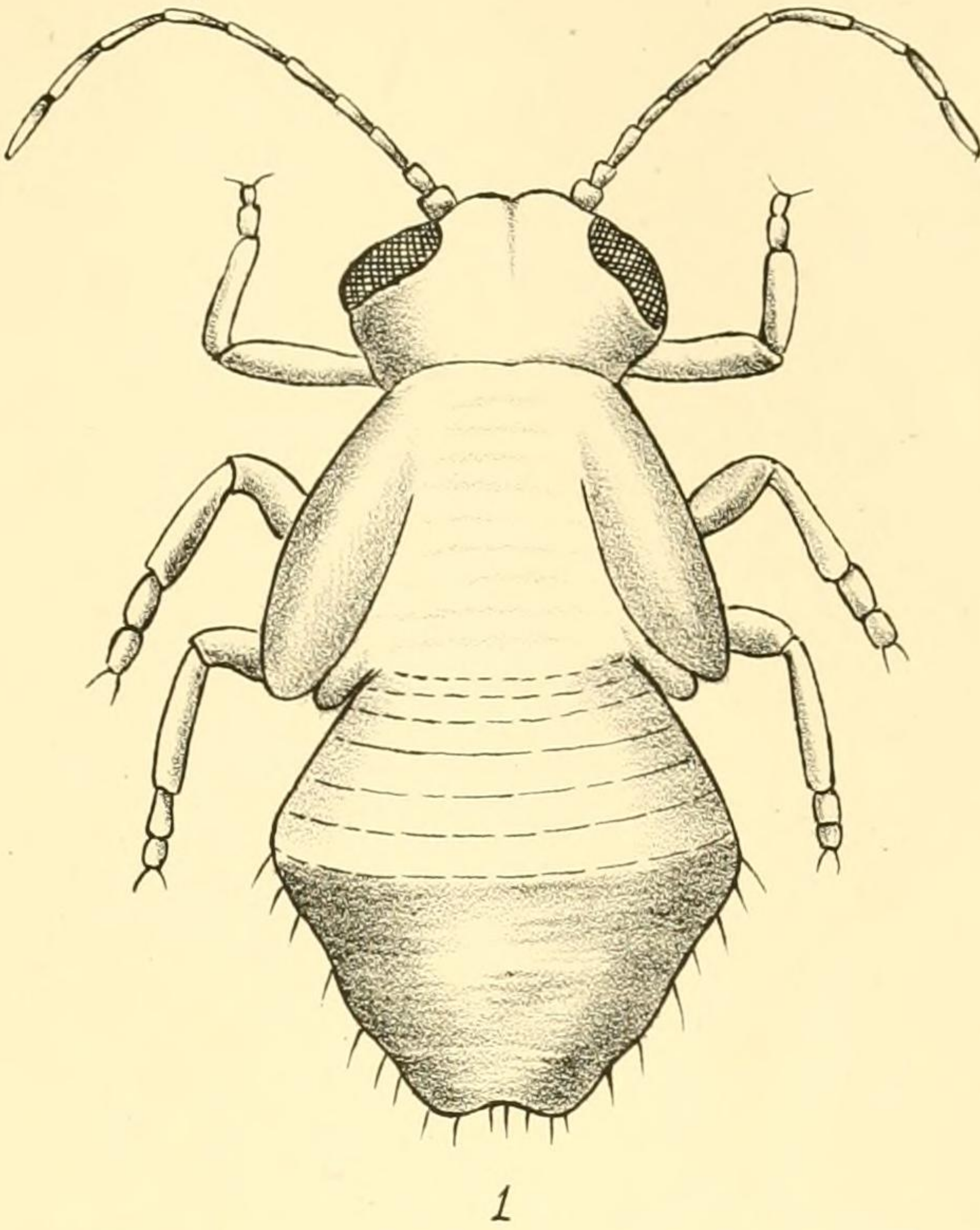
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