A STUDY OF THE TARSAL STRUCTURES IN CICADELLIDÆ.*

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NOTE.—This article includes extracts from a paper prepared some years ago, but which remained unpublished mainly because of the limited openings for publication at the time. It is believed that the parts here given and reference to the table of species, with the figures which are reproduced entire, will furnish a working basis for further studies in related groups. The structures discussed were first figured by the writer in Bulletin 20, Iowa Experiment Station, p. 714, (1893) and figured and described as cited by Miss Howe in 1912. It may be remarked here that while these structures do not seem to offer evidence of generic affinities, they may prove of value in showing affinities of larger or subfamily divisions and that while there is no constant progression in number for the different instars, there is an evident increase of numbers with the age of the insect.

The nomenclature has been revised to agree with the Van Duzee catalogue. The complete thesis is deposited in the library of the Ohio State University.

HERBERT OSBORN.

HISTORICAL REFERENCE.

In Bulletin No. 108, n. s. (1912) U. S. Dept. of Agriculture, Bureau of Entomology: "Leaf Hoppers Affecting Cereals, Grasses and Forage Crops," by Professor Herbert Osborn, Professor of Zoology and Entomology, Ohio State University, p. 76, the following statement appears, "At the end of the first tarsal joint of the hind legs there is a peculiar microscopic spatulate structure that occurs in varying numbers from the newly hatched nymphs to the adult form. In the specimens studied and figured there were for the first instar one, for the second instar two, for the third instar three, for the fourth instar five, and for the adult insect five." (Illustrated p. 74 Ibid.).

At the suggestion of Professor Osborn the work of investigating these structures has been carried through the species included in the following pages. The specimens were supplied from the University or Professor Osborn's collection. These were mounted in balsam, the entire insect where size permitted, the legs only when size precluded, and in that case the insect is either preserved on pin if not mutilated, or if mutilated the insect is preserved in a bottle after legs were removed for study.

I wish to express my very sincere appreciation to Professor Herbert Osborn for his unfailing kindness, interest, advice and the use of his collection of insects and books.

*Extract from a thesis prepared for the degree of Master of Arts, Ohio State University.

General Description.

In describing these structures the term *platella* is used because the terms pallette, plate, and platelet have been applied to other insect structures differing so much from these that it did not seem fitting to apply them in this case.

These platellæ are small spatulate structures usually located at the end of the first and second tarsal segments, although in a few genera, as is shown in the table, they may be found upon the sides of the first tarsal segment.

These structures vary in form and number, even upon right and left leg of the same insect. On one they may be larger and more fully developed than on the other. Sometimes the first tarsal joint will have five and four. Perhaps on the second tarsal joint they may number one and two. In the table prepared I have shown the variations in the different species in the right and left leg in some specimens and whether specimens were male or female, adult or nymph. I have used the following formulæ for convenience in describing each species:

S—Side of first tarsal segment.
T_1—Apex of first tarsal segment.
T_2—Apex of second tarsal segment.

Also in the last column of table I have placed the names of food plants upon which the species was found.

These platellæ arise from a crown of chitinous scales at the apex of the tarsal joint. They are joined solidly and are immovable. The scales and platellæ seem to develop together, as in the immature forms there is no evidence of the scale upon the tarsal joint where it is not yet divided except where the platella is developed. Evidently they are solid, that is there is no air chamber since when the tarsus was placed in alcohol or Xylol there was no air space as there always was in the tarsi and tibiæ until the liquid penetrated the structure. However, I hope later to test this by cross-sections. The platellæ did not break off readily as they were moved about into position in the balsam before putting down the cover glass.

The drawings are flat outline. Stippling is used merely to indicate the thick heavy chitin at base of platellæ and on a few of the heaviest spines. Spines are omitted where they interfered with the view of the platellæ or seemed to cause a confused appearance in the drawings. The drawings are nearly all made with a 16 mm. objective and an 8 ocular. A

TABLE I

SHOWING FORMULÆ OF PLATELLÆ, AND FOOD PLANTS.

