Monograph of the Psyllinae and Triozinae (Psyllidae: Homoptera) in America north of Mexico

Leonard Dale Tuthill
Iowa State College

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MONOGRAPH OF THE PSYLLINAE AND TRIOZINAE (PSYLLIDAE: HOMOPTERA) IN AMERICA NORTH OF MEXICO

by

Leonard D. Tuthill

A Thesis Submitted to the Graduate Faculty for the Degree of

DOCTOR OF PHILOSOPHY

Major Subject Entomology

Approved:

Signature was redacted for privacy.

In charge of Major work

Signature was redacted for privacy.

Head of Major Department

Signature was redacted for privacy.

Dean of Graduate College

Iowa State College
1941
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INTRODUCTION

Systematic work in the homopterous family Psyllidae was begun by the author six years ago in an attempt to bring the knowledge of the forms found in North America up to date. With the increasing economic importance of these insects due to the ravages of some of the species which feed on cultivated plants such a revision has become necessary.
In 1851 Fitch described six species of psyllids from the state of New York. This is apparently the first definite record of the occurrence of these animals in North America. The following year Walker, in his List of the Homopterous Insects of the British Museum listed Fitch's species, several more of Fitch's manuscript names and added one new species from Hudson Bay. Provancher added three names to the list in 1872. In 1890 he described six species as new, then in the Errata and Corrigenda of the same volume made two of them synonyms of his older species. Unfortunately he had the genera confused. Although one can almost be positive of what his genera really were the specific descriptions are almost entirely of the coloration except for characters which are of only generic or family significance. Until his specimens can be seen (if they are still extant) his names must remain nomina inquirenda. Beginning in 1876 C. V. Riley published various articles on Psyllidae intermittently for the next fifteen years, describing several new genera and species. Various workers added a few names to the growing list of species known from North America until when Malby published a list of all such in 1894 a total of thirty-one species was listed (several of these have since proved to be synonyms).
The first worker in this country to take any active interest in other than North American forms was Schwarz who made a few contributions to the knowledge concerning this group in other parts of the world as well as describing several new forms from this continent.

About 1910 two workers, who were to add a great deal to our fund of knowledge of the psyllids, became interested in this family. The first of these was Patch who described numerous species, noted the life history of several and worked out the wing venation, homologizing it with the venation in other Homoptera and applying the Comstock-Needham system of nomenclature to the veins. The second was Crawford who culminated several years of very active work with his Monograph of the Jumping Plant-Lice or Psyllidae of the New World in 1914. In this paper he revised the subfamily classification. As far as the North American genera are concerned at least, his classification appears to be valid for the most part and it is followed here without exception as the possible exceptions are those which show some relationships with subfamilies which are largely exotic and with which the author is not familiar. Crawford continued active work in the field until quite recently but as he soon removed to Hawaii most of his interest devolved to the pacific fauna.
Numerous contributions have been made since Crawford's work, notably by Ferris, Klyver, Van Duzee and Caldwell. The forms of economic importance have of course received a great deal of attention, especially the pear psylla (*Psylla pyricola* Förster) and the potato psyllid (*Paratriozoa cockerelli* (Sulc)). A very voluminous literature has developed about these two species.
GENERAL DISCUSSION

Morphology

The first extensive work on the structure of the Psyllidae was that of Witlaczil who in 1835 published his Die Anatomie de Psylliden (reviewed by Macloskie, Am. Nat. XX, 1886), treating not only the external anatomy but also the internal structure, with especial emphasis on the nervous system. Stough, 1910, published on Pachypylla celtidis-mamma at some length but as this species is one of the more specialized and was studied without a background of the generalized species his interpretations are somewhat erroneous. As is mentioned above, Patch determined the homologies of the wing veins in 1909.

Crawford's work in his monograph on the external morphology remains as the most complete and thoroughly done. With a few changes in terminology his interpretations are followed by the author.

The structure of the nympha has received comparatively little attention. Mally described and figured a few in 1895. Ferris has published several papers on various species. He started a series in which he planned to study the nymph of the type of each genus; this was subsequently turned over to Klyver and unfortunately seems to have been abandoned.
As this family is of world wide distribution and is quite highly evolved great variation in structure occurs and considerable work remains to be done in homologizing and interpreting structures both within the family and with other Homoptera.

Biology

The biology of the forms in this family has received but desultory interest for the most part. Notes on observations of time of emergence of adults, egg laying, appearance of nymphs, gall formation etc. make up the bulk of our knowledge. The complete life cycle of several species has been worked out however, Ashmead (1881) being the first to give such data for some of his species. Among others who have recorded some complete life cycles are Mally, Ferris and Hyatt, and Caldwell. The biology of the economically important species has, of course, been studied extensively, and most of their life cycles are known in detail. Much more life history work needs to be done as much of the taxonomic work is and shall remain quite uncertain until biological evidence such as the amount of variation within a species, the degree of host specificity etc. is known. This is especially true in Aphalaras, Aphalaroida and certain complexes of Trioza and Psylla.
The most common life cycle finds the adult as the overwintering stage, the eggs deposited singly on the foliage of the host plant in the spring, one or more generations developing through the summer. Several species, however, overwinter as nymphs, emerging as adults late the following spring. This variation in life cycle occurs between members of the same genus.

The coloration of both nymphs and adults is quite variable as has been noted by all who have worked on these insects. Löw, Mally, Progratt, Patch, Caldwell and others have remarked on this variation and noted that it occurs among individuals of the same age and brood and that there is no correlation between the amount of pigmentation in the nymph and the adult.

Without known exception the members of this family are plant feeders, sucking the sap and cell contents from their hosts. The great majority live upon trees or shrubs. Some occur on herbaceous plants of various kinds other than grasses (Gramineae). There are a few that develop on Juncus however.

The feeding of the nymphs of many species causes the production of galls or pseudogalls on their hosts. Among the more remarkable gall formers are the pachysyllids—the entire genus produces galls on the leaves, twigs or branches of Celtis app. (hackberries). In most of the other genera
occasional species cause gall formation. Some species, notably *Pannistria cockerelli*, apparently inject a toxic material into the host plant thereby causing a physiological disturbance, an insect disease.

The different species vary markedly in the amount of host specificity which they exhibit, some being limited to a single species and others developing on a number of hosts of various degrees of relationship. The adults seem to be able to maintain themselves on a wider variety of plants than the immature stages. At least a few species apparently have a definite alternation of hosts between the nymphal and imaginal stages although the adult host range does not seem to be as limited as it is in many of the aphids which exhibit the same type of relationship. Because of the variability in the feeding habits of the adults no plants are recorded in the following pages as hosts unless it is quite certain that the nymphs develop thereon. The literature of this group is full of references to hosts many of which seem to have been merely plants on which adults were resting at the time of collection. All recorded host records are therefore disregarded unless there is some evidence given that the plant named as host actually supports the developmental stages. Unfortunately such discrimination has not always prevailed and thus we have species named for plants which are not hosts at all.
The production of honey dew and of wax is general throughout the family. Many of the nymphs secrete large quantities of wax which usually occur as a filamentous deposit. The adults also secrete wax but usually in less abundance.

Collecting and Preserving

The psyllids are commonly overlooked by most collectors due in part to their small size but even more to their habits when swept up in a net. For several minutes after being thus captured most of the specimens remain quiet in any debris which may be present in the net. Their first activity is usually to jump from the net in two or three leaps. This type of action causes them to be very easily missed.

As most of the species occur on trees and shrubs and many cling very tightly to the host the ordinary type of sweeping often fails to dislodge them. Beating or a thorough shaking of a plant within the net will sometimes produce specimens which are utterly unobtainable by other means. They are so small and jump so quickly that an aspirator while not indispensable is of the greatest aid in their capture.

The adults may be preserved in alcohol or mounted dry on points or mounted nadeln. Mounting of the entire insect on slides after clearing and dismembering as practiced and
recommended by Ferris and Klyver, who carried the idea over from the former's work with coccids, is not satisfactory. This is especially true where only one or two specimens are known. By this method one can ascertain many minutiae of course, such as the exact number and shape of setae or glands, but some of the more general and certainly more usable characters such as proportionate length of various parts, shape of vertex and genal processes, angle of the latter with respect to the vertex, and color are lost. It is often desirable to clear and study some parts, such as the genitalia, under higher magnifications. When this is necessary a temporary glycerine mount of the cleared parts is preferrable for study; after such study is completed the part or parts are placed, still in a small drop of glycerine, in a minute vial, covered with refined mineral oil, corked and placed with the untreated part of the insect by pinning through the cork. In this way the material is always available for further study, it may be viewed from any angle, further dissection may be made if desired and no distortion occurs such as is unavoidable in slide mounts. By the use of oil to cover and thus seal off the small drop of glycerine any possibility of its creeping out and rusting the pin or ruining the label is forestalled.

Nymphs, on the other hand, are best preserved and studied as permanent slide mounts. As they are quite
strongly flattened almost no distortion occurs in such mounting nor are any characters obscured.

Explanation of Terms and Methods

In order to prevent misunderstanding and confusion the following explanations and definitions are given.

Only the overall length from the tip of the head to the tip of the folded wings is given in millimeters. In making this measurement the insect is measured with a millimeter rule under a binocular microscope. This measuring is not done more accurately and no other such measurements are given for the reason that it has become evident from study of large series of specimens of various species that so much variation in size occurs within a species that exact measurements are of little significance. The proportions between various parts of the insect are in general quite constant, however, and have been utilized in lieu of metric fractions in the conviction that they are of much more value than the latter. The proportional measurements are made by means of a squared eyepiece in the ocular of the microscope.

The principal measurable terms are defined as follows:

**Width of head**—distance across head including eyes.

**Length of vertex**—total length from most caudal points to most anterior points, measured with vertex flat (not the median length).
Width of vertex—width between compound eyes.

Length of genal processes—length measured on median line from base of frons to spines of processes.

Length of antennae—total length including the two basal segments.

Width of thorax—width at widest point, as seen in dorsal view, usually across mesoscutum.

Length of forewing—total length measured parallel to straight portion of anal margin.

Width of forewing—greatest width at any point.

Wherever such comparative terms as long, short, large, etc. are used they mean, of course, in proportion to the rest of the insect and imply comparison with the same structure in related species.

All descriptions are from dried specimens unless otherwise indicated.

The term genal processes has been substituted for genal cones as used by Crawford et al. to obviate the absurdity of such expressions as, cones conical, cones transverse etc.

The cell in the forewings between the branches of media is termed the medial cell and that between the branches of cubitus the cubital cell for reasons of brevity and convenience. These names are much less confusing than the previously used first marginal and second marginal.

In those descriptions in which minute setae on the wing membrane are referred to the tiny setae called points by
Ferris et al. are meant, not the larger hair-like setae which occur quite commonly on the veins and occasionally on the membrane. These minute setae are often continuous with but much smaller than those which make up the radular areas near the wing margin (the alar radulae of authors).

A form is considered as a subspecies when it shows some constant but minor morphological differences, usually coupled with a somewhat different range. Such probably represent incipient species.

Variety as herein used refers to a distinct, constantly reappearing variation in color or color pattern. Most of Crawford's varieties are based on morphological differences and are here classed as subspecies.

Synonymy and Bibliography

Under each species is listed the complete synonymy as known to the author. A complete list of references is included for most of the species. For those forms which are of considerable economic importance or for some other reason have received great attention the list is necessarily cut-tailed and includes only those which are deemed pertinent to a work of this nature, that is those which deal with the taxonomy, biology or morphology of the species, or which contain a considerable bibliography of other types of papers. In these specific lists only abbreviated references are given.
In the bibliography the complete title of the paper and of the publication is given.

The bibliography includes all works cited plus other important contributions with especial emphasis on those not included in Crawford's monograph.

Except where otherwise indicated the original of all references has been seen.

Location of Types

Some of the insects in Pitch's material, including the Psyllidae, found their way to the U. S. National Museum and the types of his psyllid species are there. Van Duzee (Can. Ent. XLIV: 317-329) discussed Provancher's collection, which he had studied, but he made no mention of the Psyllidae. It seems doubtful therefore that they have been preserved. Riley's types (where designated) are in the National Museum as are those of Ashmead and Schwarz. Mally's types, the location and existence of which have been problematical, are in the Iowa State College Collection at Ames, Iowa. In reply to a query concerning the types of some of her species Dr. Fitch replied that the specimens, "must be among those lent some time ago to some one who has not yet returned them." Whether this means that all of her types are thus lost I am unable to say. Crawford's types are about equally distributed between the National Museum and his own collection which is
housed in the Bishop Museum in Honolulu, Hawaii. The whereabouts of Klyver's types is unknown to the writer—presumably they are in his personal collection at San Mateo Junior College, San Mateo, California. Those of Van Duzee are in the Museum of the California Academy of Sciences. Caldwell reports that his types are in the Ohio State University Collection.
ACKNOWLEDGEMENTS

I wish to express my deepest appreciation to Mr. P. W. Oman of the U. S. National Museum staff through whose good offices I was able to obtain the available material in the National Museum for study and whose suggestions and assistance have done much to aid and lighten this task. Dr. John S. Caldwell has been most kind in exchanging and comparing specimens and has furnished heretofore unpublished drawings of some of his species. President D. L. Crawford of the University of Hawai'i has not only supplied specimens and reprints of his papers but his own work has been a constant help and inspiration. Dr. R. H. Peamer of the University of Kansas has placed the material of that institution at my disposal and has been a great source of encouragement.

To Miss Margaret Poor I am deeply grateful for the comparing of specimens with the types in Crawford's collection and the taking of notes on them, and for assistance in the preparation of the keys. The late E. P. Van Duzee was helpful in the exchange of paratypes.

It was at the suggestion of Dr. C. J. Drake that this work was initiated and it has been pursued under his direction. Dr. H. H. Knight and Dr. H. M. Harris have been of great assistance by their constant help and suggestions.
To the following also I wish to express my thanks for placing at my disposal specimens in their charge: Mr. Joe Schuh and Mr. R. L. Post, Oregon State College; Mr. Roy D. Shenefelt, Washington State College; Dr. Maurice T. James, Colorado State College; Dr. Clarence E. Mickel, University of Minnesota; Dr. Herbert H. Ross, Illinois Natural History Survey; Dr. H. D. Tate, University of Nebraska; Mr. John Standish and Mr. Robert W. Kaiser formerly of Oklahoma State College.
SYSTEMATIC TREATMENT

Family Psyllidae Latreille

1815 Psyllides Leach, Edinb. Encycl. IX:125 [fide Aulmann].
1835 Psyllodes Burmeister, Handb. d.'Ent. II:95.
1840 Psylliens Blanchard, Hist. des Ins., Hemip. 201.
1861 Psyllodea Flor, Rhyn. Livl. II:433.
1874 Psyllodea Lethierry, Cat. Hemip. du Nord. ed. 2:35
  [fide Aulmann].
1904 Chermidie Kirkaldy, Entom. XXXVII:255.
1913 Psyllidae Aulmann, Psy. Cat. 5.
Antennae filiform, usually of ten segments, sometimes fewer. Three ocelli, one medial on frons, two lateral near compound eyes near caudal edge of vertex. Genae often produced, variously shaped. Beak arising from posterior portion of head, usually enclosed by forecoxae, apparently arising between them. Thorax strongly developed for flying and jumping. Two pairs of wings, usually membranous, anterior pair sometimes thickened, coriaceous, veins of forewings consisting of radius (branched once), media (branched once), cubitus (branched once), first A (cleval suture); venation of hind wings very variable, weak, often indicated merely by rows of setae, similar to forewing, radius and media usually unbranched. Usually all legs fitted for jumping; tarsi two-segmented. Metacoxae usually with large spur caudad. Male genital segment bearing a pair of somewhat elongate processes (forceps).