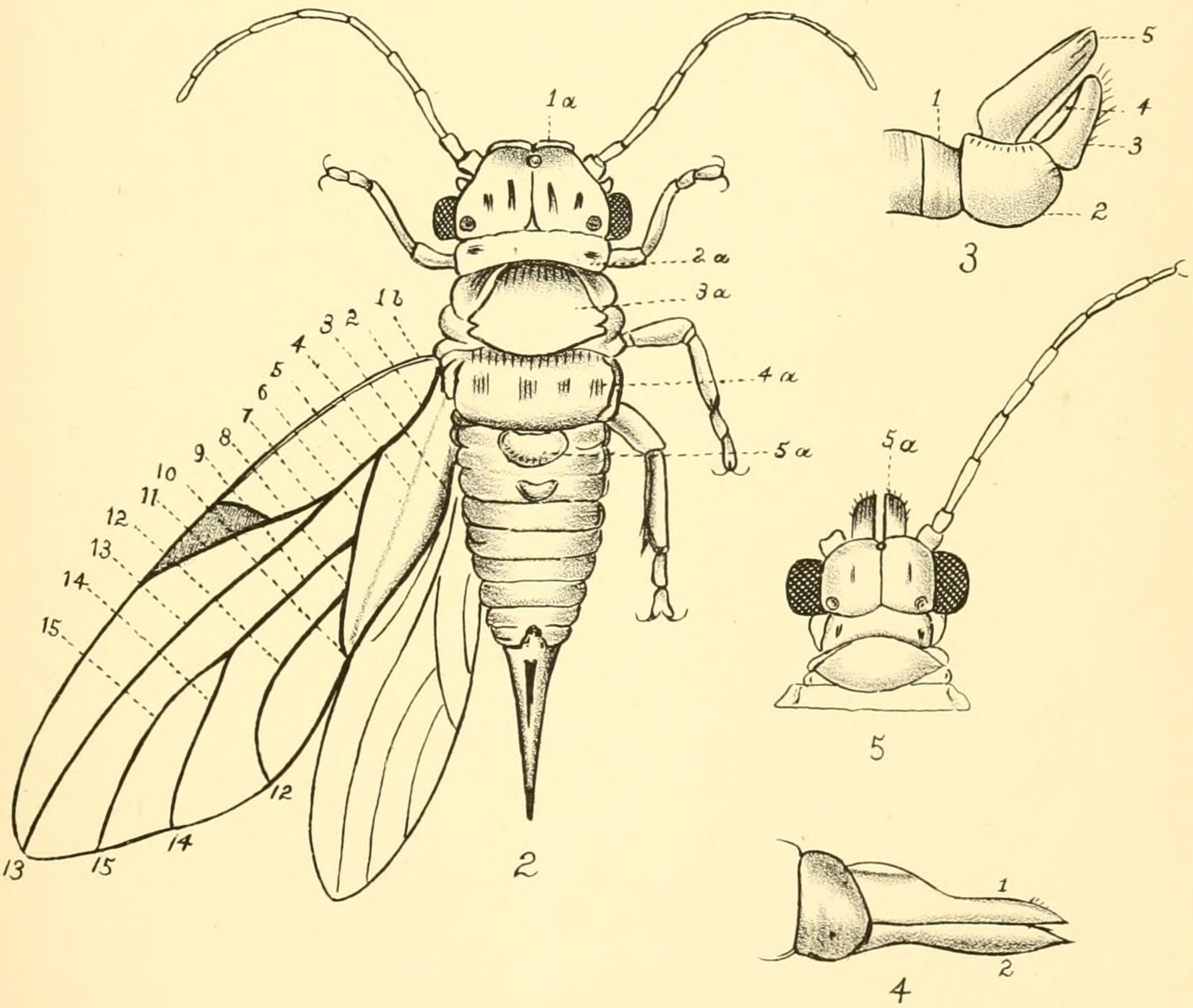