	LEFT			RIGHT			Food
	Side	T_1	T_2	Side	T_1	T_2	
Acocephalus nervosus...	5	6	3	5	6	3	Grass, varied, Vegetation.
Acocephalus nervosus...	6	5	3	3	5	2	
Aconura sp.....	.....	4	2	.....	.....	...	Coarse Plains Grass.
Agallia sp.....	.....	2	0	.....	.....	...	Wheat, Barley, Legumes.
Acinopterus acuminatus.	.....	4	2	.....	4	2	Grass.
Chlorotettix.....	5	5	4	4	7	4	Grass.
Chlorotettix unicolor....	4	6	3	4	6	4	
Chlorotettix unicolor....	4	6	4	4	6	3	
Chlorotettix sp.....	.....	4	3	.....	.....	...	
Cicadella gothica.....	.....	3	2	.....	3	2	Wood Lot.
Cicadula 6-notata.....n	.....	4	...	.....	4	...	Wheat, Grass, Oats, Timothy.
Cicadula 6-notata.....n	.....	4	1	.....	3	1	
Cicadula 6-notata.....n	.....	3	...	.....	3	...	
Cicadula 6-notata.....n	.....	3	...	.....	3	...	
Cicadula 6-notata.....n	.....	4	1	.....	3	1	
Cicadula slossoni.....	.....	3	2	.....	3	2	
Cicadula slossoni.....	.....	3	2	.....	3	2	
Deltocephalus sp.....	.....	2	2	.....	.....	...	Wheat.
D. apicatus.....	.....	2	2	.....	2	2	Timothy.
D. apicatus.....	.....	3	1	.....	.....	...	
Deltocephalus sp.....	.....	3	2	.....	2	1	
Deltocephalus sp.....	.....	...	...	.....	2	2	
Delt. inimicus.....	.....	6	2	.....	.....	...	Blue Grass.
Delt. pascuellus.....	.....	4	2	.....	4	2	
Delt. pascuellus.....	.....	5	1	.....	4	2	
Diedrocephala coccinea..	.....	3	1	.....	3	1	Corn, Wheat, Timothy.
Dreculacephala mollipes	3	3	2	3	3	2	Grasses, Oats, Wheat, Rye, Barley Varied.
Euscelis curtisii.....	.....	...	...	.....	4	2	Timothy, Blue Grass.
Euscelis curtisii.....	.....	5	2	.....	4	4	Wood-lot, Varied.
Euscelis extrusus.....	.....	6	2	.....	.....	...	Grass.
Euscelis sp.....	.....	...	...	.....	4	3	
Eutetix cincta.....	.....	3	2	.....	3	2	
E. semi-nudus.....	.....	4	2	.....	.....	...	
Gypona 8-lineata var...n	.....	5	1	.....	6	3	Coarse Grass, Varied.
Gypona 8-lineata var...n	.....	5	1	.....	5	1	
Helochara communis....	3	4	2	4	4	2	Bog, Grass, Juncus, Trees.
Idiocerus sp.....	.....	3	2	.....	.....	...	
Jassus olitorius.....	.....	2	2	.....	.....	...	Varied Shrubbery.
Mesamia vitellina.....	.....	6	3	.....	.....	...	Conifers.
Phlepsius sp.....	.....	5	3	.....	6	2	Wood-lot, Oats, Wheat, Grass.
P. fulvidorsum.....	.....	5	2	.....	5	3	Varied.
P. fulvidorsum.....	.....	4	3	.....	5	2	
Platymetopius frontalis..	.....	3	0	.....	3	1	Timothy, Blue Grass, Wood-lot.
Platymetopius frontalis n	.....	5	0	.....	.....	...	
Platymetopius frontalis..	.....	4	2	.....	.....	...	
Scaphoideus auronitens..	.....	4	2	.....	.....	...	Shrubs, Willows, etc.
Scaphoideus immistus...	.....	...	...	.....	5	2	Varied.
Thamnotettix sp.....	.....	...	...	.....	5	4	Timothy, Red-top.
Tham. clitellaris.....	.....	...	...	.....	4	2	Clover, Alfalfa.

few are made with the 4 ocular. This in cases where the tarsi were not contained in the field with the 8 ocular. One *Deltocephalus inimicus* (Figs. 24, 25) with 4 mm. objective shows only the apex of T_1 and T_2 and detail of platellæ.

In the detailed descriptions the species are taken up in the order adopted in Van Duzee's Catalogue.

Description of Structures by Subfamilies.

Subfamily Bythoscopinæ.

In this subfamily the first genus examined was *Idiocerus* (Fig. 1). In the species studied the formula is $T_1 3$, $T_2 2$. These platellæ are elipsoidal and the distal border is narrowed almost to a point, light brown in color, slightly darker than tarsus, rather heavy, flat transversely, but on the perpendicular axis slightly convex to the tarsus. T_1 length .035 mm.; width .015 mm.; T_2 length .03 mm.; width .01 mm. The platellæ arise from a crown of brown chitin which is not so heavy as in some other species.

In *Agallia* the formula for the species studied (Fig. 2) in the specimen examined was $T_1 2$. These are very transparent and delicate, paler yellow than tarsus, flat, spatulate in form. The longer one is almost half the length of the second tarsal joint which is short. They are not set evenly upon the border of the apex of the tarsal joint but the smaller one sets up or back a little from the edge. Each arises from a heavy ring of chitin.

Macropsis and *Bythoscopus* were found to be without platellæ in all the species examined.

Subfamily Cicadellinæ.

Cicadella gothica. The formulæ in this species in the specimens examined were $T_1 3$, $T_2 2$. On T_1 the three platellæ are broadly oval on the distal border, lateral border straight, heavy in texture, set evenly on the apex, slightly convex to tarsus. Length .03 mm.; width .015 mm. On T_2 the two platellæ are set wide apart on the apex. The distal border has more pointed oval sides tapering towards base, dark brown, heavy texture. Length .0275 mm.; width .0125 mm. On both segments the platellæ are slightly darker in color than on the tarsus. (Figs. 3, 4.)

Graphocephala coccinea. (Figs. 5, 6). In this species the formula in the specimen examined is $T_1 3$; $T_2 2$. The platellæ are large, heavy and dark brown, while the tarsus is yellow, and the scales which form the crown of chitin are heavy, long and sharp pointed. The three platellæ on T_1, are similar in form, distal border oval, lateral border straight, flat transversely but slightly convex on the perpendicular axis to the tarsus. Length .04 mm.; width .0125 mm. The platellæ on T_2, are similar to those on T_2 but smaller. Length .03 mm.; width .01 mm.

Subfamily GYPONINÆ.

Gypona 8-lineata var *cana*. (Figs. 11, 14). The formulæ for the specimens examined are: left, $T_1 2$, $T_2 2$; right, $T_1 6$, $T_2 3$. These are rather long and slender, tapering towards both ends, flat pale yellow, unicolorous with tarsus, uniform in size and standing perpendicularly on the apex. Length .05 mm.; width .01125 mm. to .015 mm. The platellæ on T_2 so closely resemble those on T_1 in form and arrangement as to require no separate description.