Type genus—Psylla Geoffroy.

Much confusion has arisen as to what is the correct family name for this group of insects since Kirkaldy (1904) proposed the name Charmidae for Psyllidae Lstreielle. Kirkaldy erroneously thought that Lamark (1801) designated ficus Linnaeus as the type of Charmes. Lamark however merely
cited it as an example of the genus and this is not acceptable as a type designation (Op. 79, Int. Comm. Zool. Nom.). Apparently because of this belief that *ficus* was the type of *Chermes* Kirkaldy considered *Psylla* Geoffroy a synonym of *Chermes*. This left the *Psylla* of Latreille *et al.* without a name as *ficus* is not congeneric with the species of the latter.

He subsequently (1905) proposed *Psyllia* as a new name for this orphaned group. The family name would not have been *Chermidae* but *Psylliidae*, however, as the type of the family had been set as *Psylla* Latreille in 1907 by Latreille, the changing of the name of this genus would merely have changed the root of the family name, not transferred it to another genus. Since the type of *Chermes* is *abietis* (an aphid) rather than *ficus* Kirkaldy's contention is groundless.

E. P. Van Duzee, the chief proponent of the name *Chermidae*, while following Kirkaldy's names based his argument on different grounds. In an editorial note in the Pan-Pacific Entomologist (VII:96) he states his case quite clearly and in private communications states his views more completely. Briefly stated his thesis is this—the type of any category must agree in all details with the published description. At first glance this position has a seemingly logical basis, and in the specific instance of *Chermes* versus *Psylla* his position appears sensible, but it is certainly not expedient, nor does it conform to the rules of
nomenclature. To abandon the system of nomenclatorial rules established by the Zoological Congress and return to such a so-called "logical" basis is of course unthinkable, and one shudders to think of the resulting confusion.

The name **Psyllidae** had been in general, almost exclusive, use for about one hundred years when this "correction" first appeared, an instance in which if it had been necessary the International Commission would surely have suspended the rules to prevent confusion. It is unfortunate indeed that this needless confusion has existed and been so long continued.

**Subfamily Psyllinae Löw**


1886 __**Psyllaria**__ Puton, Cat. Hém. Faune Palée. 91.


1912 __**Psyllaria**__ Oshanin, Cat. palæa. Hemip. 126.

1913 __**Psyllinae**__ Aulmann, Psy. Cat. 5.

1914 __**Psyllinae**__ Crawford, U. S. N. M. Bull. 35:13, 105.

1916 __**Psyllinae**__ Van Duzee, Check List Hemip. N. A. 37.

1917 __**Psyllinae**__ Van Duzee, Cat. Hemip. N. A. 709.
Head more or less deflexed. Genae produced as variously-shaped processes. Frons covered by genae except a small portion bearing median ocellus. Antennae ten-segmented, length variable. Eyes hemispherical and lateral or somewhat elongate and recessive. Thorex variously arched. Forewings variable in shape and texture, media and cubitus with a common petiole, pterostigma commonly present but frequently obsolete. Metacoxal spurs present. Metatibiae often armed basally, a variable number of spines apically. Basal segment of metatarsi bearing two black claw-like spines except in Tetragonocephala. Male proctiger simple.

This is a very large and widely distributed subfamily, representatives being found throughout the world. There are few characters which can be cited as typical of it which will not show some exceptions. There is always a medial-cubital petiole in the forewing; the genae are produced as variously-shaped processes which almost always cover the frons except for a small area which bears the median ocellus. Crawford considered the presence of the two black claws on the basal segment of the metatarsi as of great importance, which indeed it is although these spines are lacking in one genus.

The nymphs are often quite active and free living, others are gall formers. Some are producers of copious quantities of wax, others seem to produce none. They characteristically have the wing pads extending prominently beyond the margin.
of the abdomen, not produced cephalad at the humeral angles and are without a fringe of large setae on the margin.

Key to the Genera of Psyllinae

1. Head somewhat deflexed, not vertical.................. 2.
   Head very strongly deflexed, head and pronotum vertical........................................ 6.

2. Genal processes large, flattened, contiguous, on same plane as vertex; forewings thickened, rugose, rhomboidal................................. Euphyllura.
   Genal processes not flattened, rarely contiguous; forewings usually membranous, sometimes thickened and rugose, not rhomboidal (except Euphalesus propinquus)........................................ 3.

3. Pleural suture of prothorax extending to middle of lateral margin of pronotum, propleurites equal dorsally........................................ 4.
   Pleural suture of prothorax oblique, propleurites not equal dorsally............................. Psylla.

4. Genal processes sharply depressed from plane of vertex, parallel to it..................... Arytsena.
   Genal processes not depressed from plane of vertex..... 5.

*The genus Spanioneura has been reported from North America but as neither specimens nor adequate descriptions are available it is not included in the key.
5. Vertex flat, large; eyes recessive; genal processes somewhat prolonged; forewings more or less thickened

Euphalerus

Vertex somewhat rounded to vertical genal processes; eyes lateral; forewings membranous

Psyllopsis

6. Basal segment of metatarsi with 2 black claws

Pachyptylla

Basal segment of metatarsi without black claws

Tetragonocaphala

Genus Psylla Geoffroy


1764 Psylla Geoffroy, Hist. Abr. des Insectes I:432, pl. X fig. II.


1913 Psylla Aulmann, Psy. Cat. 3.
1914 Brachypsylla Crawford (pro parte), U. S. N. M. Bull. 85: 142.
1917 Psylla Van Duzee, Cat. Hemip. N. A. 305.
1921 Asphasia Enderlein, Zool. Anz. LII:120.
1921 Asphacidella Enderlein, Zool. Anz. LII:120.
1926 Baeopelma Enderlein, Ent. Mitt. XV:399.

Head large, as broad as thorax or nearly so, deflexed. Vertex more or less depressed discally, shape somewhat
variable. Densae produced as conical processes usually deflected from plane of vertex. Eyes hemispherical. Antennae slender, usually longer than head, often much longer. Thorax large, well arched. Pronotum descending anteriorly, not flat. Propleurites not equal at juncture with pronotum, pleural suture oblique, extending to posterior edge of pronotum, or proepimeron not extending to pronotum at all. Forewings membranous, usually hyaline, transparent, rounded apically, cubitus and media with a common basal petiole, pterostigma present, obsolete or obsolete. Metatibiae usually with a large or small basal spur and five or six black spines apically. Basal segment of metatarsi with 2 black claw-like spines.

Logotype: *Psylla alni* (Linnaeus).

Linnaeus' genus *Chermes* (1758) contained 14 species including abietis and alni. The first valid designation of a type species for *Chermes* is that of abietis by Passerini in 1863 (Arch. Zool. Anat. Fisiol. II:205). As abietis is an aphid *Chermes* is established as an aphid genus.

The first use of the name *Psylla* seems to have been in the 1762 edition of "Histoire abrégée des Insectes" which is generally accredited to Geoffroy. If the 1762 edition is not acceptable the name will date from 1764. Geoffroy's treatment is not binomial but is binary which is valid under the international code. Latreille first designated a type for
the genus *Psylla* in 1910, naming *alni* Linnæus.

Kirkaldy (1904) cited *Psylla* as a synonym of *Chermes*, basing this action on the ground that Lamark (1801) had designated *Chermes ficus* Linn. as the type of *Chermes* thereby making *Psylla* Geoffroy a synonym of *Chermes* and leaving *Psylla* Leitreille without a name. For this latter group he proposed (1905) the name *Psylla Kirkaldy*—type *Chermes pyri* Linn. As the type of *Chermes* is not *ficus* but *abietis*, an aphid, his action was groundless and *Psylla* is a synonym of *Psylla*.

Enderlein in the later numbers of his "Psyllidolorica" established a great many new genera, often apparently without seeing any specimens of the species involved and using characters of slight significance. In this way he sometimes has placed very closely related species in different genera on some minor, scarcely specific character. *Labicræ*, *Asphæbræ*, *Asphæridælla* and *Bæopælæma* are four fragments which he thus splits from *Psylla* and which I do not believe to be worthy of generic distinction.

Key to the Genus *Psylla*

1. Eyes borne on prominent stalk-like portion of head... 2.
   Eyes not borne on stalk-like area.......................... 4.

2. (1) Forewings twice as long as wide... *phoradendræ* Tuthill.
   Forewings 2-1/2 times as long as wide................... 3.
3.(2) Antennae annulated with black.......... annulata Pitch.
   Antennae unicolorous except tip dark... negundinise Wally.
4.(1) Antennae twice as long as width of head
   or longer................................................ 5.
   Antennae distinctly less than twice as
   long as width of head................................. 23.
5.(4) Antennae distinctly more than 2-1/2 times as long
   as width of head (usually 3 times as long)........... 6.
   Antennae less than 2-1/2 times as long as width
   of head................................................... 12.
6.(5) Pterostigma obsolete or almost obsolete.............. 7.
   Pterostigma present, prominent....................... 10.
7.(6) Female genital segment longer than rest of
   abdomen, slender, styliform, abruptly en-
   larged basally; male forceps not notched
   apically................................................. floccosa Pitch.
   Female genital segment shorter than rest
   of abdomen, stout; male forceps notched
   apically.................................................. 8.
8.(7) Uniformly green or greenish yellow in
   color............... trimaculata var. astigmata Crawford.
   Not uniformly greenish, at least some
   red markings............................................ 9.
9.(8) With 3 prominent red spots on dorsum of mesothorax,
   otherwise unicolorous............... trimaculata Crawford.
General color red, black bands on abdomen

................................ trimaculate var. cerasi Patch.

10. (6) Female genital segment 3/4 as long as rest
of body, with an apparent suture midway;
male forceps enlarged apically....... caudate Crawford.
Female genital segment not over 1/2 as
long as rest of body.......................... 11.

11. (10) Genal processes short, rounded, 2/3 as
long as vertex............... alti rosaeformis Crawford.
Genal processes large, cone-shaped,
as long as vertex......................... salesformis Patch.

Forewings without maculae................. 14.

13. (12) Genal processes cone-shaped, as long as
vertex................................. maculata Crawford.
Genal processes small, blunt, less than 1/2
as long as vertex........................... nana Tuthill.

14. (12) Male forceps simple,* straight in lateral
view........................................... 15.
Male forceps not simple and straight........... 21.

15. (14) Female genital segment shorter than rest of
abdomen..................................... 16.
Female genital segment longer than rest of
abdomen..................................... 13.

*Simple as used in this key means tapered to an acute, subacute
or blunt apex, not broadly truncate, dentate, notched, lobate,
emarginate, etc., the forceps may be curved or twisted however.
16.(15) Pterostigma large, long; genital processes
large, blunt, scarcely divergent... *albarena* (Caldwell).
Pterostigma broad but short; genital processes
slender, subacute, strongly divergent............... 17.

17.(16) Male forceps straight; vertex and genital
processes striped red and white... *brevistigmata* Patch.
Male forceps bent sharply cephalad in
anical 1/3; vertex and genital processes
nearly unicolorous....... *brevistigmata acuta* Crawford.

18.(15) Female genital segment large basally,
then attenuate, styliform............... *floccose* Patch.
Female genital segment stout, not
styliform............................................. 19.

19.(13) Apex of dorsal valve of female genital
segment sharp............... *carpinicola* Crawford.
Apex of dorsal valve of female genital
segment blunt................................. 20.

20.(19) Genal processes large, acute, fully as long
as vertex....................... *diloncha* (Caldwell).
Genal processes small, blunt, 1/2 as long
as vertex................................. *striata* Patch.

21.(14) Female genital segment as long as rest of
abdomen or longer; male forceps not cleft,
bearing a large Y-shaped black tooth
apically....................... *arita* n. sp.
Female genital segment shorter than abdomen; male forceps cleft.......................... 22.

22.(21) Larger species (3.5 mm.); male forceps with only apical cleft, posterior lobe bearing an acute black tooth................. magna Crawford. Smaller species (3 mm.); male forceps cleft nearly halfway to the base, caudo-mesal lobe ending in a T-shaped tooth.................................................. omari n. sp.

23.(4) Small species (2-2.5 mm.); genital processes separate basally, strongly divergent; forewings more or less fumate......................... 24. Larger species (2.5 mm. or more); genital processes not separate basally, less strongly divergent; forewings usually not fumate (more or less fumate in alaskensis, pyricola and media).................................................. 27.

24.(23) Head and thorax very prominently pubescent ........................................... hiruta (Tuthill). Head and thorax not prominently pubescent............. 25.


26.(25) Male forceps deeply cleft spically...... media n. sp. Male forceps notched on lateral margin apically................................. coryli Patch.
27. (23) Female genital segment distinctly longer than rest of abdomen and male forceps simple...... 28.
Female genital segment at most as long as rest of abdomen or if longer male forceps not simple.......................... 34.

28. (27) Antennae 1-2/3 times as long as width of head
or more......................................................... 29.
Antennae 1-1/3 to 1-1/2 times as long as width of head.......................................................... 32.

Apex of dorsal valve of female genital segment upcurved......................................................... 30.

30. (29) Dorsal valve of female genital segment with apex sharp............................ stricklandi (Caldwell).
Dorsal valve of female genital segment with apex blunt......................................................... 31.

31. (30) Ventral valve of female genital segment nearly as long as dorsal valve, latter very abruptly upturned apically........... tuthilli (Caldwell).
Ventral valve of female genital segment distinctly shorter than dorsal valve, latter evenly upcurved.................. magnicauda Crawford.

32. (29) General color reddish brown; forewings somewhat fumate, long (over 2-1/2 times as long as wide),
cells very long and narrow........ aslakensis Ashmead.
General color light green; forewings not fumate, less than 2-1/2 times as long as wide, cells normal................... 33.

33.(32) Large species (3.5 to 4 mm. to tip of folded wings)......................... buxi (Linn.).
Smaller species (2.75 to 3 mm. to tip of folded wings)......................... bulbos n. sp.

34.(27) Antennae but slightly longer than width of head................................. 35.
Antennae at least 1-1/3 times as long as width of head................................. 39.

35.(34) Male forceps T-shaped apically...... parallela Crawford.
Male forceps not T-shaped.................. 36.

36.(35) Forewings more or less fumate; male forceps with broad plate-like caudal lobe........ manisi n. sp.
Forewings not fumate (often whitish); male forceps without plate-like caudal lobe........ 37.

37.(36) Uniformly yellowish green in color; head and thorax not punctate; genal processes 3/4 as long as vertex......................... brevifrons Patch.
General color red to reddish brown, more or less marked with black and white; genal processes 1/2 or 2/3 as long as vertex........... 39.

38.(37) Female genital segment elongate, slender, dorsal
valve straight; male forceps in lateral view
swollen midway, tapered to apices, curved caudal,
apices truncate with a small sharp anterior
tooth............................................ quadrilineata Pitch.
Female genital segment short, dorsal valve
concave; male forceps in lateral view very
broad, apically twisted caudal, apices a
broadly rounded tooth......................... confusa n. sp.