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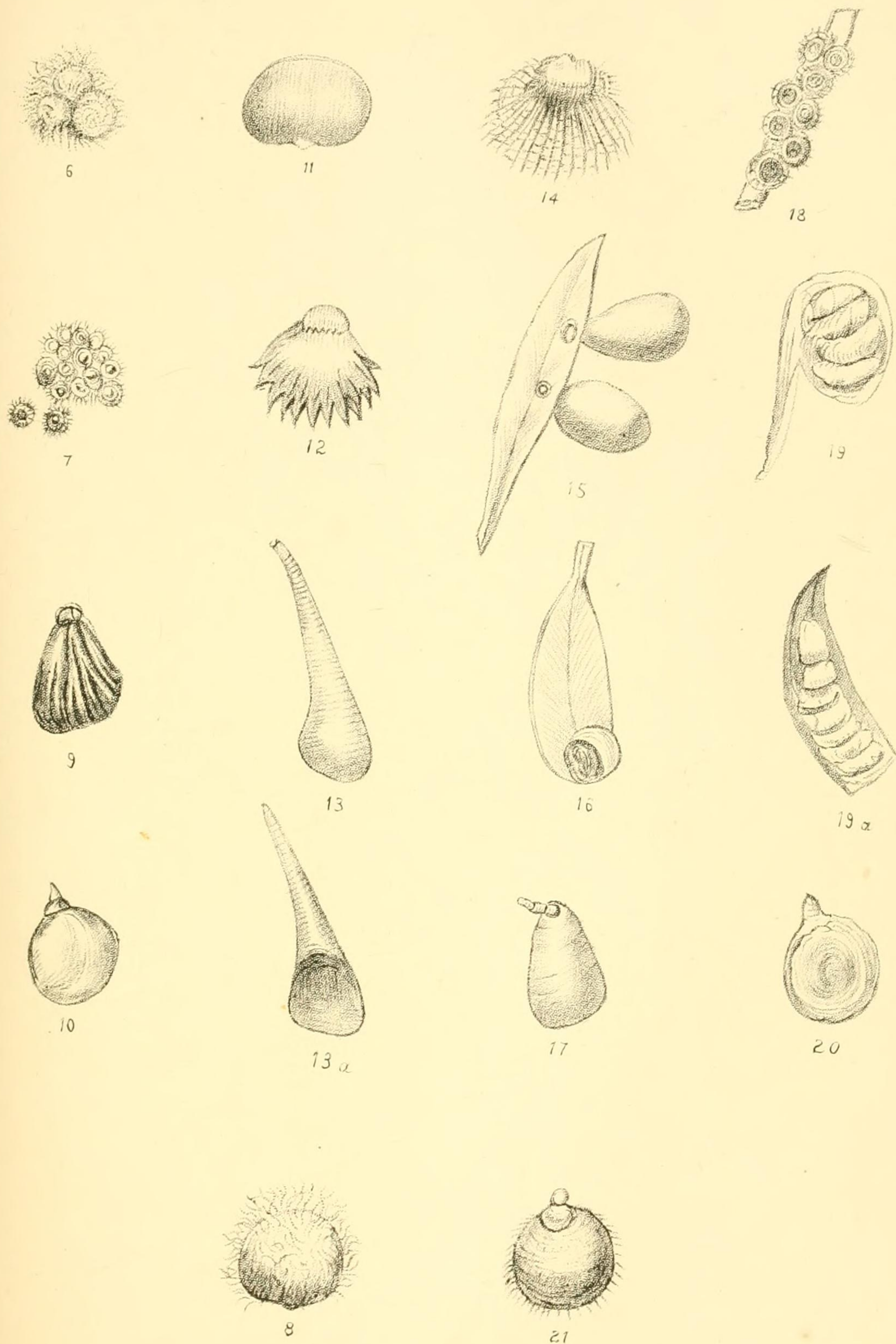