In the nymphal specimens of Gypona (Figs. 13, 14) there are but two tarsal joints. The formula is 5 for T_1 and 1 where T_2 is beginning to divide. These are set at an angle to the apex, tapering to a point at the distal edge and not very uniform in outline. Length .03 mm.; width .01 mm. Segmentation has begun in T_2, and the platella has developed, short, wider at proximal end, tapering to distal border. Length .02 mm. width .01 mm.

Subfamily JASSINÆ.

Acocephalus nervosus. (Figs. 15, 16). In this species the formulæ for the specimens examined are S5; $T_1 6$; $T_2 3$; both right and left legs. The first platella on the side of T_1, nearest the proximal end is spatulate and transversely concave, flat in the perpendicular axis, widening from the base to the distal border. The other four on the side are somewhat larger, not so much curved, and tapering a little more at an angle of less than 45° from the body. Each one arises from the center of a heavy chitinous ring. At the apex of T_1, the platellæ are more slender, tapering in at the base, spreading out flat transversely, spatulate, and tapering in at the point, slightly concave from the tarsus; length about half that of the portion of the second tarsus extending below it. These are brownish yellow, unicolorous with tarsus, and arise from a heavy crown of chitin. The platellæ at apex of T_2 are similar to those of T_1. In another specimen (Figs. 17, 18) of *Acocephalus* sp. the formulæ are S3; $T_1 5$; $T_2 2$; for right; S6; $T_1 5$; $T_2 3$; for left. In this specimen the platellæ are all translucent and almost colorless.

Mesamia vitellina. (Fig. 19). The formula for the specimen examined was $T_1 6$; $T_2 3$. On T_1 the first four are slender, quadrate with rounded angles, straight lateral borders presenting a rectangle in form. The others are shorter and wider. These do not stand evenly on the apex. The second one overlaps the first one slightly. They vary in length from the first. Length .05 mm.; width .0125 mm.; the smallest length .03 mm.; width .0125 mm., the shorter ones being wider. On T_2, the platellæ are similar in shape to the first four on T_1. Length .03 mm. to .02 mm.; width .01 mm. on all.

These are pale yellow. The crown of chitin from which they arise is a little deeper yellow. Platellæ are unicolorous with tarsus.

Platymetopius frontalis. (Figs. 20, 21.) In the specimen examined the formulæ vary (see table). On T_1, we have 3, 4, or 5 platellæ. These are quadrate with rounded angles, lateral border straight, set evenly in crown of chitin, flat, a very pale yellow, unicolorous with tarsus, thin and transparent.

Length .03 mm.; width .01 mm. Those on T_2 are broader at distal border and rounded, tapering in to the narrow base, otherwise similar to those on T_1. Length .02 mm.; width .015 mm.

On the one nymph (Figs. 22, 23) examined T_1 had 5 platellæ. These were not uniform as in the mature specimens. The second platella from the outer one was longer than the outer one. The others tapered in to the base and were set irregularly on the apex. This seems a characteristic common to all immature forms. On T_2 the line where division was to take place was visible, and the two large spines were developed but no platella.

Deltocephalus inimicus. (Figs. 24, 25.) This is the species especially described by Professor Herbert Osborn in the Bulletin quoted at the opening of this article. In Deltocephalus the formulæ vary as may be seen from the table. T_12; T_22; T_16; T_22; T_16; T_22 is the formula of D. inimicus in the specimen examined, but this specimen is not fully developed, the third tarsal joint not being separated yet. On T_1 the four outer platellæ have straight lateral borders, tapering in towards the base so that they are slightly narrower at the base. They stand perpendicular and parallel with the apex. The two inner platellæ are transversely convex towards the tarsus and stand at a slight angle towards the body of the tarsus. The platellæ are pale almost colorless, unicolorous with tarsus, at the distal end verging into a light brown at base. The crown of chitin is dark and heavy. Length .015 mm.; width .01 mm. Rounded at distal border and tapering in towards base, about half as wide at base as in the widest part.

Cicadula slossoni (Fig. 74, 75). The formulæ for both male and female are T_13; T_22, both right and left legs. These are a little stouter and darker brown than the nymph forms of *C 6*-notata, but closely resemble them in shape. The two outer on T_2 are straight with distal border drawing slightly towards a point but in no wise spines. Length .02 mm.; width .0050 mm. They arise from a dark brown almost black crown of chitin. In color they agree with the distal ends of tarsal segments which are darker brown than the body of segments. There is no difference in the structure in male and female.

Gnathodus = *Balclutha* was examined and found to be without the platellæ.

Subfamily Typhlocybinæ.

The species of *Empoasea* examined were without platellæ.

Parallel Structures in Other Groups.

In related groups the only structure resembling this is a formation known as a calcar at the base of the tibia in Fulgoridæ. The formation is used in the Keys to Species (See "A Contribution Toward a Monograph of the Homoptera Insects of the Family Delphacidæ" by David L. Crawford of Stanford Univ. Calif., No. 2041, Proc. of U. S. Nat. Museum, Vol. 46, pp. 557-640. Plates 44-49, March 4, 1914) as "a constant and easily appreciated character of identification."

This calcar is a single large movable spine of varying type, as spiniform, tectiform or cultrate. These forms are further modified by the addition of teeth either coarse or fine along the border. They differ from the structure on the tarsal segments of the Jassids in that they are articulate, there is but one, and it is very large in comparison with the platellæ on the tarsal joints of the Jassids. The writer found no comment as to whether this calcar was the same size in nymphal stage as in adult.

In Cercopidæ nothing similar is found but instead a series of flat hairs fringe the tarsal joints, as is figured in illustration (Fig. 76).