39.(34) Male forceps simple, blunt to acute apically
(not truncate)................................................ 40.
Male forceps not simple................................. 45.

40.(39) Genal processes almost as long as vertex;
light green species........................................... 41.
Genal processes not over 2/3 as long as vertex;
dark colored species........................................... 42.

41.(40) Length to tip of folded wings 4 mm.; genal
processes slender, divergent; female genital
segment much shorter than rest of abdomen,
valves nearly equal................................. mali (Schmid.).
Length to tip of folded wings 3 mm.; genal pro-
cesses stout, nearly contiguous; female genital
segment nearly as long as rest of ab-
domen.......................................................... alba Crawford.

42.(40) Forewings with a black spot at apex of clavus,
often somewhat fumata................................. 43.
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Forewings immaculate................................. 44.

43. (42) Genal processes uniformly white, robust;
pterostigma narrow......................... ribesiae (Crawford).
Genal processes dark, at least basally, less
robust; pterostigma large............. pyricola Förster.

44. (42) Proctiger distinctly longer than forceps........................ americana Crawford.
Proctiger scarcely longer than forceps, usually
enclosing latter apically..... americana curta n. subsp.

45. (39) Forewings with a prominent dark spot at apex
of clavus......................... ribesiae (Crawford).
Forewings immaculate (except pterostigma
may be dark)................................................. 46.

46. (45) Male forceps narrowed before apices then enlarged
and truncate, somewhat T-shaped in appearance...... 47.
Male forceps not T-shaped............................... 49.

47. (46) Length to tip of folded wings 3 mm.

.................................................. parallels Crawford.

Length to tip of folded wings 3.5 to 4 mm......... 48.

43. (47) General color dark brown to black..... minor Crawford.
General color yellow....... minor var. flave Crawford.

49. (46) Male forceps deeply notched apically............... 50.
Male forceps otherwise............................... 51.

50. (49) Forewings fumate; pterostigma very small... media n. sp.
Forewings clear; pterostigma moderately
large........................................... pullus n. sp.

51.(49) Male forceps broad, apices very broadly truncate and heavily sclerotized.......... lina n. sp.
Male forceps otherwise................................... 52.

52.(51) Male forceps very broad, flattened, narrowed toward apices, twisted caudal, apices visible only in caudal view, sharply narrowed near tips, terminating as a blunt rounded tooth, somewhat sinuate on caudal margin....... confuse n. sp.
Male forceps otherwise................................... 53.

53.(52) Male forceps strongly sinuate on caudal margin................................................ sinuata Crawford.
Male forceps otherwise................................... 54.

54.(53) Male forceps produced as rounded lobes basally on caudal margin.......................... fibulata Crawford.
Male forceps otherwise................................... 55.

55.(54) Proctiger of male about as long as forceps, forceps strongly produced cephalad apically, hook-like......................... cola n. sp.
Proctiger of male very long, twice as long as forceps, forceps bent caudal apically, truncate................................. eva n. sp.
Psylla phorodendrae Tuthill

Figs. 1, 2, 8.


Length to tip of folded wings 3 mm.

Color: Green, forewings olive green.

Structure: Head very broad. Genal processes short, not as long as broad, rather blunt. Antennae 1-4/5 times as long as width of head. Eyes borne on prominent stalk-like area of head. Thorax very broad. Wings twice as long as wide; cubital cell larger than medial, latter slender, R₃ straight to near apex, sharply turned toward costa, pterostigma large.

Genitalia: Male proctiger narrow in lateral aspect, straight. Forceps very slender in lateral view, base somewhat enlarged, remainder bent forward, apices blunt, postero-apical margins sharp, black-margined; in caudal view arched, apices touching, a large mesally projecting, black-tipped tooth near base. Apical portion of aedeagus very much enlarged, in dorsal view notched apically, large wing-shaped lateral lobes, two slender, retrose, medial processes extending caudal. Female genital segment short, about 1/2 as long as remainder of abdomen; dorsal valve elongate hood-shaped; ventral valve very short with a large median,
transparent, truncate tooth.

In addition to the type specimens from Los Angeles County, California and Huachucas Mountains, Arizona, specimens are at hand from the Sante Rite Mountains, Arizona. Additional specimens from the Huachucas Mountains bear the host plant label Phoradendron tomentosum Oliver.

The original spelling of the name as phorodendrae was due to an error in transcription and is here amended to phorodendrae.

Type, female, Huachucas Mountains, Arizona, in the Snow Collection, University of Kansas.

*Psylla annulata* Fitch

1891 *Psylla annulata* Fitch, 4th Rept. N. Y. Sta. Mus. 64.
1913 *Psylla annulata* Aulmann, Psy. Cat. 10.
1914 *Psylla annulata* Crawford, U. S. N. M. Bull. 35:152.
1917 *Psylla annulata* Van Duzee, Cat. Hemip. N. A. 309.

Length to tip of folded wings 3.5 to 4 mm.

*Color*: General color light yellow, abdomen often green.
Antennae with dark annulus apically on each segment. Wings whitish.

**Structure:** Head unusually wide. Vertex short, slightly impressed discally, abrupt anteriorly. Median ocellus far below plane of vertex. Eyes borne on very prominent stalk-like areas of head, definitely separated from raised portion of vertex. Genal processes slender, cone-shaped, divergent, blunt, as long as vertex, longer than median length of vertex. Antennae twice as long as vertex. Thorax scarcely arched. Hind tibiae with short basal spur. Forewings broad, 2-1/2 times as long as wide, membrane minutely setate; veins biseriately set with very fine setae; venation typical, pterostigma very broad.

**Genitalia:** Male genitalia small. Proctiger short, almost straight. Forceps in lateral view straight; in caudal view straight basally then bowed out and arched to sharp black apices. Female genital segment short, shorter than rest of abdomen; dorsal valve slightly longer than ventral, almost straight to rounded apex; ventral valve strongly up-curved.

Described from specimens from the following localities: Schenectady, New York, Massachusetts, New Hampshire, Connecticut, Maine, Michigan and Iowa. Caldwell records it from Ohio and McAtee from Maryland.

The host is *Acer saccharum* Marsh.

Type?
Psylla negundinis Mally

1913 *Psylla negundinis* Aulmann, Psy. Cat. 20.

Length to tip of folded wings 3.5 to 4 mm.

Very similar to *annulata* from which it is distinguished chiefly on the lack of annulations on the antennae. Color uniformly green to yellow except tips of antennae black. The host plant is box elder, *Acer negundo*.

Specimens are at hand from Iowa, Nebraska, Kansas, Minnesota, North Dakota, Manitoba, Colorado, Utah, Arizona. It is also recorded from Wisconsin, New Mexico, Ohio and Alberta (Strickland, on *Negundo interius*).

The life cycle is recorded by Mally as follows:

"The eggs are deposited in autumn just as soon as the leaves begin to fall. They are inserted closely around the edge of the buds, but are attached to the twig, so in case the bud is broken off the eggs still remain in place. They
hatch in early spring, enter the opening buds and feed by sucking the juices from the young tissue. When the leaves are large and have a long petiole, the young larva may be found anywhere on the under side of the leaf, on the petiole, or more preferably at the axil of the leaf, with head downward, i.e. toward the stem, and crowded as far down as possible for protection. In this position they may be observed for hours, sitting very quietly, only moving the abdomen laterally or vertically occasionally so as to remove the white mass of excreta and the cottony wax secretion. They pass through five stages and emerge as adults about the middle of May or the first of June. The adults live on the trees during the summer months, feeding on the plant juices, pairing, and maturing the eggs till autumn. When the leaves begin to fall and expose the buds the female begins depositing the little white glistening eggs around the edges of the buds, and their life cycle is complete."

Type, male, in the collection of Iowa State College.

Psylla floccosa Patch

Length to tip of folded wings 5 to 5.5 mm.


Structure: Head scarcely as long as thorax, strongly deflexed. Vertex about 1/2 as long as wide, discal impressions shallow, anterior margin not abrupt nor overhanging median ocellus. Genal processes large, cone-shaped, blunt, slightly longer than vertex. Antennae typically over 3 times as long as width of head (numerous Colorado, Utah, and Oregon specimens at hand have the antennae slightly less than 2-1/2 times as long as width of head). Thorax well arched. Pronotum large. Hind tibiae with small basal spurs. Forewings large, slightly less than 1-1/2 times as long as wide;
membrane set with minute setae; venation typical, pterostigma almost or entirely lacking.

Genitalia: Male proctiger long, straight. Process much shorter than proctiger; in lateral view straight; in caudal view slender, evenly arched to apices; apices slightly pointed, black. Female genital segment longer than rest of abdomen, large basally, very suddenly narrowed, styliform to apex; ventral valve acute; dorsal valve slightly longer than ventral, more slender, straight, apex upturned as a small dorsal tooth.

Described from many specimens from the following states and provinces: Nova Scotia, New Hampshire, Maryland, Ontario, Michigan, Minnesota, Manitoba, Montana, Wyoming, Colorado, New Mexico, Utah, Nevada, California, Oregon, Washington and British Columbia.

It has also been recorded from Maine, Connecticut, New York and Alberta.

The nymphs are very conspicuous on the host, alder (Alnus spp.), being covered with a very abundant flocculent waxy secretion. The wax is easily removed leaving the nymphs naked. Miss Patch has recorded the life history briefly.

"The eggs are probably deposited upon the alder in the fall, as the newly-hatched Psyllids appear about the time the alder leaves are unfolding in the spring, and settle upon the ventral surface of the leaves. The mature winged forms
are present in great numbers on the ventral side of the leaves, freshly emerged and not yet taken to flight (June 6)." Near Creede, Colorado (elevation 9,000 ft.) the adults appear about the first of June. The Colorado specimens and others from the western area have much shorter antennae than the typical form as noted in the description. Specimens from the San Jacinto Mountains of California have the longest antennae of any of the numerous specimens at hand.

Specimens of Crawford's *P. styliformis* are in the U. S. National Museum.

Type?

**Psylla trimaculata** Crawford


1914 *Psylla trimaculata* Crawford, U. S. N. M. Bull. 35:155.

1917 *Psylla trimaculata* Van Duzee, Cat. Hemip. N. A. 310.


1922 *Psylla trimaculata* Osborn, ibid. 54, 101-104 [life history notes].


Length to tip of folded wings 5 mm.

Color: General color yellow or greenish yellow. A
large median spot on anterior portion of prescutum, a large spot on each side of scutum, red. Antennae dark except three basal segments. Forewings hyaline. Hind wings slightly whitish.

**Structure:** Head small, narrow. Vertex twice as wide as long, deeply excavate between lateral ocelli. Genal processes as long as vertex, scarcely divergent, slender apically, blunt. Antennae pubescent, 3 times as long as width of head. Thorax well arched. Pronotum large, roundly produced cephalad mesally. Hind tibiae with large basal spurs. Forewings large, 1-1/3 to 1-1/2 times as long as body, very broadly rounded; veins biserially set with small setae; membrane with numerous extremely small setae; medial cell unusually large, elongate, petiole of cubitus and media very short, pterostigma very narrow, almost obsolete. Hind wings very long, greatly exceeding abdomen.

**Genitalia:** Male proctiger stout, slightly produced on caudal margin. Forceps short; in lateral view slender, enlarged apically; in caudal view heavy, strongly arched to black spines; in dorsal view spines notched to form two acute black teeth, cephalic tooth larger than caudal, somewhat variable. Female genital segment shorter than rest of abdomen; dorsal valve straight to blunt black apex, apical portion slender; ventral valve upcurved in apical half to meet dorsal, acute; long silky pubescence on both valves.
Described from numerous specimens from New York, New Hampshire, Michigan, Wisconsin, Minnesota, Manitoba, and Florida. This species is apparently numerous wherever its hosts (various species of Prunus, wild cherry) occur.

Numerous specimens collected in Minnesota show gradations from typical trimaculate forms to unmarked individuals. The latter are identical with P. astigmata Crawford which name is retained as a variety however since typical specimens of the two forms are so distinct in appearance. Osborn (1922) noted the same facts and made astigmata a direct synonym of trimaculata. Strickland (Can. Ent. LXXI:215, 1939) has taken both males and females of a darker form, apparently that described as P. cerasi Patch from the female only, and concludes that they are only a color variant of astigmata. It is interesting to note that both Miss Patch's and Strickland's specimens were taken in September and in quite northerly latitudes. It seems probable that a temperature factor is responsible for the greater pigmentation. Miss Patch notes (1923) that her P. cerasi is "pale early in the season but richly colored in fall."

Crawford (1914 l.c.) says of the three forms involved "It is possible that all three will prove to be but variations of one species."

Type, female, Gowanada, New York, Aug. 2 to 9, 1907, Van Duzee, in the Crawford Collection.
Psylla trimaculata var. astigmata Crawford n. comb.

1914 Psylla astigmata Crawford, U. S. N. M. Bull. 35:139,155.
1917 Psylla astigmata Van Duzee, Cat. Hemipt. N. A. 810.
1921 Asphagidella astigmata Baderlein, Zool. Anz. LII:120.
1932 Psylla astigmata Klyver, Pan-Pac. Ent. VII:16.

Identical with the typical form except in color. The three red maculae on the mesothorax lacking. Green to yellow unicolorous. Numerous specimens are at hand from Wisconsin, Michigan, Minnesota, Colorado, Arizona, Idaho, California, Oregon, Washington, British Columbia. Many of the western specimens have genital processes which are proportionately shorter and thicker than in typical. It is also recorded from Nova Scotia and Alberta.

Type, female, Polk County, Wisconsin, July, Baker, in Crawford Collection.

Host: Frunus spp.

Psylla trimaculata var. cerasi Patch n. comb.

1914 Psylla cerasi Crawford, U. S. N. M. Bull. 35:156.
1917 Psylla cerasi Van Duzee, Cat. Hemipt. N. A. 810.
1923 *Psylla cerasi* Patch, Hemip. Conn. 249.

Distinguished from typical *trimaculata* by the color of the females. Patch describes the color as follows: "dorsal head and thorax rosy, dorsal abdomen almost vermillion, a black spot on dorsum of 1st abdominal segment, 5 vivid black transverse bands across the abdominal dorsum, the last coming just cephalad the genital segment. Antennal joints I, II, III rosy, rest black. Eyes bright black and bulging to width of thorax or slightly more. Wings clear and a little brownish. Ventral body pale."

Strickland collected numerous males and females of this form in Alberta. He found the males to be much less highly pigmented than the females, in fact he states that many of the males were indistinguishable from *astigmata*.

Apparently Miss Patch's and Strickland's specimens are the only known collections of this color variety. One tenereal female in the U. S. National Museum Collection bears no locality label.

This is probably Provancher's *Diraphis sanguinea* (as Crawford suggests) but without a study of his types this cannot be determined.
Psylla caudata Crawford

1917 Psylla caudata Van Duzee, Cat. Hemip. N. A. 811.
1932 Psylla caudata Klyver, Pan-Pac. Ent. VIII:17.

Length to tip of folded wings 4.5 to 5 mm.

Color: General color light to dark brown in fully matured specimens. Younger individuals greenish yellow. Antennae dark from third segment.