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LERP-SCALES OF AUSTRALIAN PSYLLIDÆ.



THE

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OF THE

LINNEAN SOCIETY

OF

NEW SOUTH WALES.

FOR THE YEAR

1900.

Vol. XXV.

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**WITH FIFTY PLATES.**

(Plates i.-xxxviii.-xxxviii.*bis*-xlix.)

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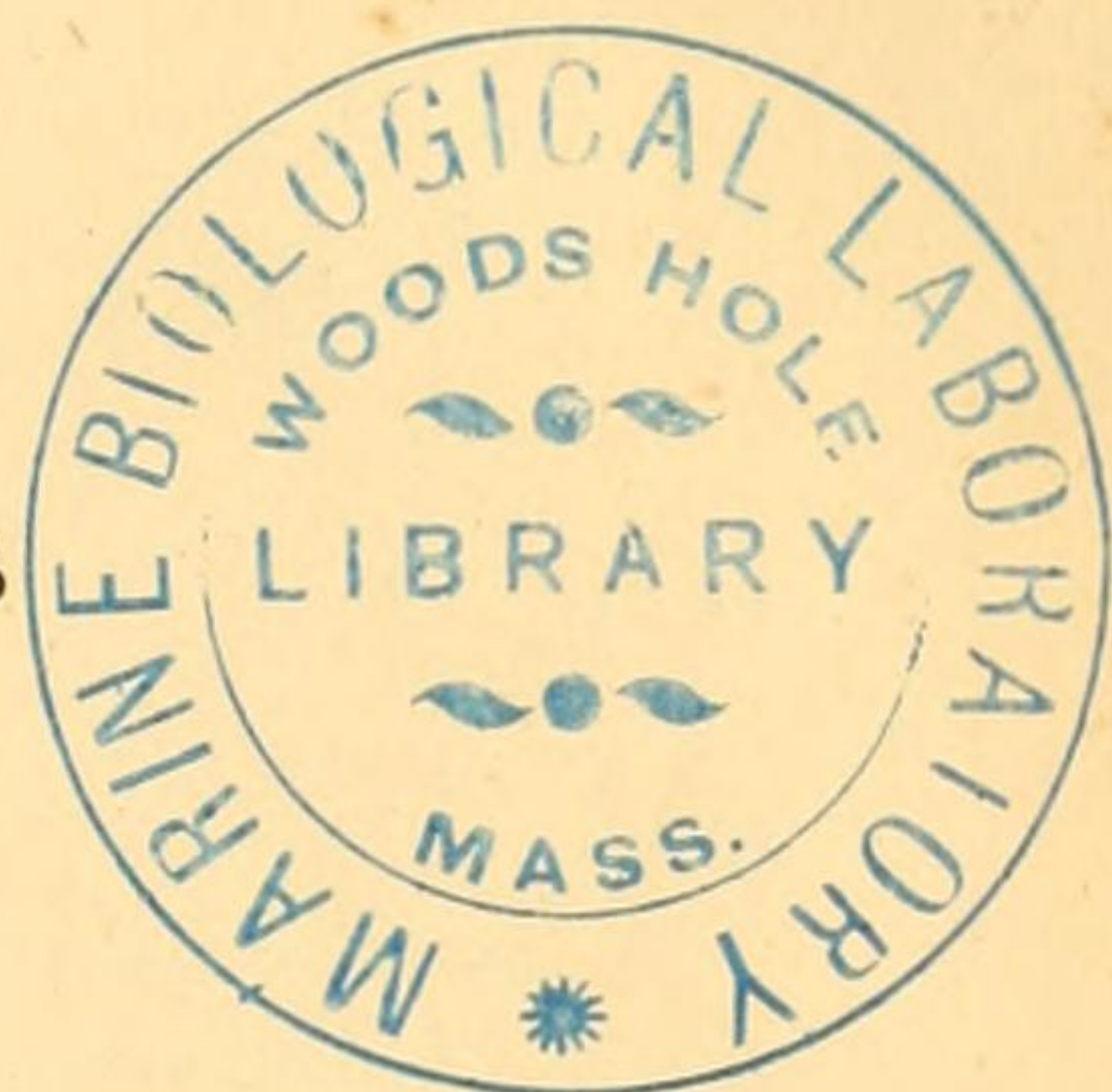
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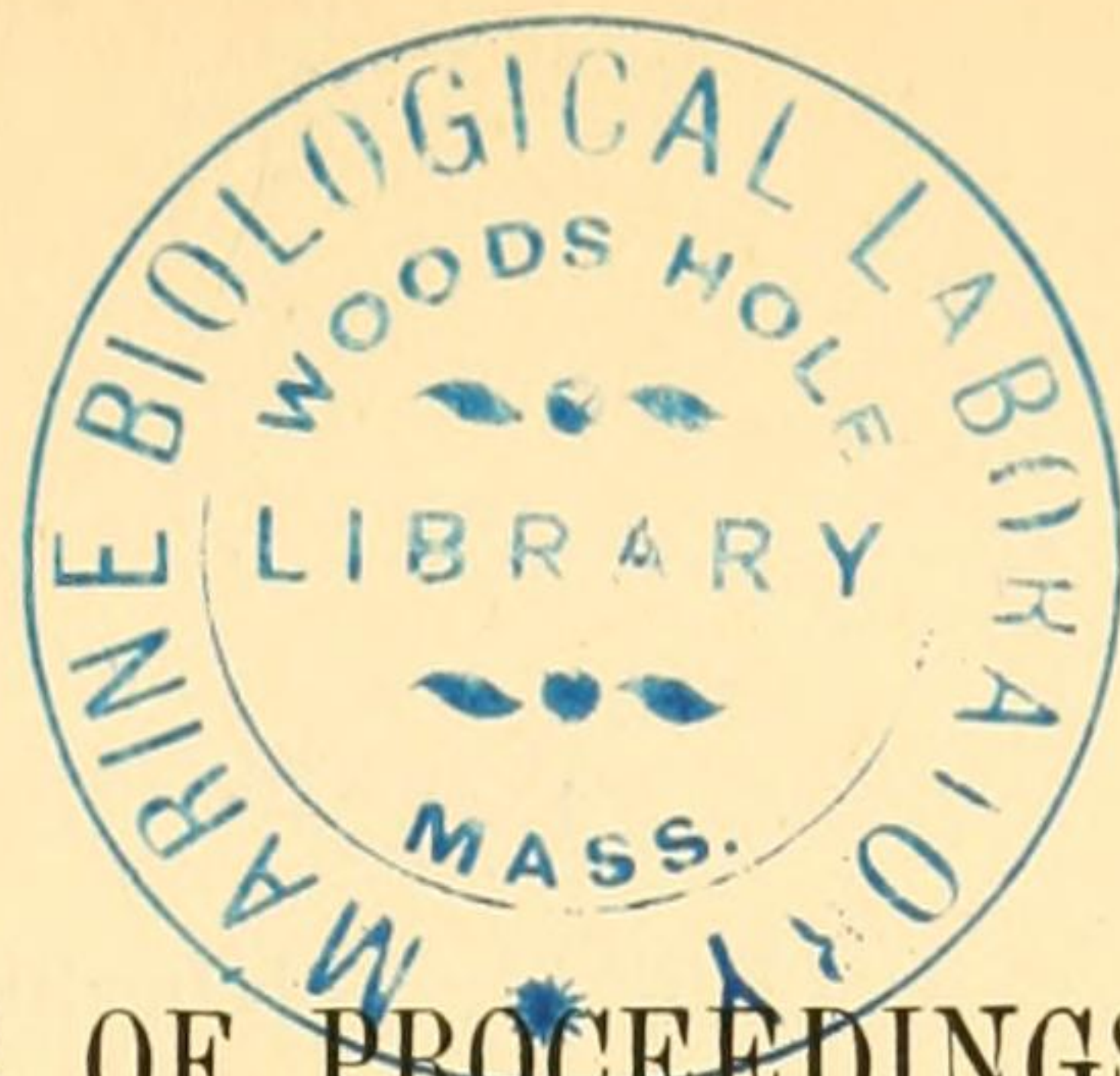
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