Taxonomic Significance.

One question which presented itself in the investigation of these structures on the tarsal joints of Cicadellidæ was whether they might be of specific or generic value or even of use in defining subfamilies. They are present in every subfamily except Typhlocybinæ. In the subfamilies there are such differences within the group, and such likenesses between genera of different subfamilies that the results as a whole are negative.

In Bythoscopinæ two genera have platellæ but in the two the characteristics are very different. In *Idiocerus* they are dark, heavy and pointed, in Agallia they are delicate, rounded, translucent, more like those on Cicadula. Idiocerus seems more nearly related to the next subfamily Cicadellinæ in this respect. *Cicadella gothica* has platellæ heavy and brown; *Graphocephala* heavy but not so dark; *Draeculacephala* heavy but not dark and no longer pointed but quadrate-angular; *Helochara* heavy but lighter in color, more slender, quadrate-angular, and inclining toward Gyponinæ. *Gypona* has platellæ rather long and slender but comparatively large as the entire leg is large. *Acocephalus* in the next subfamily also large and heavy agreeing with the entire leg in that respect. In *Mesamia vitellina* they are more like *Gypona* but have the quadrate angular tip instead of the tapering form of Gypona.

In *Platymetopius frontalis*, the platellæ are short, broad and thinner in texture, and slightly concave transversely, not at all resembling *Mesamia*. In *Deltocephalus* the platellæ are somewhat similar to *Platymetopius* but more curved in outline, and thinner and more delicate in structure. The entire tarsus is not so heavy as those previously discussed. *Euscelis* is somewhat heavier than *Deltocephalus* and a little longer.

In *Eutettix* the tarsi are heavier and the platellæ are much thinner and lighter in structure. They are broad like *Euscelis*. *Aconura* is more like *Helochara* in the Cicadellinæ, quadrately angular but not quite so slender. *Phlepsius* is even more like *Helochara* in outline and of thick heavy structure. *Acinopterus* returns to the broad flat type and closely resembles *Platympopius* although heavier. *Scaphoideus* again is more like *Phlepsius*, long, slender, and it seems ought to come next to it rather than after *Acinopterus;* or else *Acinopterus* should be placed next to *Eutettix*. *Thamnotettix* again returns to the broad flat type, and the platellæ are set somewhat irregularly on the tarsal joint.

Chlorotettix is quite a contrast to *Thamnotettix*. The platellæ are numerous, long, broad, and straight, on the first tarsal joint arranged with regularity, but somewhat irregular on the second tarsal joint.

In *Jassus olitorius* the platellæ are very heavy and dark, much heavier than any other examined, resembling the early members of the series more, being as heavy, tapering more and larger than *Cicadella gothica*, in form and structure more like Idiocerus than any other. *Cicadula*, the last of the group possessing platellæ is characterized by very small delicate structures more nearly resembling those in *Agallia* than any others.

As a whole the variations are so gradual through the series that if one or two genera were changed about in position no definite particular characteristic could be selected as being sufficiently different from others to warrant its use as a character of generic value, and, as was stated at the beginning of this section, would eliminate but one Subfamily, Typhlocybinæ.

Developmental Significance.

Do they indicate age or instar? In *Cicadula 6-notata* a number of nymph forms were examined to determine if the platellæ varied in number with the instar. The youngest nymphs as indicated by wing development had three platellæ on the first tarsal joint, the next oldest had four and the oldest, but still immature forms, had four on first tarsal joint, and one small platella developing on the first tarsal joint where the division was beginning to take place to form the middle segment of the adult tarsus. In the adult specimens *C. slossoni* the first tarsal joint bore three platellæ, the second joint, two.

In the nymph *Gypona* the second tarsal joint was not separated but one platella had developed at the line of separation. The first tarsal joint bore five platellæ. In the adult specimen one leg bore five and two, the other leg bore six and three. This shows that the development may vary in the two legs of one specimen. Similar variation in other species is shown in the table. This appearance of a less number of platellæ in the *Cicadula* and *Gypona* nymph forms adds proof to the observation quoted at the opening of this paper.

Correlation of This Structure With That of the Food Plants.

In an examination of the various food plants upon which the different genera were found to see if there were any hairs or scales or structures of any kind which might seem to demand the development of these platellæ nothing of special significance was observed in pubescence or scales to indicate a special function for the platellæ. The spines and tarsal claws hold them and serve as a lever when they jump or arise from their resting place. There is nothing unless they afford a broader base and more leverage at the instant of flight but the spines extend so much beyond these structures that they would hardly touch a surface which the spines rested upon, unless the spines penetrated among the small hairs, and the platellæ rested on these hairs of the leaves.

Evolution of the Structures.

In studying the development of these structures, comparison with the other members of the group has been made. Fulgoridæ have a single large articulate spine or calcar on the tibia. The distal border of the tarsal joints in Cercopidæ is fringed with flat hairs. (Fig. 76). In Membracidæ there is one thick short heavy scale on the first tarsal joint and then a rather sparse fringe of delicate hairs. At the same time the diameter across the distal border is very much less, in fact the tarsal joint is almost straight. But in none of these is there any appearance of the spatulate plates or platellæ. This structure seems peculiar to the Cicadelldis alone. The shape of the tarsal joints in Cicadellidæ is more like that in Membracidæ. The spines are coarser and stouter.

The difficulty in homologizing these structures with the hairs of the other members of the group is the fact that the platellæ are rigidly attached. So far as evidence goes they are organs which have originated *de novo* in this member of the group. Their absence in certain genera may be either a primitive or a vestigial condition.