Structure: Head rather small, strongly deflexed. Vertex strongly impressed discally, 1/2 as long as wide. Genal processes rather short, cone-shaped, blunt, about 2/3 as long as vertex, as long as vertex on median line. Antennae slightly over 2-1/2 times as long as width of head. Thorax somewhat arched. Pronotum large. Hind tibiae with prominent basal spur. Forewings large, often milky, membrane very thickly set with small setae, 2-1/2 times as long as wide; medial cell large, pterostigma prominent. Hind wings very long, equalling genital segment in female.

Genitalia: Male proctiger short, straight. Forceps in lateral view slightly curved cephalad, slender basally, much enlarged apically; spicles black, notched; in caudal view slender, slightly arched. Female genital segment extremely long, upcurved, about 3/4 as long as rest of body (often
appearing even longer due to the partially exerted ovipositor); ventral valve slender, attenuate, acute apically; dorsal valve much longer than ventral, very slender and styliform in apical half, apex scarcely acute; an apparent suture across segment midway.

Described from several hundred specimens from Colorado taken on alder (Alnus sp.). This species is similar to *galeaformis* in many respects but can readily be separated from the latter by the color, which is typically much darker, the smaller genital processes and the genitalia of both sexes. Both the forceps and proctiger of the male are much shorter than they are in *galeaformis* and the forceps are much enlarged apically. The extremely long and upcurved female genital segment is instantly recognizable.

Klyver has recorded it from Vancouver, British Columbia and Idaho. These are the only records of its occurrence outside of Colorado where I have taken it in great numbers in company with *P. floccosa*.

Type, male, Pagosa Springs, Colorado, Baker, in Crawford Collection.

Psylla alni gossypiona Crawford

1914 *Psylla alni americana* Crawford, U. S. N. M. Bull. 35: 139, 156.

1914 *Psylla alni* gossypiona Crawford, Ibid. 157.
Length to tip of folded wings 4.5 to 5 mm.

Color: General color yellowish green. Antennae dark in distal half. Forewings clear, veins often bright green.

Structure: Head broad, strongly deflexed. Eyes unusually large. Vertex 1/2 as long as wide, two discal foveae, clothed with very short, sparse pubescence. Genal processes short, 2/3 as long as vertex, divergent, from blunt to sub-acute. Antennae about 3 times as long as width of head.

Thorax well arched. Pronotum long, half as long as prescutum. Hind tibiae with small basal spur. Forewings with typical venation, 2-2/3 times as long as wide, pterostigma small.

Genitalia: Male proctiger long, straight to near apex then hooked caudal. Forceps in lateral view slender basally, enlarged apically; in caudal view slightly but evenly arched; apex truncate, black-margined, often somewhat excavate thus appearing slightly bidentate. Female genital segment longer than rest of abdomen prominently pubescent, slightly uncurved, broad basally, evenly narrowed to apex; dorsal valve longer than ventral, styliform in apical third, blunt; ventral valve very slender apically.
As Strickland (1939) has noted, Crawford’s varietal or subspecific name of *americanus* was preoccupied by *Psylla americana*. In his monograph however Crawford validated the manuscript name of *Psylla alni gossypina* which therefore is the correct name for the North American subspecies.

As the name indicates the host is *Alnus* (Alder). Strickland records it as occurring on *Betula glandulosa* in Alberta. Numerous specimens are at hand from various localities in California and Oregon, Oak Creek Canyon, Arizona and Asotin, Washington. It has also been recorded from Nevada, British Columbia, Idaho and Alberta.

Type, Mountains near Claremont, California, Baker, is in Crawford’s collection and bears the label, "type *Psylla alni gossypina* Crawford."

The type of *alni americana*, a female from Ormsby County, Nevada is also in the Crawford Collection.

*Psylla galeaformis* Patch


1917 *Psylla galeaformis* Van Duzee, Cat. Hemip. N. A. 812.

1923 *Psylla galeaformis* Patch, Hemip. Conn. 249.

Length to tip of folded wings 4.5 to 5 mm.

Color: General color green to yellow to reddish brown.
Antennae dark distally. Wings hyaline to yellowish.

**Structure:** Head strongly deflexed. Vertex with deep discal impressions, 1/2 as long as wide. Genal processes large, cone-shaped, straight, blunt, as long as vertex.
Antennae slightly less than 3 times as long as width of head.
Thorax well arched. Pronotum large, strongly descending.
Hind tibiae with large basal spur. Forewings typical in size and venation, pterostigma small. Membrane of both fore and hind wings set with minute setae. Hind wings large, exceeding abdomen.

**Genitalia:** Male proctiger long, straight, slender.
Forceps slender; in lateral view slightly curved cephalad, almost parallel-margined to spicis; spicis black, notched; in caudal view narrow, strongly arched. Female genital segment longer than rest of abdomen, slender, with prominent pubescence; ventral valve very slender and attenuate in apical half, acute; dorsal valve longer than ventral, apical third very slender, straight, apex blunt with a rosette of short stiff setae.

Described from a large series of specimens from Dixfield, Maine, August 20, 1934, P. W. Oman. Specimens are also at hand from the following states and provinces: Vermont, Massachusetts, New Hampshire, Nova Scotia, Ontario, Michigan, Wisconsin, Minnesota, Manitoba, Saskatchewan, Colorado, Utah, Nevada, Oregon, Washington and British Columbia. The host is
alder (Alnus), apparently of several species (A. incana and A. tenuifolia). It has also been recorded from New York and Connecticut.

As Crawford indicates this may be identical with Diraphia viridescens (= 4-cornis) Provancher. Without seeing Provancher's specimens this cannot be determined however.

Type?

Psylla maculata Crawford
Figs. 3, 3a.

1914 Psylla maculata Crawford, U. S. N. W. Bull. 35:137, 141.
1917 Psylla maculata Van Duzee, Cat. Hemip. N. A. 806.
[male described].

Length to tip of folded wings 2.50 to 2.75 mm.

Color: General color dark brown. Vertex, posterior half of pronotum, posterior portion of prescutum, longitudinal bands on scutum, scutellum, genal processes, distal portions of legs, margins of abdominal sclerites, lighter brown to yellow. Forewings with brown maculae along cubitus and media, including most of medial cell and extending to Rs at margin.

Structure: Vertex almost twice as wide as long, pubescent on anterior margin, discal foveae very prominent. Genal processes as long as vertex, cone-shaped, separated at
base. Antennae slightly over twice as long as width of head. Thorax typical. Basal spur on hind tibiae small. Forewings somewhat less than 2-1/2 times as long as wide; veins setaceous; pterostigma short and wide, Rs sinuate.

Genitalia: Male proctiger rather short, in lateral view narrow, curved caudad. Forceps bearing a very large acute retrorsce hook on caudal margin reaching almost to base, apices acute, black. Female genital segment shorter than rest of abdomen, both valves acute, dorsal longer than ventral, excavate dorsally.

Described from numerous specimens collected at Mesa Verde, Colorado on Cercocarpus parvifolius. Also at hand are specimens from Durango and Poudre River Canyon, Colorado. The males have very distinctive forceps, the large retrorse hooks on them being quite unlike anything known in the genus. The male from California described by Crawford is apparently a different species as he certainly would not have overlooked such a prominent structure. Mr. E. C. Zimmerman of the Bishop Museum in which the Crawford Collection is housed informs me that he is unable to find any specimens of P. maculata and that the tray bearing this label shows no pin holes. A male of the series at hand (Mesa Verde, Colorado, July 18, 1938, L. D. Tuthill) is therefore designated as the allotype and deposited in the U. S. National Museum.

Type, female, no. 13107 U. S. N. M., Colorado, Baker.
Type examined.

Host, *Cercocarpus parvifolius*.

*Psylla nana* Tuthill

Figs. 4, 5, 89.


Length to tip of folded wings 2 to 2.25 mm.

**Color:** General body color, including legs, dirty white, with orange markings. Vertex white with margins, median line and discal foveae orange; genal processes white; antennal segments dark on apices, last two segments black. Thoracic dorsum with a median orange line, a pair of broader orange stripes on each side of scutum. Forewings more or less fumate in basal half; membrane whitish with somewhat irregular brown maculae as illustrated; veins white.

**Structure:** Head of medium size. Vertex bulging forward between antennae, medial suture and discal impressions prominent. Genal processes small, blunt, somewhat pubescent, slightly over 1/2 as long as vertex. Antennae about twice as long as width of head. Thorax relatively flat. Hind tibiae with large basal spur. Forewings 2-1/3 times as long as wide, broadly rounded; venation typical, medial cell larger than cubital, pterostigma very short.

**Genitalia:** Male genitalia quite large. Proctiger slightly longer than forceps, tapering from rather broad base,
apex bent caudad at right angles. Forceps fairly broad in lateral view, curved cephalad and then caudad near apices, apices black; in caudal view almost straight. Female genital segment shorter than rest of abdomen; dorsal valve straight on dorsal side; ventral valve evenly curved up to apex, slightly exceeded by dorsal valve.

Known from several points in Arizona. (Santa Rita Mountains, Chiricahua Mountains, Patagonia).

Host unknown.

Type, male, Santa Rita Mountains, Arizona, in Snow Collection, University of Kansas.

Psylla albagena (Caldwell)


Caldwell's description of this species is as follows:

"Length to tip of forewing 2.5-3.5 mm.; forewing 2-2.3 mm.

"Color: Genal cones light gray to white; vertex light orange to yellow; pronotum dark gray; prescutum and scutum orange; abdomen green; legs sooty white; forewings appearing white; sometimes whole body covered with a white dust.

"Head over twice as broad as long. Vertex almost 2/3 as long as broad; dorsal margin concave; depressed discally.
Genal cones as long as vertex at median line, divergent; apices not broadly rounded; bases moderately depressed below plane of vertex.

"Thorax strongly arched; pronotum and prescutum strongly descending. Forewing almost two and one-half times as long as broad, hyaline; pterostigmas rather broad and long.

"Genitalia: Male genital plate small. Forceps short, moderately stout. Proctiger one and one-half times longer than forceps. Odeagus swollen and hooked apically.

"Female genital segment shorter than rest of abdomen. Dorsum of dorsal valve sinuate; apical fourth straight, narrow; apex broadly rounded. Ventral valve short, stout."

I have a pair of paratypes of this willow inhabiting species. Some additional data taken from them are: Genal processes very large, blunt. Antennae twice as long as width of head. Thorax scarcely arched. Hind tibiae with small basal tubercle. Male proctiger slightly flexed caudal. Forceps simple, straight, slightly turned cuneolated apically.

Caldwell also describes the various stadii nymphs and gives some biological data.

Host *Salix longifolia*.

Type, male, in Ohio Biological Survey Collection, Ohio State University.
Psylla carpinicola Crawford

1931 Psylla carpinicola Pitch, 4th Rept. N. Y. St. Mus. 64
[non carpini Förster 1843].
1913 Psylla carpini Aulmann, Psy. Cat. 12.
1914 Psylla carpinicola Crawford, U. S. N. M. Bull. 35:151.
1914 Psylla cephalica Crawford, ibid. 133, 151.
1917 Psylla carpinicola Van Duzee, Cat. Hemip. N. A. 309.
1917 Psylla cephalica Van Duzee, ibid. 309.
1918 Psylla cephalica McAtee, ibid. 224.
Pub. 16:54.
34:266.

Length to tip of folded wings 4 mm.

Color: Variable in color from uniform light green to reddish brown. Forewings clear to slightly fumate, veins green.

Structure: Head large, strongly deflexed (typically). Vertex slightly over 1/2 as long as broad, discal impressions slight, genal processes large, blunt, pubescent, variable in angle, in shape, in length, usually about 3/4 as long as
vertex. Antennae twice as long as width of head (Crawford and Caldwell both record the antennae as 2-1/2 times as long as width of head but I have been unable to find any of more than very slightly over twice the head width). Thorax scarcely arched. Hind tibiae with a large spur at base. Forewings somewhat rugose; membrane evenly set with numerous very small setae, 2-1/2 times as long as wide; veins biseriately setate, venation variable in curvature of \(R_3\) and amount of arcing in \(Cu_1\), pterostigma small, also somewhat variable.

**Genitalia:** Male proctiger slender, narrowed and bent caudad in apical third. Forceps shorter than proctiger; in lateral view stout, straight, slightly enlarged apically; in caudal view very slender, gently arched to apices, terminating in a small black tooth. Female genital segment large, longer than rest of abdomen; dorsal valve much longer than ventral, dorsal margin sinuate, apical third attenuate, apex upcurved, acute; ventral valve acute, upcurved.

At hand are specimens from New York, Connecticut, New Hampshire, Nova Scotia, Pennsylvania, New Jersey, Maryland, District of Columbia, Virginia, North Carolina, Alabama, Florida, Mississippi, Louisiana, Missouri, Illinois, Ohio, Michigan, Wisconsin, Iowa, and Kansas. Crawford (1914) records specimens from Nevada; these however are *dilonica* which he had not separated from *carpinicola*. His confusion of these two forms accounts for some of the indefiniteness of
his description.

_P. cephalea_ was established on the greater arch in vein Cu1 and several other minor variations from the type which are apparently of no specific significance. Typical examples of _cephalea_ are abundant from Mississippi, Alabama, and Florida. Specimens from more northern localities show a gradual decrease in the amount of variation from the type which is a specimen from New York.

The host of this very abundant species is _Carpinus caroliniana_.

Pitch's type series is in the U. S. National Museum.

Type, no. 1343 U. S. N. M. (Pitch's no. 9680).

Type examined.

_Psylla diloncha_ (Caldwell)

1914 _Psylla coryli_ Crawford, U. S. N. M. Bull. 35:150.  
[non _Psylla coryli_ Patch].


Length to tip of folded wings 3.5 to 4 mm.

Color: Pale green to yellow. Apical half of antennae with segments annulated, tip black. Forewings slightly yellowish.

Structure: Head only slightly deflexed. Vertex 1/2 as long as wide, discal impressions slight, scarcely
emarginate anteriorly. Genal processes large, cone-shaped, acute, extending forward and almost on same plane as vertex, with long silky pubescence, fully as long as vertex. Antennae about 2-1/4 times as long as width of head. Thorax scarcely arched. Hind tibiae with small basal spur. Forewings large, membrane set with numerous very small setae, veins bearing small setae, 2-1/3 times as long as wide; venation typical, Rs curved, pterostigma almost obsolete.

Genitalia: Male proctiger long, slightly narrowed and bent caudal in apical third. Forceps shorter than proctiger; in lateral view slender, straight, in caudal view slender, slightly arched, apices black, acute, many long silky setae on caudal and medial margins. Female genital segment longer than rest of abdomen (much longer in dry specimens); ventral valve elongate, acute, upcurved; dorsal valve attenuate, longer than ventral, dorsal margin sinuate, apex blunt, slightly upcurved.

This species was described from one pair from Ohio. I have taken it in great numbers in Minnesota on hazel brush (Corylus sp.) during August. Specimens are also before me from Wisconsin; Onaga, Kansas; Ormsby County, Nevada; Humboldt and Marin County, California, (Koebele, on Corylus rostrata). The latter specimens are those mentioned by Crawford as a varietal form of striata and inadvertently named Psylla coryli by him. This name was preoccupied by P. coryli Patch,
thus Caldwell's name stands for the species.

Type, male, Fulton Co., Ohio, H. Osborn, in Ohio Biological Survey Collection, Ohio State University, Columbus, Ohio.