As the Typlocybinæ are distinctly specialized forms it is possible that these structures were eliminated in the evolution of this group, or else that the structure developed in the other divisions of the group after Typhlocybinæ separated from the primitive stem.

EXPLANATION OF PLATES.

Abbreviations—P., platella; S., spine; T_1, T_2, T_3, Tarsi, 1, 2, 3.

Plate I.

Fig. 1. Idiocerus, sp. (imago).
Fig. 2. Agallia, sp. (imago).
Fig. 3. Cicadella gothica ♀, (imago). Right.
Fig. 4. Cicadella gothica ♀, (imago). Left.
Fig. 5. Graphocephala coccina ♂, (imago). Left.
Fig. 6. Graphocephala coccinea ♂, (imago). Right.
Fig. 7. Draeculacephala mollipes ♀, (imago). Left.
Fig. 8. Draeculacephala mollipes ♀, (imago). Right.
Fig. 9. Helochara communis ♀, (imago). Left.
Fig. 10. Helochara communis ♀, (imago). Right.

Plate II.

Fig. 11. Gypona 8-lineata var. ♂, (imago). Right.
Fig. 12. Gypona 8-lineata var. ♂, (imago). Left.
Fig. 13. Gypona 8-lineata var. (nymph). Right.
Fig. 14. Gypona 8-lineata var. (nymph). Left.
Fig. 15. Acocephalus nervosus, ♂.
Fig. 16. Acocephalus nervosus, ♂, (imago).
Fig. 17. Acocephalus sp. (imago). Right Leg.
Fig. 19. Mesamia vitellina, (imago).

PLATE III.

Fig. 18. Acocephalus sp. (imago). Left Leg.
Fig. 20. Platymetopius frontalis (imago).
Fig. 21. Platymetopius frontalis (imago).
Fig. 22. Platymetopius, (imago).
Fig. 23. Platymetopius, (nymph).
Figs. 24 and 25. Deltocephalus inimicus.
Fig. 26. Delt. apicatus, (imago). Left Leg.
Fig. 27. Delt. apicatus, (imago). Right Leg.
Fig. 28. Delt. apicatus, ♂, (imago). Right Leg.
Fig. 29. Delt. pascuellus, ♀, (imago). Right Leg.
Fig. 30. Delt. pascuellus, ♀, (imago). Left Leg.
Fig. 31. Delt. pascuellus, ♂, (imago). Left Leg.
Fig. 32. Delt. pascuellus, ♂, (imago). Right Leg.
Fig. 33. Deltocephalus, (imago).
Fig. 34. Deltocephalus, (imago).
Fig. 35. Deltocephalus, (imago).
Fig. 36. Deltocephalus, (imago).

PLATE IV.

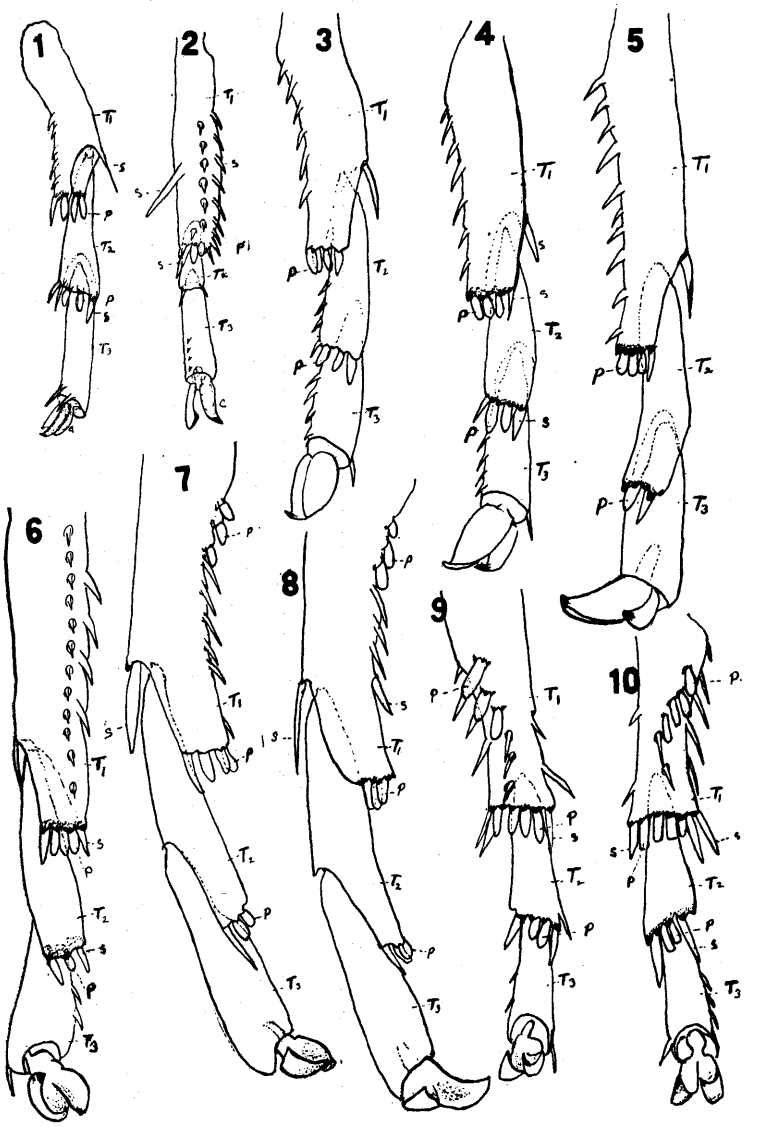
Fig. 37. Euscelis curtisii, (imago).
Fig. 38. Euscelis extrusus, (imago).
Fig. 39. Eutettix cincta, (imago). Right Leg.
Fig. 40. Eutettix cincta, (imago). Left Leg.
Fig. 41. Eutettix semi-nudus ♀, (imago).
Fig. 42. Aconura, ♂, (imago).
Fig. 43. Phlepsius fulvidorsum, (imago). Right Leg.
Fig. 44. Phlepsius fulvidorsum ♂, (imago). Left Leg.
Fig. 45. Phlepsius fulvidorsum, (imago). Left Leg.
Fig. 46. Phlepsius fulvidorsum, (imago). Right Leg.
Fig. 47. Phlepsius sp., (imago). Left Leg.

PLATE V.

Fig. 48. Phlepsius sp., (imago).
Fig. 49. Acinopterus acuminatus, (imago). Left.
Fig. 50. Acinopterus acuminatus, (imago). Right.
Fig. 51. Scaphoides auroniteus, (imago).
Fig. 52. Scaphoideus immistus, (imago).
Fig. 53. Thamnotettix sp., (imago).
Fig. 54. Thamnotettix clitellaris, (imago).
Fig. 55. Chlorotettix unicolor ♂, (imago). Right Leg.
Fig. 56. Chlorotettix unicolor, ♂, (imago). Left Leg.
Fig. 57. Chlorotettix unicolor, ♀, (imago). Left Leg.
Fig. 58. Chlorotettix unicolor, ♀, (imago). Right Leg.
Fig. 59. Chlorotettix unicolor, (imago). Right Leg.
Fig. 60. Chlorotettix tergatus, (imago).

PLATE VI.

Fig. 61. Jassus olitorius.
Figs. 62, 63. Cicadula, (nymph). Right.
Figs. 64, 65. Cicadula, (nymph). Left.
Figs. 66, 67. Cicadula, (nymph). Right.
Figs. 68, 69. Cicadula, (nymph). Right, Left.
Figs. 70, 71. Cicadula, (nymph). Right.
Figs. 72, 73. Cicadula slossoni, ♂, (imago). Right Leg.
Fig. 74. Cicadula slossoni, ♀, (imago). Left Leg.
Fig. 75. Cicadula slossoni, ♀, (imago). Right Leg.