Host Corylus sp.

**Psylla striata** Patch

1914 *Psylla striata* Crawford, U. S. N. M. Bull. 85:139, 150.
1917 *Psylla striata* Van Duzee, Cat. Hemip. N. A. 309.
1923 *Psylla striata* Patch, Hemip. Conn. 249.
1938 *Psylla striata* Brimley, Ins. M. C. 104.
1939 *Psylla striata* Strickland, Can. Ent. LXX:205.

Length to tip of folded wings 3 to 3.5 mm.

Color: Yellow, including wings, sometimes greenish.

Apical third of antennae dark.

Structure: Head small, strongly deflexed. Vertex over 1/2 as long as wide, discal depressions slight. Genal processes small, blunt, scarcely divergent, 1/2 as long as vertex. Antennae twice as long as width of head. Thorax well arched. Hind tibiae with basal spur. Forewings with
typical venation, about 2-1/2 times as long as wide; R₃ weakly
sinuate, pterostigma prominent.

**Genitalia:** Male protiger slender, almost straight,
very slightly curved caudal. Forceps in lateral view very
narrow, straight; in caudal view slender, arched to acute
black spines, medial margins with many long setae. Female
genital segment twice as long as rest of abdomen; dorsal
valve much longer than ventral, apical half attenuate with
dorsal margin straight, apex blunt; ventral valve acute.

Numerous specimens are at hand from Massachusetts, New
Hampshire, Nova Scotia, New York, Michigan, Wisconsin, South
Dakota, Colorado, Utah, Washington and British Columbia. It
is also recorded from Connecticut, California, and Alberta.

Miss Patch described this species from *Betula* sp. (birch)
and gives a few life history notes, the nymphs occurring on
the leaves and terminal shoots of birch, covering themselves
with inconspicuous woolly masses. The adults emerge late in
June in Maine. Klyver records it as occurring in California
on *Betula fontanalis*.

There is in the University of Kansas Collection one
female bearing a paratype label and the data: Basswood,
Ottawa Ont. 1-VII-1904, W. Metcalfe. This is obviously
incorrectly labeled as the original description lists only
specimens from Orono, Maine. This specimen is actually
*P. diloncha* Caldwell.
Psylla brevistigmata Patch


1914 *Psylla brevistigmata* Crawford, U. S. N. M. Bull. 35:153.

1914 *Psylla albirufa* Crawford, ibid. 153.

1917 *Psylla brevistigmata* Van Duzee, Cat. Hemip. N. A. 209.


Length to tip of folded wings 2.5 to 3.25 mm.

**Color:** General color red with white markings as follows:

- Posterior and anterior margins of vertex, basal 2/3 of genal processes, posterior margin of pronotum and mesocutum, six longitudinal stripes on scutum, margins of scutellum, margins of abdominal sclerites. Antennae dark distally. Wings somewhat fumate, pterostigma yellow. Variable from typical coloration to dark forms with genal processes, anterior portion of pronotum, venter of thorax, abdomen, and veins of forewings dark brown. Forewings variable from almost hyaline through whitish to heavily infuscated.

**Structure:** Head broad, deflexed. Vertex pubescent on anterior margin, less than 1/2 as long as broad, very deeply impressed discally, anterior margin abrupt. Genal processes strongly divergent, subacute, nearly parallel to plane of
Vertex, 2/3 as long as vertex, prominently pubescent.
Antennae twice as long as width of head. Thorax weakly arched. Hind tibiae with prominent basal spur. Forewings long, over 2-1/2 times as long as wide, often somewhat rufose; small radular areas on apical margin; venation typical, veins biseriately setate, pterostigma broad but typically very short, somewhat variable.

Genitalia: Male genitalia small. Proctiger in lateral view slender, curved caudad apically. Forceps shorter than proctiger; in lateral view slender, straight to acute black spicula; in caudal view simple, slender, evenly arched to acute black spicula, a fringe of stout setae on medial margina. Female genital segment subject to considerable variation in length, typically much shorter than rest of abdomen even in dried specimens, in some equalling rest of abdomen; dorsal valve longer than ventral, somewhat upturned, subacute; ventral valve evenly curved dorsad, apex acute.

The above description is written from California specimens but many specimens are at hand from various western states. As may be expected in such an abundant species considerable variation occurs in characters. In addition to color variations the pterostigma is quite variable in length as is the female genital segment. It occurs in large numbers on its host plant, mountain mahogany (Cercocarpus parvifolius).
Specimens are at hand from numerous localities in California, Arizona, Utah, Colorado, and New Mexico. The type specimens (2 females) were from Sequoia National Park, California.

Crawford gives the length of the antennae as 2-3/4 times the width of the head. I believe this to be a mistake as although I have measured numerous individuals I have been unable to find any in which the antennae are more than slightly over twice as long as the width of the head.

Psylla brevistigmata acute Crawford

1914 Psylla brevistigmata acute Crawford, U. S. N. M. Bull. 35:139, 154.

1917 Psylla brevistigmata acute Van Duzee, Cat. Hemip. N. A. 810.

Twelve specimens of this subspecies are at hand, all from Utah. They are uniformly much lighter in color than the typical subspecies, the genal processes are shorter (barely 1/2 as long as vertex) more blunt and more divergent. the male forceps in lateral view tapered from midpoint, strongly bent mesad and cephalad as long slender black apices.

Specimens at hand are from Cedar City, Pintura, Weber Canyon, Providence Canyon, Logan Canyon and Wasatch Mountains, Utah. One of the Wasatch Mountains specimens (Koebele) bears
a label *Cerocarpus ledifolius*.
Type, male, no. 13112 U. S. N. M.
Type examined.

**Psylla arita** n. sp.
Figs. 6, 7, 90.

Length to tip of folded wings 3.25 to 3.50 mm.

**Color:** General color red. More or less distinct white markings as in *brevistigmata*.

**Structure:** Similar to *brevistigmata* except genal processes much larger, almost as long as vertex.

**Genitalia:** Male proctiger long, stout, parallel-sided. Forceps in lateral view long, slightly swollen apically; in caudal view nearly straight to near apex, turned sharply mesad as black, heavy, sharp spines; in dorsal view spines rounded, bearing a large somewhat Y-shaped black tooth, extending mesad. Female genital segment very large, as long as rest of abdomen or longer; dorsal valve slightly longer than ventral, blunt.

The exact relationship of this form to *brevistigmata* is uncertain but as it is distinct and readily recognizable it is described as a species of the somewhat confusing *brevistigmata* complex.

Described from numerous males and females bearing data as follows: Salt Lake City, Utah, July 3, 1931; Weber Canyon, Utah, July 4, 1931; Fish Lake, Utah, Aug. 16, 1929; Bray,
California, June 30, 1935; all specimens collected by R. H. Beamer; two females from Bray, California, June 30, 1935, P. W. Oman.

Holotype, male, allotype, female, Salt Lake City, Utah, in Snow Collection, University of Kansas. Paratypes in Snow Collection, U. S. National Museum and author's collection.

The females from Bray, California have an extremely large genital segment the valves of which are somewhat different in shape from the Utah specimens but the males appear to be identical.

Psylla magna Crawford
Figs. 8, 9, 90.

1914 Psylla brevistigmata magna Crawford, U. S. N. M. Bull.
35:139, 154.

1917 Psylla brevistigmata magna Van Duzee, Cat. Hemip.
N. A. 809.

Similar to brevistigmata except in genitalia and size.

Length to tip of folded wings 3.5 mm.

Genitalia: Male proctiger short; in lateral view straight, broad, excave on caudal margin apically. Forceps in lateral view nearly straight, enlarged apically, a deep, rounded cleft in apices, anterior lobe short, rounded, posterior lobe ending in a large, black, acute tooth extending antero-mesally;
in caudal view weakly arched to black spines. Female genital segment very short and turned ventrad; dorsal valve slightly longer than ventral, apex blunt.

Crawford described this form as a variety but due to the very distinct and constant genital characters I am raising it to specific rank.

Numerous specimens are at hand from Bray, California; Carson City, Nevada; Fish Lake, Weber Canyon, Zion National Park and Pintura, Utah.

Host unknown, probably Cerococcus.

Type, male, no. 19111 U. S. N. M.

Type examined.

Psylle omani n. sp.

Figs. 10, 11, 91.

Length to tip of folded wings 3 mm.

Color: General color light green to white. Flavous to orange markings on thorax. Wings whitish.

Structure: Head deflexed. Vertex broadly impressed discally, over 1/2 as long as wide. Lateral ocelli on raised areas. Genal processes slender, parallel to plane of vertex, scarcely divergent, blunt, 2/3 as long as vertex. Antennae twice as long as width of head. Thorax weakly arched. Pronotum strongly descending, long. Hind tibiae with prominent basal spur. Forewings somewhat thickened,
2-1/2 times as long as wide; venation typical, pterostigma short; radular areas at margin of marginal cells and between M3 and Cu1. Membrane of hind wings set with minute setae.

Genitalia: Male proctiger short, straight. Forceps with long heavy pubescence; in lateral view narrow basally then much enlarged on caudal margin, spicis bearing a large black somewhat T-shaped tooth near cephalic margin; in caudal view bowed outward basally, deeply cleft, outer lobes slender, erect, acute, inner lobes, stout, bent mesad, then dorsad to black spicis, a small hooked tooth apically. Female genital segment shorter than rest of abdomen, bent ventrad; dorsal valve curved, apex blunt; ventral valve equalling dorsal, spoon-shaped apically.


Holotype, male, no. 55169 U. S. N. M. It is with great pleasure that I dedicate this species to a friend and colleague, P. W. Oman of the National Museum.

Psylle hirsuta (Tuthill)
Figs. 12, 13, 92.


Length to tip of folded wings 2 to 2.25 mm.

Color: General body color, including legs, red. Head
and thoracic dorsum with prominent white pubescence. Disc of vertex white, except medial line and two foveae black; antennae black at tip. Thoracic dorsum white, heavily marked with black and red; scutum definitely striped. Forewings reddish fumose, darker toward apex; veins red.

**Structure:** Head deflexed, slightly broader than thorax.

Discal foveae and medial suture of vertex very prominent, postero-lateral portions of vertex, which bear ocelli, prominently raised. Genal processes blunt, pubescent, strongly divergent from base, scarcely touching basally, 1/3 as long as vertex. Antennae about 1-1/2 times as long as width of head. Thorax heavily pubescent, granular. Posterior tibiae with very small basal spur. Forewings twice as long as broad, coriaceous; venation typical, nterostigmata short and broad.

**Genitalia:** Male proctiger longer than forceps, narrow in lateral view. Forceps in lateral view straight, parallel-margined; in caudal view strongly arched, apices notched, medial tooth thus formed, black, enlarged, extending antero- mesally. Female genital segment short, constricted midway and very narrow to apex; dorsal valve slightly longer than ventral.

This species is close to *Psylla corylli* but can readily be distinguished by the very heavy pubescence. The forewings are much more coriaceous and darker, the head is larger.
and the female genital segment is different. Specimens are at hand from Oregon, Washington, California, Nevada and Montana. Some of the California specimens bear labels identical with a series of Coryl. A series from Satus Creek, Washington, April 23, 1933, K. Gray bears the label "on Purshia tridentata."

Holotype, male, no. 55170 U. S. N. M.

Psylla minuta Crawford

1914 Psylla minuta Crawford, U. S. N. M. Bull. 35:137, 142.
1914 Psylla purshiae Crawford, ibid. 142.
1914 Brachypsylla purshiae Crawford, ibid. 142.
1917 Psylla minuta Van Duzee, Cat. Hemip. N. A. 906.
1931 Psylla minuta Klyver, Pan-Pac. Ent. VII:158.

Length to tip of folded wings 2.5 mm.

Color: General body color light to dark brown or red. Vertex, stripes on scutum, parts of remainder of thoracic dorsum, lighter. Wings more or less fumate, more heavily in apical half.

Structure: Vertex slightly more than 1/2 as long as wide, strongly bulging anteriorly, shallowly depressed discally. Genal processes cone-shaped, slender, acute, separated at base, divergent, 2/3 as long as vertex (typically).
Antennae 1-2/3 times as long as width of head. Vertex and
dorsum of thorax slightly pubescent. Basal spur on hind
tibiae very small, blunt. Forewings somewhat rugose, 2-1/4
times as long as wide; venation typical, pterostigma long,
large.

Genitalia: Male proctiger in lateral view narrow,
longer than forceps. Forceps straight in lateral view; in
caudal view arched to rather blunt, black spicula; heavy
pubescence, especially on mesal margins. Female genital
segment as long as rest of abdomen; dorsal valve longer than
ventral, both acute at apex.

This common species is represented in the material at
hand by specimens from various localities in California,
Arizona, Utah, Colorado, and Idaho. Klyver records it from
Nevada also. As is to be expected in such an abundant
species the specimens show considerable variation, especially
in color. The host plant is Puschia tridentata.

Type, female, no. 13103 U. S. N. M., American Fork
Canyon, Utah, Hubbard and Schwarz.

Type examined.

Psylla media n. sp.

Figs. 14, 15, 93.

Length to tip of folded wings 2.5 mm.

Color: Head and pronotum white with orange markings.
Remainder of thorax mostly orange with markings lighter to white. Abdomen dark brown, sclerites white-marginated. Forewings somewhat fumate, most heavily along veins M and Cu, whitish spots on margin in medial cell, between M₄ and Cu₄ and in cubital cell. Hind wings white.

**Structure:** Head small. Vertex 3/5 as long as wide, discal impressions broad and deep, deeply emarginate anteriorly. Genal processes cone-shaped, strongly divergent, blunt, 1/3 as long as vertex, nearly parallel to plane of vertex.

Antennae 1-1/2 times as long as width of head. Thorax well arched. Pronotum long. Mesopleurites very strongly developed. Forewings long; venation typical, pterostigma very small. Basal spur on hind tibia extremely small.

**Genitalia:** Male genitalia large. Proctiger short, stout, evenly narrowed to blunt apex. Forceps in lateral view broad, deeply cleft apically; caudal portion extending antero-mesally as a large, heavily sclerotized, obliquely truncate tooth, cephalic lobe rounded; in caudal view stout to cleft apexes, well arched. Female genital segment 1/2 as long as rest of abdomen; dorsal valve sinuate on dorsal margin, apex slightly upturned, acute; ventral valve shorter than dorsal, acute.

Described from three females and one male from Trout Creek, Utah, May 8, 1934, T. O. Thatcher. Taken on "Carcocerbus sedifolius".

Holotype, female, no. 55171 U. S. N. M.
Psylla coryli Patch

1917 *Psylla coryli* Van Duzee, Cat. Hemip. N. A. 306.

Length to tip of folded wings 2 to 2.25 mm.

**Color:** General color light brown to yellowish, thoracic dorsum dark brown except for light stripes. Posterior portion of vertex sometimes dark. Forewings yellowish fumate, more heavily so apically.

**Structure:** Vertex narrow, strongly depressed discally, 2/3 as long as wide, strongly overhanging anteriorly. Genal processes large, slightly over 1/2 as long as vertex, acute, divergent, almost parallel to plane of vertex. Antennae 1-1/2 times as long as width of head. Thorax very strongly arched. Only a very slight protuberance on base of hind tibiae. Forewings of typical shape and venation, a little more than twice as long as wide, pterostigma broad, of moderate length.

**Genitalia:** Male prostiger long, straight. Forceps small, straight and parallel-sided in lateral view; in caudal view arched, each with a large black inner apical tooth, heavy setae on basal half of inner margins. Female genital segment as long as rest of abdomen; valves somewhat attenuate, dorsal longer than ventral, latter black-margined
apically, somewhat flattened.

This species was described by Patch from one (?) male specimen from Colorado. Specimens are at hand from Colorado, Arizona, Nevada, California, Idaho, Oregon, Washington, and British Columbia.

Although Miss Patch's specimen is unavailable her photograph of the male forceps plus Crawford's description make the identification of this species fairly certain.

Type, male, whereabouts unknown.

No indication of a host plant is given on any of the specimens.

**Psylla hartigii** Flor

1861 **Psylla Hartigii** Flor, Rhynch. Liv. II:450, 469.


1874 **Psylla sylvicola** Lethierry, Cat. Hémid. Dept. Nord. 90 [fide Van Duzee].

1876 **Psylla sylvicola** Scott, Trans. Ent. Soc. London 1876:539.

1896 **Psylla Hartigii** Edwards, Hemip.-Homop. Fr. Is. 244, pl. XXVIII, fig. 4.


1912 **Psylla Hartigii** Oshanin, Kat. palæa. Hemip. 127.
1913 Psyllla hirtigi Aulmann, Psy. Cat. 16.
1914 Psyllla hirtigi Aulmann, Psy. Bull. 35:146.

Length to tip of folded wings 3 to 3.5 mm.

Color: General color yellow to orange, darkest on dorsum. Antennae black apically. Forewings yellowish fumate.

Structure: Head small, not as strongly deflexed as in striata. Vertex slightly over 1/2 as long as wide, with very slight discal impressions. Genal processes acute, apices incurved, almost 2/3 as long as vertex. Antennae 1-2/3 times as long as width of head (sometimes longer—Crawford).

Thorax moderately arched. Hind tibiae without basal spurs.
Forewings of average size, slightly less than 2-1/2 times as long as wide; venation typical, Rs straight, pterostigma very large.

Genitalia: Male proctiger straight, narrow. Forceps in lateral view broad basally, quickly narrowed and very slender to apices; in caudal view slender, arched to apparently acute black apices; apices slightly bifid in caudal view.

Female genital segment longer than rest of abdomen, slender, valves attenuate, ventral valve acute, straight, dorsal slightly longer than ventral, apical third very slender, downcurved.
Described from specimens from Lead, South Dakota, and Douglas Lake, Michigan. Originally described in Europe where it occurs on Betula alba, this apparently holletic species was first recorded from North America by Miss Patch (Maine) on Betula populifolia. Additional records are New York, Nova Scotia and Alberta. No host records are available on the specimens at hand, but the Lead, South Dakota, series was apparently taken with P. strissa. Other than North America its known distribution is northern and central Europe.

Flor in describing this psyllid used the spelling hartigi. According to the international rules of nomenclature when modern patronymics are originally published as ending in $ii$ such names retain their original form even though they have been incorrectly formed (Op. 3).

**Psylla stricklandi** (Caldwell)

1939 *Psyllia stricklandi* Caldwell, Can. Ent. LXXI:212.

Length to tip of folded wings 4 to 4.5 mm.

**Color:** General color green to yellow, fully mature specimens with brown markings on thorax, males darker. Antennae dark apically. Forewings slightly yellowish.

**Structure:** Head small. Vertex 1/2 as long as wide, posterior margin almost straight, discal impressions slight.
Genal processes slender, blunt, divergent, as long as vertex at middle, vertical. Antennae slightly under twice as long as width of head. Thorax slightly arched. Posterior tibiae with small basal spur. Forewings large, broad, barely over twice as long as wide, costal margin strongly arched; venation typical, pterostigma small.

Genitalia: Male proctiger long, slender, bent caudad apically. Forceps as long as proctiger; nearly straight in lateral view to near apex, then narrowed (mostly on caudal margins) to blunt black spines; in caudal view slender, well arched, very long slender setae medially. Female genital segment longer than rest of abdomen; dorsal valve much longer than ventral, attenuate in apical half to slender, acute, slightly upturned apex, dorsal margin almost straight, styliform portion very densely radulate; ventral valve in lateral view acute, radulate apically.

Described from a pair of paratypes from Columbia Ice Field, Alberta, (6,700 ft.) July 22, on Shepherdia canadensis and numerous adults and nymphs from Creede, Colorado, taken at about 10,000 to 11,000 feet; also in July on Shepherdia canadensis in 1939, 1939 and 1940. In general the Colorado specimens are lighter in color than the paratypes.

Type, female, in Canadian National Collection, Ottawa, Ontario.
Psylla tuthilli (Caldwell)

1939 *Psyllis virida* Caldwell, Can. Ent. LXXI:212.
1939 *Psyllis virida* Strickland, Ibid. 215.

"Length to tip of forewing 3 to 3.5 mm.; forewing 2.7 to 3.3 mm.

"Color: Appearing yellow-green throughout; antennae black at joints and distally; forewings yellowish; genital segment brownish.

"Genal cones longer, more divergent, and more slender than in *stricklandi*. Forewings with Cu₁ rather arched, similar to *cepinicola* Crawford.

"Genitalia: Female segment longer than rest of abdomen. Dorsal valve styliform for caudal third, this portion minutely roughened; caudal half of styliform portion abruptly turned up; apex blunt. Ventral valve almost as long as dorsal; very strongly hooked dorsad in lateral aspect. Lateral plates no longer than ventral valve.

"Forceps of male attenuate in apical third in caudal aspect, in lateral aspect appearing very slender and gradually narrowed to apex." Caldwell.

This species was described from a single female and several males. I have examined one male paratype and find
it to be very similar to *P. magnicauda*. The genital processes are more slender than on the latter species, the antennae slightly shorter proportionately, slight differences are apparent in the venation, etc., but nothing of any marked distinction. Caldwell writes that the female was quite distinct however and was therefore made the type, that the dorsal and ventral valves of the female genital segment are much more upturned than they are in *magnicauda*, that the valves are nearly the same length, and that the lateral plates do not exceed the ventral valve as they do in *magnicauda*.

Host *Shepherdia argentea*, "Bullberry" (Strickland).

Type, female, August 7, 1939, Medicine Hat, Alberta, in Canadian National Collection, Ottawa, Ontario.

**Psylla magnicauda** Crawford

1914 *Psylla magnicauda* Crawford, U. S. N. M. Bull. 95:133, 149.

1914 *Psylla americana abdominalis* Crawford, ibid. 150.

1917 *Psylla magnicauda* Van Duzee, Cat. Hemip. N. A. 909.


Length to tip of folded wings 3.5 to 4.25 mm.

**Color:** Uniformly light green or slightly yellowish,
occasionally faint, longitudinal stripes on scutum. Head often whitish. Forewings clear or slightly yellow.

**Structure:** Head strongly depressed, vertex almost perpendicular. Vertex 1/2 as long as wide, rounded down anteriorly, discal impressions prominent. Genal processes large, slender, cone-shaped, about as long as vertex. Antennae almost twice as long as width of head. Thorax well arched. Hind tibiae with small basal spur. Forewings broad, less than 2-1/2 times as long as wide; marginal cells large, Rs sinuate, pterostigma small.

**Genitalia:** Male proctiger slender, apical fourth bent caudad. Forceps large, almost as long as proctiger; in lateral view parallel-margined; in caudal view slender, arched to black, blunt apices. Female genital segment large and very thick dorso-ventrally, as long as rest of abdomen or longer; dorsal margin of dorsal valve sinuate, apex slender, elongate, radulate, apex upturned; ventral valve much shorter than dorsal, acute, slightly upcurved; lateral plates longer than ventral valve.

Numerous specimens are at hand from Colorado, Wyoming, Montana, North Dakota, Minnesota, British Columbia, Saskatchewan, Manitoba. It is also recorded from California and Alberta. Strickland gives the host of this abundant and wide-spread species as **Eleagnus commutata** (*Eleagnus argentea*) wolf willow. In Colorado I have taken it on **Shepherdia argentea**.
Type, female, Sheridan, Wyoming, Metz is in the Crawford Collection and also bears the type label of *Psylla americana abdominalis*.

*Psylla alaskensis* Ashmead

Figs. 16, 17, 94.

1904 *Psylla alaskensis* Ashmead, Harriman Alaska Exped. VIII: 137.

1913 *Psylla alaskensis* Aulmann, Psy. Cat. 8.

1914 *Psylla alaskensis* Crawford, U. S. N. M. Bull. 35:133, 149.

1917 *Psyllia alaskensis* Van Duzee, Cat. Hemip. N. A. 809.


Length to tip of folded wings 2.75 to 3 mm.

Color: General color orange to reddish brown, faint longitudinal stripes on scutum. Forewings with veins dark, prominent, membrane more or less fumate, more heavily anically, sometimes with a white bloom.

Structure: Vertex 2/3 as long as wide, with two discal foveae, strongly bulging anteriorly. Genal processes cone-shaped, blunt, about 3/4 as long as vertex. Antennae short, pubescent, about 1-1/3 times as long as width of head. Thorax quite flat for this genus. Hind tibiae with a slight tubercle at base. Forewings long and slender, over 2-1/2 times as long.
as wide, tapering apically to narrowly rounded spicis; Rs reaching almost to apex, cells elongate, narrow, cubital larger than medial, pterostigma very long, narrow.

Genitalia: Male subgenital plate large, globose. Proctiger broad, short; in lateral view broad and straight. Forceps in caudal view stout, moderately arched to acute, black spicis; in lateral view broad basally, cephalic margin excavate about midway to apex, then strongly narrowed to black apex, apically produced anteriorly as a rather sharp tooth, caudal margin straight to near apex then extending caudad. Female genital segment as long as or longer than rest of abdomen, both valves broad, somewhat shovel-like, dorsal valve straight, much longer than ventral, latter stout, black-tipped.

Described from numerous specimens from Alaska, Colorado, and one specimen bearing the label Ks. 2139, C. F. Baker. Ashmead's description of the color seems to have been based on rather teneral specimens. His illustration of the male genitalis is of very little value as the tips of the forceps are not shown.

The type is apparently lost or destroyed. There remain in the U. S. National Museum but two specimens of the original series, one male from Fox Point and one female from Seldovia, Alaska. The male is here designated as neotype.

In Colorado this species has been taken on Salix sp. at altitudes of about 11,000 feet.
A paratype of Caldwell's *Arytaina fuscata* in the collection of the University of Minnesota has been examined and it is undoubtedly conspecific with the Alaskan specimens at hand. This adds Manitoba to the known range of the species.

Type, male, no. 6274 U. S. N. M., Fox Point, Alaska.

**Type examined.**

*Psylla buxi* (Linnaeus)


1880 *Psylla buxi* Riley, 5th Rept. U. S. Ent. Comm. 672

[rept. of discovery in N. Y., 1881].


1912 *Psylla buxi* Oshanin, Kat. paläs. Hemip. 127.

1913 *Psylla buxi* Aulmann, Psy. Cat. II.


1917 *Psylla buxi* Van Duzee, Cat. Hemip. N. A. 311.

1926 Aspharidella buxi Enderlein, Ent. Mitt. XV:393.
1927 Psylla buxi Perris, Gen. Ent. LVIII:19 [desc. and figs. nymph].

Length to tip of folded wings 3.5 to 4 mm.

Color: General color light green, more or less brown on dorsum and pleurites of thorax, pro- and mesothoracic femora partly embrowned. Forewings slightly yellowish. Hind wings white.

Structure: Head large, deflexed about 45°. Vertex 3/5 as long as wide, with very prominent discal foveae, a sharp sulcus extending from each medio-anteriorly to near anterior margin. Genal processes very large, robust, blunt, 1/2 as long as vertex. Antennae 1-1/2 times as long as width of head. Thorax well arched. Posterior tibias with large basal spur and small tubercle. Forewings large, much longer than body, somewhat over 1-1/2 times as long as wide; membrane thickly set with minute setae; marginal cells large, Rs long, curved, pterostigma almost entirely lacking.

Genitalia: Male proctiger longer than forcipps, almost straight. Forceps in lateral view broad, straight, slightly enlarged toward apices; in caudal view stout, slightly arched, apices flattened, incurved, terminating in a large, curved, black tooth. Female genital segment twice as long as rest of
abdomen, dorsal valve much longer than ventral, downcurved, apex acute, upturned; ventral valve acute, upturned.

Described from a series of specimens from New York on Bux. Additional specimens are at hand from Portland, Oregon. It is also recorded from New Jersey, Ohio, Connecticut and California. Outside of North America its known distribution embraces Great Britain and almost all of continental Europe.

The male specimens at hand are all somewhat teneral, hence the description of the male genitalia may be erroneous in some details.

Enderlein (1921) designated P. buxi as type of a new genus, Asphacidella, based on the lack of the pterostigma in the forewing and venational characteristics of the hind wings, characters which I do not believe to be of generic significance.

This species causes considerable injury to its host, ornamental box (Buxus sempervirens).

Psylla bulbosa n. sp.

Figs. 19, 19, 95.

Length to tip of folded wings 2.75 to 3 mm.

Structure: Head strongly deflexed. Vertex almost plane, slightly over 1/2 as long as wide. Genal processes large, swollen, rounded, contiguous most of length, 3/4 as long as vertex, scarcely depressed below plane of vertex, nearly parallel. Antennae 1-1/3 times as long as width of head.

Thorax broad, well arched. Hind tibiae with prominent spur at base. Forewings broad, but slightly over twice as long as wide; venation typical, pterostigma very broad, of moderate length. Membrane of both fore and hind wings thickly set with minute setae, forming indefinite radular areas on margin of forewing.

Genitalia: Male genitalia large. Subgenital plate unusually large. Proctiger straight, narrow. Forceps nearly reaching tip of proctiger, with long heavy pubescence; in lateral view narrow, slightly sinuate on caudal margin; in caudal view arched to blunt, black apices, somewhat flattened on caudal side near apex; in dorsal view apices truncate, produced cephalad as small blunt tooth. Female genital segment heavy, longer than rest of abdomen, with long sparse pubescence; dorsal valve longer than ventral, nearly straight, apex subsacute, upturned, apical portion radulate; ventral valve nearly straight, acute.

Described from 22 specimens from Ruby, Arizona, July 22, 1933, R. H. Beamer, collected on Selix taxifolia H. E. K., in the Snow Collection, University of Kansas, and 26 specimens
in the U. S. National Museum, 21 of which bear a label,
Turkey Creek, Arizona, June 10, 1933, P. W. Oman; the remain-
ing 5 are from Nogales, Arizona, June 25, 1933, P. W. Oman.

Holotype, male, allotype, female, and paratypes in Snow
Collection; paratypes in U. S. National Museum and author's
collection.

*Psylla manisi* n. sp.
Figs. 20, 21, 96.

Length to tip of folded wings 3.5 mm.

**Color:** General color reddish, genal processes and legs
lighter. Antennae black apically. Forewings fumate, most
heavily along veins and apically; pterostigma yellowish
opaque.