Fig. 76. Cercopidæ. Philaenus lineata, (imago).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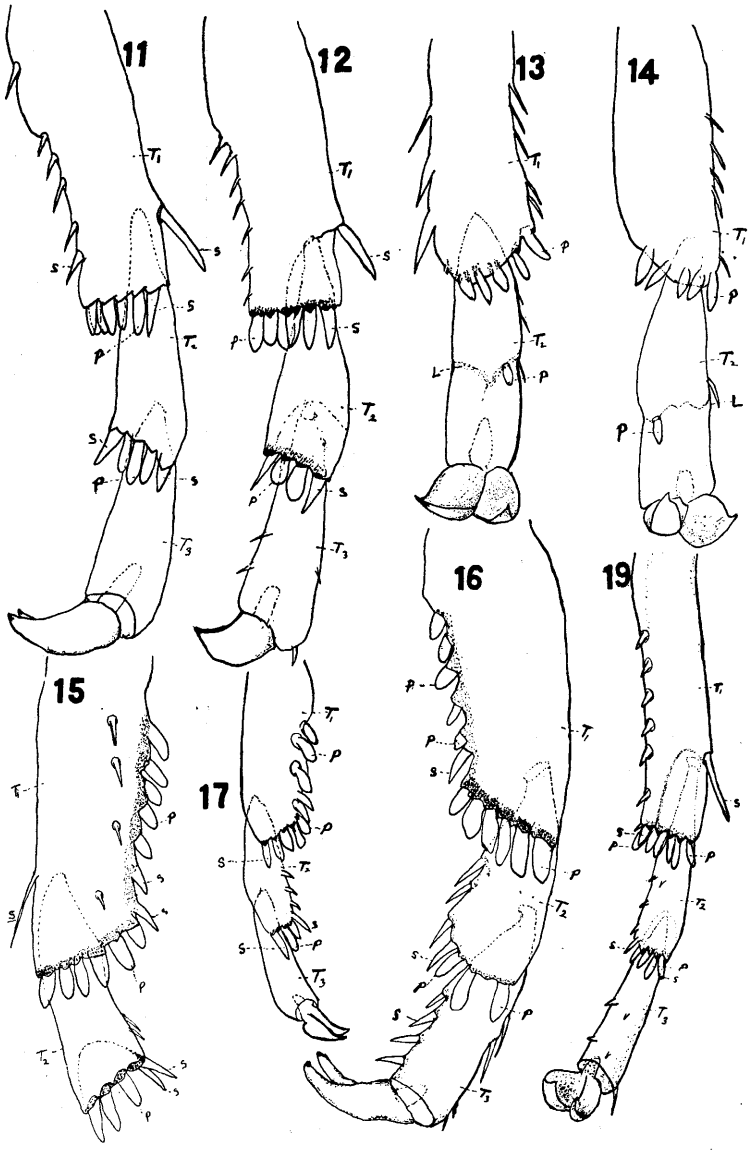
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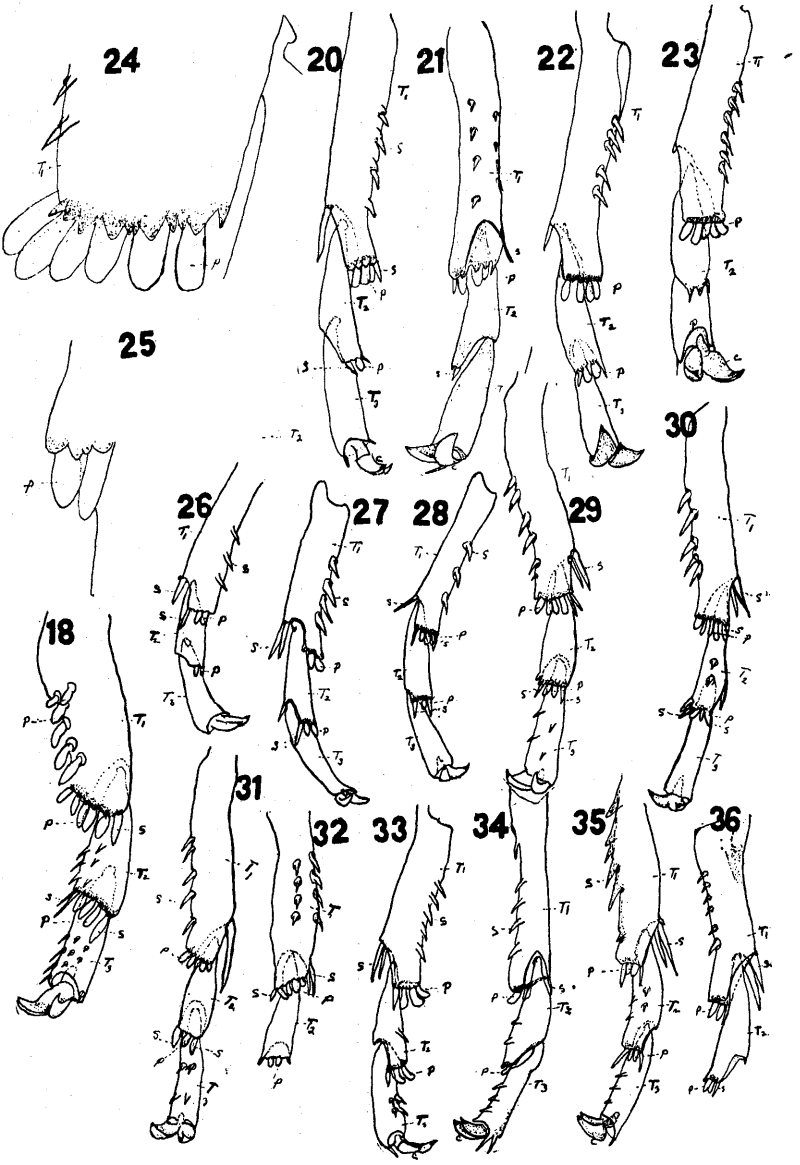
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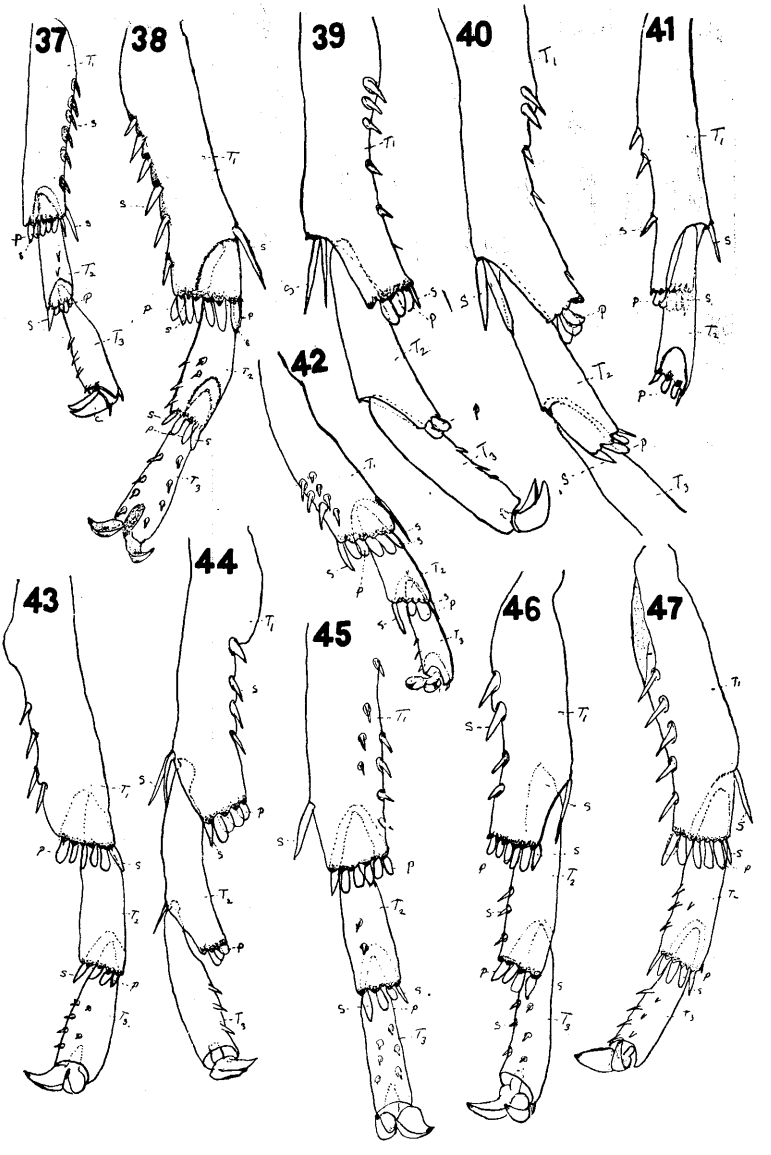
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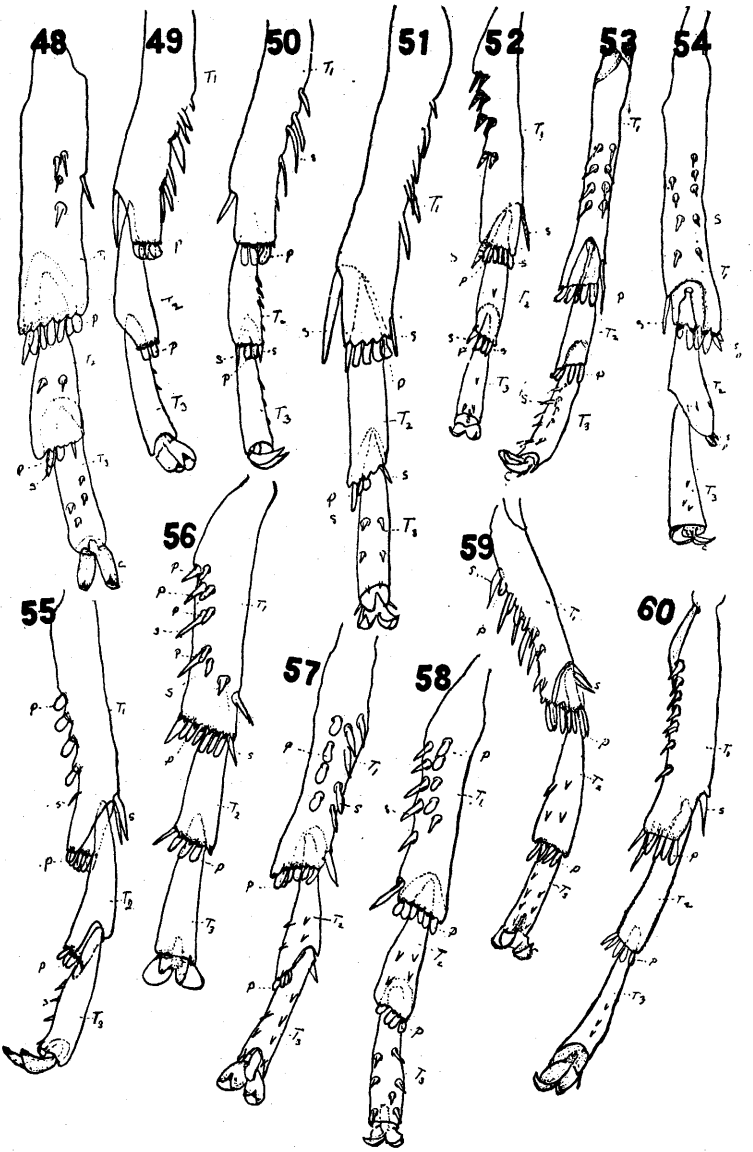
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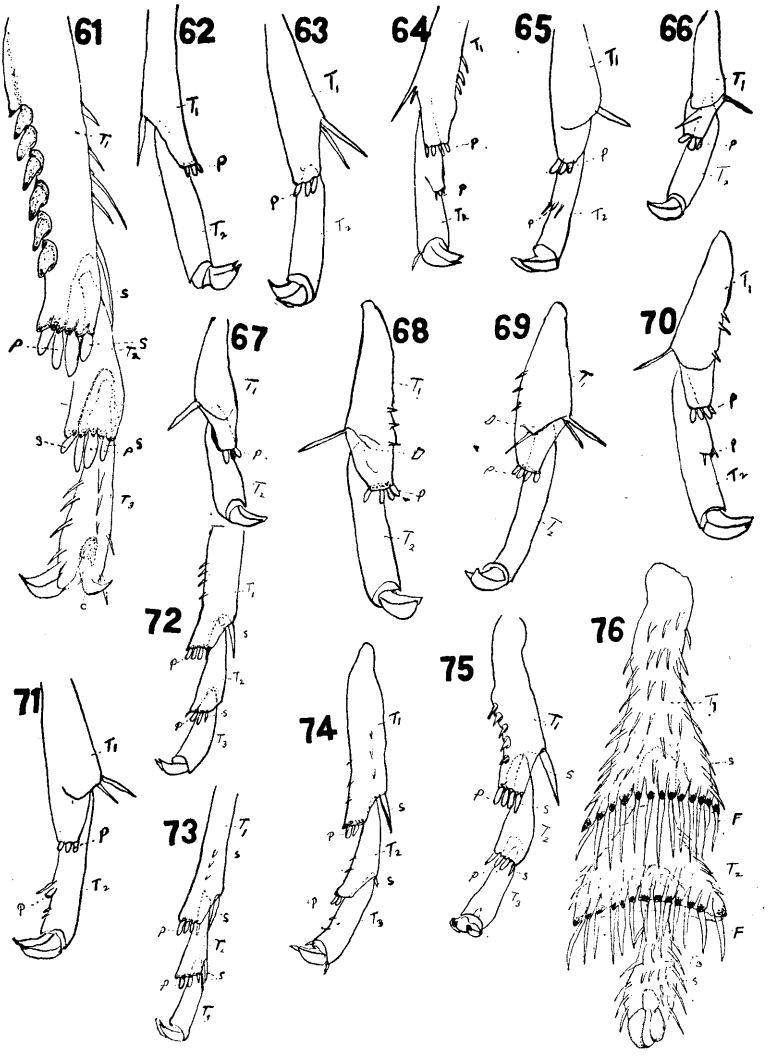
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