**Structure:** Head strongly deflexed. Head and thorax
punctate. Vertex long, over 1/2 as long as wide, slight
discal impressions. Genal processes stout, continuous almost
to tips, 1/2 as long as vertex. Antennae slightly longer than
width of head. Thorax well arched. Pronotum almost vertical.
Hind tibiae with small basal tubercle. Forewings slightly
over 2-1/2 times as long as wide; membrane very thickly set
with minute setae; cubital cell larger than medial, ptero-
stigma very large.

**Genitalia:** Male proctiger much longer than forceps,
near apex narrowed and flexed caudal. Forceps in lateral
view broad basally, much enlarged then converging (more abruptly on caudal margin) to narrow, cephalically turned, sharp, black spines; in caudal view very broad basally, mesal margins sinuate, lateral margins nearly straight 2/3 of length then sharply excavate, slender brown apical portion slightly incurved, sharp lateral margins near base produced caudad as a small flat lobe. Female genital segment shorter than rest of abdomen (much shorter in fresh or alcoholic specimens); dorsal valve slightly upcurved, blunt; ventral valve shorter than dorsal, deep, ventral margin straight to midpoint then angularly bent dorsad to acute apex.

Described from a series of thirty-seven males and females sent to me by H. C. Manis of the University of Idaho, to whom the species is dedicated. They were collected on mountain ash on Moscow Mountain near Moscow, Idaho, September 5, 1940. Three additional females from the same locality collected in July and August, 1933, by H. M. Harris.

Holotype, male, allotype, female, and paratypes in author's collection; paratypes in U. S. National Museum and University of Kansas.

Psylla breviate Patch


1914 Psylla breviate Crawford, U. S. M. M. Bull. 35:137, 141.
1917 *Psyllia brevista* Van Duzee, Cat. Hemip. N. A. 906.

Length to tip of folded wings 3 mm.

**Color:** Greenish yellow throughout except tip of antennae dark. Wings slightly whitish.

**Structure:** Head strongly deflexed. Vertex with prominent discal impressions, 2/3 as long as wide. Genal processes slender, straight, blunt, 3/4 as long as vertex. Antennae but very slightly longer than width of head. Thorax well arched. Pronotum nearly vertical. Hind tibiae with small, blunt basal spur. Forewings broad, but slightly over twice as long as wide; venation typical, pterostigma large. Membrane of both fore and hind wings very thickly set with minute setae.

**Genitalia:** Male prostiger long, straight. Forceps in lateral view long, straight to near apex then excavate on cephalic margin; in caudal view bowed basally, nearly straight to near apex then sharply bent mesad; spines slender, acute, curving cephalad. Female genital segment about as long as rest of abdomen, stout; dorsal valve longer than ventral, attenuate, slightly upcurved and knob-like apically; ventral valve acute.

One female is at hand from Marquette, Michigan and a large series of males and females from California (Placer and Nevada Counties and Argus Mountains). The description of the
male genitalia is from the latter group. That the California specimens are Miss Patch's species I believe is quite doubtful but until some males are available from the type locality they are placed here. The original description was based on three females from Dows Swamp, Ottawa, Ontario, June 14, 1903. Host unknown.

From the figure of the male genitalia accompanying Klyver's records of breviata from Utah and Nevada his specimens apparently are not the same species. I believe them to be a heretofore undescribed species *Psylla manisi*.

**Psylla quadrilineata** Pritch

Figs. 22, 23.

1851 *Psylla quadrilineata* Pritch, 4th Rep. N. Y. Sta. Mus. 64.
(reprint of original desc.).
1913 *Psylla quadrilineata* Aulmania, Psy. Cat. 25.
1914 *Psylla quadrilineata* Crawford, U. S. N. M. Bull. 85:143.
1917 *Psylla quadrilineata* Van Duzee, Cat. Hemip. N. A. 303.

Length to tip of folded wings 3 mm.

**Color:** General color red to reddish brown. Lighter on
margins of most sclerites. Four light longitudinal stripes on scutum. Wings slightly whitish, pterostigma infuscated.

**Structure:** Head and thorax coarsely punctate. Head large, strongly deflexed. Vertex 2/3 as long as wide, posterior margin deeply concave, deeply impressed discally, anterior margin very strongly protruding, overhanging median ocellus. Genal processes stout, straight, blunt, scarcely tapered, 1/2 as long as vertex. Antennae short, thick, as long as width of head. Thorax moderately arched. Legs short. Hind tibiae with short, stout, basal spur. Membrane of both fore and hind wings thickly set with minute setae, in forewing forming indefinite radular areas on apical margin. Forewings slightly less than 2-1/2 times as long as wide; marginal cells unusually large; Rs very long, pterostigma very large.

**Genitalia:** Male proctiger stout, straight, parallel-margined, with an anterior projection basally and an apical epiphysis. Forceps in lateral view moderately broad basally, enlarged, slightly constricted beyond midpoint, apical portion sharply constricted and flexed caudad to truncate black apices; meso-apical margin produced anteriorly as a small black tooth; in caudal view evenly arched from bases to acute black apices, broadest midway. Female genital segment 1/4 shorter than rest of abdomen; dorsal valve straight, apical portion attenuate, blunt; ventral valve shorter, upturned midway, acute.
Described from five females and one male from New Hampshire which have been compared with the type. The type, a female, no. 1342 U. S. W. M., and two females of Fitch's type series are in the National Museum. They have been molded but are in fair condition. This species is similar to *P. americana* in many respects.

The host is unknown.

**Psylla mali** (Schmidberger)


1848 *Psylla pomi* Förster, *ibid.* 72.

1848 *Psylla crataegicola* Förster, *ibid.* 72.

1848 *Psylla aeruginosa* Förster, *ibid.* 97.

1848 *Psylla occultata* Förster, *ibid.* 93.

1848 *Psylla dubia* Förster, *ibid.* 73.


1872 *Psylla claripennis* Meyer-Dür, *ibid.* 400.


1876 *Psylla crataegicola* Scott, *ibid.* 542.
1376 *Psylla viridissima* Scott, *ibid.* 543.


[life history, control].


Length to tip of folded wings 4 mm.

Color: "Summer coloration. General color pale green, sometimes tinged with yellow; no color difference exists between the sexes in the early part of the season....."

"Autumn coloration, female.....Head varying from bright yellow to dark brown with local modulations; median suture always darker.....Prothorax, dull yellow varying to dark brown; reddish and dusky markings may occur. Praescutum of mesothorax orange to brown, sometimes greenish; anterior portion usually darker..... Scutum, dull yellow to dark orange, dark brown where yellow bars existed in summer coloration. Remainder of thorax, dull yellow and orange with dusky markings varying in location and intensity. Abdomen; the yellow posterior margin of the dorsum of each segment becomes orange or deep blood red,......(rest) dusky or jet
black........ Entire ventral surface of body uniform dull yellow........

"Male. General body color changed from green to bright orange yellow." Brittain.

Structure: Head very strongly deflexed, almost perpendicular to axis of body. Vertex with shallow discal impressions, bulging anteriorly, 1/2 as long as wide. Genal processes divergent, slender, blunt, almost as long as vertex. Antennae small, 1-3/4 times as long as width of head. Thorax strongly arched. Legs small; hind tibiae with small basal spur. Forewings somewhat whitish, 2-1/2 times as long as wide; venation typical, pterostigma very large. Membrane of fore and hind wings thickly set with minute setae.

Genitalia: Male genitalia small. Proctiger short, slightly longer than forceps, strongly bent caudad near apex. Forceps simple, slightly arched to blunt, black, spicate. Female genital segment shorter than rest of abdomen, stout; dorsal valve blunt, slightly longer than ventral, latter acute.

Described from a short series from Digby and Kings Counties, Nova Scotia collected by W. H. Brittain, July, 1931 and determined by Oman as Psylla mali. I have not seen any European specimens.

Brittain has done a great amount of work on this pest since its discovery in Nova Scotia in 1919. It is treated in
detail in Bulletin No. 10 of the Dept. of Agr. of Nova Scotia. Briefly the life history in Nova Scotia is as follows: The eggs are deposited in the fall (September and October). Hatching occurs early in May. The average nymphal life is 34 days, the adults appearing in the last half of June. Mating occurs within a fortnight of emergence and continues for the next two months. There is but one generation per year.

As indicated above the color changes as the season progresses from a pale green to brown and vivid orange or red.

To date it has been recorded only from Nova Scotia and New Brunswick in North America. It is generally distributed through northern and central Europe and Asia including Japan.

Psylla alba Crawford

1914 Psylla alba Crawford, U. S. N. M. Bull. 85:139, 143.
1914 Psylla americana alba Crawford, ibid. 143.
1917 Psyllia alba Van Duzee, Cat. Hemip. N. A. 306.
1933 Psyllia alba Strickland, Can. Ent. LXX:204.

Length to tip of folded wings 3 mm.

Color: Typically greenish white, some specimens (faded?) yellowish.

Structure: Vertex a little over 1/2 as long as wide, strongly bulging anteriorly, with shallow discal impressions.
Genitalia: Male proctiger long and slender, straight. Forceps small, much shorter than proctiger, stout; in caudal view almost straight to near apexes, a large, black, incurved tooth at apex of each. Female genital segment as long as rest of abdomen, dorsal valve a little longer than ventral, both acute.

Described from specimens from Nicolsus, California which have been compared with the type. Specimens are at hand from California, Washington, Utah, Wyoming, Colorado.

Type, female, Crasby County, Nevada, July, Farker, in the Crawford Collection.

The host is Salix sp.

**Psylla ribesiae** (Crawford)


1914 *Arytaina ribesiae* Crawford, U. S. N. M. Bull. 35:126.

1914 *Psylla ribis* Crawford, ibid. 127.

[non *Psylla ribis* Patch].
1917 Arytaina ribesiae Van Duzee, Cat. Hemip. N. A. 304.

Length to tip of folded wings 3.25 to 4 mm.

Color: Quite variable. From light to dark brown, usually dark. Scutum with light and dark stripes. Vertex white with variable dark markings. Genal processes white. Antennae dark distally, tips of basal segments dark. Forewings clear except for a prominent dark spot at apex of clavus, sometimes a brownish area at base, four more or less prominent spots on margin.

Structure: Head large, very strongly deflexed. Vertex shallowly impressed discally, 3/5 as long as wide. Genal processes almost on same plane as vertex, somewhat divergent then incurved slightly, blunt, quite variable in shape and size, usually about 2/3 as long as vertex. Antennae 1-3/4 times as long as width of head. Thorax strongly arched. Hind tibiae with small basal spur. Forewings about 2-1/2 times as long as wide; venation typical, pterostigma small; four radial areas along margin, in cubital cell, between Cu1 and M4, in medial cell, between M1 and R5.

Genitalia: Male proctiger stout, straight, length somewhat variable. Forceps in lateral view broad basally, unevenly narrowed to slender truncate spines, turned caudad at apex; in caudal view broad, slightly arched. (Quite variable in size and exact shape). Female genital segment
shorter than rest of abdomen, stout; valves almost equal in length, acute; ventral valve strongly upcurved.

This is a numerous and widespread species occurring over western North America. It is extremely variable in almost all characters, especially color, genal processes and genitalia which makes it very difficult to define. In addition to a paratype from Boulder, Colorado specimens are at hand from numerous localities in the following states; Colorado, Kansas, Nebraska, South Dakota, Wyoming, Idaho, Arizona, California and Oregon.

Klyver records *Ceanothus thyrsiflorus* as a definite host in California. Many of the specimens at hand bear labels "currant", *Ribes, Ribes aureum*. Many of the specimens so labeled are teneral and have cast nymphal skins or nymphs on the pin with them. It would seem therefore as if hosts in at least two different genera were capable of supporting this common form. Many of the specimens from which Patch described *gilletti* are in the collection of the Colorado Agricultural College and have been examined.

Crawford placed this species in *Arytaena* apparently on the position of the genal processes which is quite similar to the condition found in some members of that genus. The chief distinction between the two genera however is the shape of the prothoracic pleurites. On this basis *ribesiae* must go in the genus *Psylle* to which it is similar in most
respects. In many specimens a slight groove on the epister-
um is pigmented and on superficial examination the propleu-
rites do have the appearance of being equal in length and in
breadth dorsally. Several other species of *Psylla* exhibit
this same character and in those forms in which the head
extends well back over the prothorax laterally it becomes
quite difficult to ascertain the exact condition of these
sclerites without dissection.

Type, female, Boulder, Colorado, Bethel, *Ribes longi-
florum*, is in the Crawford Collection.

*Psylla pyricola* Förster

1840 *Psylla pyri* Curtis, Gerd. Chron. 156 (nec Linn. Paun.
succ. 1761) [fide Aulmann, Psy. Cat. 24].
V:77-78.
1848 *Psylla apiophila* Förster, ibid. 79.
1861 *Psylla notata* Flor, Bull. Soc. Imp. Nat. Moscou XXXIV:
341, 349, 355, 365-367.
1872 *Psylla apiophila* Meyer-Dür, ibid. 396.
1992 *Psylla pyricola simulans* Slingerland, N. Y. (Cornell)
Length to tip of folded wings, (summer form) 2.0 to 2.75 mm., (winter form) 3.3 to 4 mm. (Crawford).

Color: Summer form. "General color light orange to reddish brown, with darker markings; vertex, genital cones, scutum between stripes, male genitalia, legs except hind femora, antennae except at tip, light brown to orange; genital cones lighter colored at apex than at base..... Wings transparent, clear or often with a slight yellowish tinge, especially in the distal cells; with a conspicuous black spot at tip of clavus;....." Winter form. "General color very
dark reddish brown to black; markings black; areas noted in summer form as lighter are correspondingly a little lighter here, but antennae mostly dark from base to tip; wings darker on basal portion, apically clear, veins black and very conspicuous, black claval spot more pronounced. Crawford.

Structure: Vertex a little over 1/2 as long as wide, discal impressions and medial suture very prominent especially anteriorly. Genal processes 4/7 as long as vertex, robust, contiguous basally, sharp apically. Antennae 1-1/2 times as long as width of head. Thorax strongly arched. Hind tibiae with small basal spur. Forewings slightly over twice as long as wide, four diffuse regular areas on margin; venation typical, pterostigma large.

Genitalia: Male proctiger short, slender, curved caudad. Forceps almost as long as proctiger, narrowed from base to acute black apices. Female genital segment shorter than rest of abdomen, stout, dorsal valve slightly longer than ventral, blunt.

This, the pear psylla, was introduced from Europe early in the 19th century. It is of great importance as a pest on its host plant Pyrus communis, the common pear. Since its introduction into the New England states it has spread north south and west having been recorded from Nova Scotia, Maine, Connecticut, Massachusetts, New York, New Jersey, Maryland, Virginia, North Carolina, Ohio, Illinois, Michigan, Ontario,
British Columbia (?) and California (?). Recently it has made its appearance in the Pacific Northwest, in the Spokane, Washington area, including part of Idaho. Besides North America it is known to occur in most of Europe, northern and central Asia, including Japan.

Lintner (1933) discusses it in detail, gives figures, life history, damage and a complete history of its occurrence in North America to that date, including a bibliography.

A brief life history taken from the sources cited above is as follows: The overwintering stage is the adult. Copulation and egg laying begin in early spring (April in New York). Approximately a month is required for the insects to reach maturity. Breeding continues throughout the season, there being several generations per year.

Due to its economic importance this psyllid has been discussed at great length and in considerable detail in various bulletins and other economic entomological literature. A great deal of research has been done on control work, especially in New York state. This literature is too voluminous to be cited here but is all listed in the Index of American Economic Entomology.
Psylla americana Crawford

1914 Psylla americana Crawford, U. S. N. M. Bull. 35:133, 147.
1917 Psylla americana Van Duzee, Cat. Hemip. N. A. 803.
1933 Psylla americana Strickland, Can. Ent. LXX:204.

Length to tip of folded wings 3 to 3.75 mm.

Color: General color red to reddish brown. Vertex usually whitish medially. Genal processes light basally, dark toward apex. Pronotum black on cephalic half, remainder white. More or less distinct white margin on lateral and posterior margins of prescutum. Variable white lines on scutum and scutellum. Wings hyaline, veins dark, pterostigma dark.

Structure: Head strongly deflexed. Vertex with deep discal impressions, about 2/3 as long as wide, somewhat bulging anteriorly. Genal processes slender, divergent, blunt, 2/3 as long as vertex. Antennae about 1-1/3 times as long as width of head or slightly longer. (I have seen none in which the ratio is as much as 1.5:1). Thorax well arched. Pronotum large, nearly vertical. Hind tibiae with small basal spur. Forewings large, about 2-1/2 times as long as wide; marginal cells large, pterostigmas large. Membrane of both fore and hind wings thickly set with minute setae.
Genitalia: Male genitalia large. Proctiger long, straight, slightly bent caudad apically. Forceps large; in lateral view broad basally, cephalic margin tapered to acute apices; in caudal view slender, almost straight to subacute black apices. Female genital segment as long as rest of abdomen, slender, straight; dorsal valve straight, apical third very slender, apex acute in both lateral and dorsal view, considerably longer than ventral valve; latter acute.

Described from specimens from "Mountains near Claremont, California" C. F. Baker. These specimens are considered as typical. Many other specimens are at hand from numerous localities in California, from Utah and Colorado. It is also recorded from Idaho and Nova Scotia. A series of specimens in the U. S. National Museum from Banff Springs, Alberta are, I assume, the basis for Crawford's record for that locality. They represent a distinct species however which is described below. The host plants of this abundant species are willow (Salix spp.). Crawford records the type as in his collection but there seems to be no specimen so designated.

*Psylla americana curta* n. subsp.

Length to tip of folded wings 3 mm.

Color: Similar to *P. americana*.

Structure: Similar to typical subspecies except antennae slightly longer, 1-1/2 times as long as width of head.
Genitalia: Male genitalia much smaller, heavily pubescent. Proctiger scarcely longer than forcips, stout, curved caudad. Forcips in lateral view stout, tapered to subacute apices, in caudal view stout, somewhat arched, apices touching. Female genital segment shorter than rest of abdomen, slender; dorsal valve straight, long, apical portion slender, straight to blunt tip; ventral valve much shorter than dorsal, not upturned, straight to acute apex.

Biological evidence may subsequently prove this to be a distinct species but since no such data are available I am unwilling to give it that status even though it can be distinguished from typical americana, the only distinct difference being in the male genitalia. This would appear to be the form Crawford had in mind when he established P. americana minor. His designated type for that name however is distinct from this form.

Specimens are at hand from Del Mar, San Jose, San Francisco, Monterey, Fieldbrook, Little River, Lompoc, Alameda County and Los Angeles County, California (some of the latter were collected on Salix californica, April, Koebel) collected from April to July. One specimen is from Sloss, Colorado collected in August.

Holotype, male, no. 35172 U. S. N. M., Del Mar, California, June 2, 1935, Oman; allotype same data. Holotype, allotype and paratypes in U. S. National Museum, paratypes in
Snow Collection, University of Kansas and author's collection.

Psylla confusa n. sp.

Figs. 24, 25, 97.

Length to tip of folded wings 3 mm.

This form is very similar to *P. americana curta* except in genital characters. Membrane of forewings without or almost without the minute setae which are so numerous on *americana* and *americana curta*. Antennae somewhat shorter, about 1-1/4 times as long as width of head. Since it is distinguishable, and from the labels on the specimens at hand appears to live upon an entirely different host it is somewhat doubtfully given specific rank.

Genitalia: Male genitalia very sparsely pubescent. Proctiger slender, 1-1/2 times as long as forceps, hooked caudal apically. Forceps broad, flat, twisted toward apices with flat surface caudal, sharply narrowed near apices leaving a large blunt apical tooth, caudal margins sinuate.

Female genital segment shorter than *curta*; dorsal valve concave dorsally, apical portion slender, tip blunt, slightly upturned; ventral valve shorter than dorsal, sharply upturned.

Described from specimens from Utah, Nevada and Arizona all collected in March and April, several bear host plant labels which with one exception are *Covillea tridentata* or *C. tridentata* (creosote bush).
Holotype, male, no. 55173 U. S. N. M., St. George, Utah, March 9, 1934, E. W. Davis, C. tridentata; allotype and 11 paratypes same data. Other paratypes as follows: 9 Hoytsville, Utah, April 17, 1912, V. L. Wildermuth; 3 Riverside, Nevada, Mar. 3, 1934, E. W. Davis, C. tridentata; 2 Littlefield, Arizona, April 28, 1931, E. W. Davis, Covillea tridentata; 1 same locality and collector, Mar. 27, 1931, Fluehea sericea; 1 Arizona, C. F. Baker.


Psylla parallela Crawford

Fig. 26.

1914 Psylla parallela Crawford, U. S. N. M. Bull. 85:137, 141.
1917 Psylla parallela Van Duzee, Cat. Hemip. N. A. 305.
1932 Psylla parallela Klyver, Pan-Pac. Ent. VIII:16.

Length to tip of folded wings 3 mm.

Color: Yellowish green (?). I have seen only the type specimens which are rather old and apparently faded to a yellowish shade.

Structure: Head small, strongly deflexed. Vertex 1/2 as long as wide with deep discal impressions, bulging in front each side of median suture. Genal processes small, slender, rather sharp, 2/3 as long as vertex. Antennae short, about 1-1/4 times as long as width of head. Thorax well
arched. Pronotum almost vertical. Hind tibiae with small basal spur. Forewings of moderate size, almost 2-1/2 times as long as wide; venation typical, pterostigma large, yellow.

**Genitalia:** Male proctiger straight, swollen from base to middle then tapered to broad, rounded apex. Forceps short; in lateral view narrow basally, caudal margin slightly excavate, cephalic margin strongly bulged midway then narrowed to near apices, apically produced both cephalad and caudad as a black tooth, general appearance T-shaped; in caudal view stout basally, bowed outward, apical third strongly narrowed, bent mesad, apices black, truncate. "Female genital segment as long as rest of abdomen, slender, dorsal valve longer than ventral." Crawford.

I have seen only the type specimens, which are from Nevada County, California, Castle Rock, collected by Koebeler in September. Klyver records it from Washington and British Columbia. I am rather doubtful of these records, they may possibly be *P. minor* the male genitalia of which resemble parallels, and which is very abundant in the Pacific Northwest.

Host entirely unknown.

Types, 2 males, (on same pin) no. 18106 U. S. N. M., with date given above, have been examined.
Psylla minor Crawford

Figs. 27, 28.

1914 Psylla americana minor Crawford, U. S. N. M. Bull. 35: 139, 147.

1914 Psylla rufula Crawford, ibid. 148.

1917 Psyllia americana minor Van Duzee, Cat. Hemip. N. A. 302.


Length to tip of folded wings 3.5 to 4 mm.


Structure: Head strongly deflexed. Vertex about as long as wide, discal impressions prominent. Genal processes slender, slightly divergent, slightly over 2/3 as long as vertex. Antennae 1-1/3 to 1-1/2 times as long as width of head. Thorax well arched. A blunt tooth at base of hind tibiae. Forewings large, enlarged toward apices, 2-1/4 times as long as wide; marginal cells large, cubital larger than medial, pterostigma of moderate width, very long. Hind wings very long. Membrane of both fore and hind wings thickly set with minute setae.

Genitalia: Male genitalia large, very pubescent. Proc- tigier stout, curved cephalad, then strongly caudad to truncate apex. Forceps almost as long as proctiger; in lateral view
broad at base, narrowed, swollen midway, converging slightly to near spines then enlarged, spines roundly truncate; in caudal view large, swollen basally, apical third narrowed and straight to truncate spines. Female genital segment somewhat shorter than rest of abdomen; dorsal valve much longer than ventral, straight, apical half slender, apex blunt; ventral valve nearly straight to acute black apex.

Described from many specimens from numerous localities in Oregon, Washington and Colorado. A series received from Mr. R. L. Post of the Oregon State College, collected in Salem, Oregon was taken on "pussy willow" and was injuring the plants. This series was erroneously determined as *Psylla parallels* Crawford a closely related or at least similar species. Other specimens bear labels "willow blossom", "willow bloom", "willow", etc. Crawford records specimens on *Salix lasiolyptis*, *Salix californica* and *Salix sp.* The hosts are apparently several species of willow (*Salix spp.*). Crawford records it from several localities in California.

I believe these specimens represent *P. americana* curta, a form which he seems to have had confused with *minor*. The type specimen, a male, on which the above description is based, is not, in my opinion, conspecific with *americana*. It is however the same species as Crawford's *americana flavus*, the latter being but a color variety of *minor*.

Type, male, no. 18109 U. S. N. M., Col. "from Gillette
Collection, 1894".

Type examined.

_Psylla minor var. flava_ Crawford n. comb.

1914 _Psylla americana longipennis_ Crawford, ibid. 148.
1917 _Psylla americana flava_ Van Duzee, Cat. Hemip. N. A. 803.
1939 _Psylla americana flava_ Strickland, Can. Ent. LXX:204.

This form is a color variety of _P. minor_. It is in general yellow instead of reddish brown or black. Specimens are at hand from Vancouver, B. C.; Oregon (Koebele); California; Utah Lake, Alta and Park City, Utah; Colorado.

The type, no. 13110 U. S. N. M., is a somewhat teneral female from Victoria, Vancouver, Hubbard and Schwarz.

Type examined.

_Psylla nulla_ n. sp.

Figs. 29, 30, 30a, 93.

Length to tip of folded wings 3 mm.

Color: General color yellow. Wings whitish; forewings more or less fumose apically. Antennae dark apically.

Structure: Head strongly deflexed. Vertex slightly impressed discally, 1/2 as long as wide, bulging anteriorly,
posterior margin nearly straight. Genal processes cone-shaped, blunt, divergent, 2/3 as long as vertex. Antennae somewhat over 1-2/3 times as long as width of head. Thorax moderately arched. Hind tibiae with small basal tubercle. Forewings about 2-1/2 times as long as wide; venation typical, pterostigmata of moderate size. Membrane of both fore and hind wings thickly set with minute setae.

**Genitalia:** Male proctiger very short, straight on caudal margin, slightly convex on cephalic margin. Forceps very pubescent, nearly as long as proctiger; in lateral view broad, margins parallel to broadly notched apices; in caudal view broad, evenly arched, notched, medial lobes produced as heavy, subacute black teeth; in dorsal view apices deeply notched, anterior lobe large, blunt, caudal lobe produced anteriorly as a black tooth, narrow basally, enlarged and sharply truncate. Female genital segment shorter than rest of abdomen, dorsal valve concave dorsally, apex upturned, acute; ventral valve shorter than dorsal, upturned, acute.


Holotype, allotype and paratypes in U. S. National Museum, paratypes in author's collection.
Paylla line n. sp.

Figs. 31, 32, 99.

Length to tip of folded wings 3 to 3.5 mm.

Color: General color greenish yellow to yellow. Wings hyaline. Distal half of antennae, apical tarsal segments and wing veins apically, dark. Sometimes a fumate spot in apex of clavus.

Structure: Head small, vertical. Vertex 1/2 as long as wide, with deep discal impressions, bulging anteriorly. Genal processes slender, subacute, strongly divergent, 2/3 as long as vertex. Antennae rather thick, somewhat less than 1-1/3 times as long as width of head. Thorax strongly arched. Pronotum nearly vertical. Hind tibiae with very small basal spur. Wings very large, 2-1/2 times as long as wide; venation typical, pterostigma moderately large.

Genitalia: Male proctiger in lateral view broad, parallel-sided, straight or flexed caudal apically, longer than forcip. Forceps in lateral view moderately broad basally, suddenly enlarged on cephalic margin then parallel-sided to apices, apices very heavily sclerotized, obliquely truncate, produced caudad as a short heavy tooth; in caudal view broad, very slightly arched; in dorsal view apices are very heavy, long, produced caudad as a small mesal tooth. Female genital segment longer than rest of abdomen; dorsal valve straight,
apex attenuate, slightly downcurved, blunt; ventral valve long, straight, acute.

Holotype, male, allotype, female, numerous paratypes, Creede, Colorado, July 14, 1940, L. D. Tuthill. Additional paratypes: Creede, Colorado, 1938 to 1939, L. D. Tuthill; Redmond, Oregon, April and June 1939, Schuh and Gray. One teneral pair from Easton, Washington, (Koebele) is perhaps also conspecific.


The Creede specimens were taken on willow. As many of them are very teneral and nymphs (presumably of the same species) were taken at the same time, Salix sp. is undoubtedly the host.

Psylla sinuata Crawford

1914 Psylla sinuata Crawford, U. S. N. M. Bull. 35:137, 140.
1914 Psylla fibulata simulans Crawford, ibid. 140.

Length to tip of folded wings 3 to 3.5 mm.

Color: Light green to light yellow brown to orange.
Segments of antennae black-tipped, distal segments entirely black. Wings slightly whitish.

**Structure:** Head small, strongly deflexed, almost perpendicular. Vertex with shallow discal impressions, almost flat, nearly twice as wide as long. Genal processes slender, divergent, blunt, slightly over 1/2 as long as vertex. Antennae 1-1/2 times as long as width of head. Thorax scarcely arched. Pronotum strongly descending. Hind tibiae with very slight tubercle at base. Forewings about 2-1/2 times as long as wide; Rs sinuate, marginal cells somewhat elongate, pterostigma of medium size. Membrane of both fore and hind wings thickly set with minute setae.

**Genitalia:** Male genitalia very large with heavy, fine pubescence. Proctiger broad, slightly curved caudad, tapered to sharp apex. Forceps in lateral view evenly curved caudad on anterior margin, caudal margin sinuate to black, blunt apices; in caudal view broad, well arched, produced midway as a large, mesal lobe, apices black, heavy. Female genital segment longer than rest of abdomen; very thickly set apically with minute setae; dorsal valve much longer than ventral, straight, flattened and rounded apically; ventral valve strongly upcurved, flattened, acute.

Described from numerous specimens taken on willow at 11,000 feet near Creede, Colorado. Other specimens are at hand from Colorado (C. F. Baker); Uteve Bay, H. P. T., L. M.
Turner; Birch River, and Swan River, Manitoba, R. H. Beamer. It is also recorded from Idaho and Alberta. Strickland records white spruce (*Picea alba*) as a definite host.

Type, male, no. 18105 U. S. N. M.

Type examined.

**Psylla fibulata** Crawford

1914 *Psylla fibulata* Crawford, U. S. N. M. Bull. 35:137, 140.

1917 *Psylla fibulata* Van Duze, Cat. Hemip. N. A. 805.


1933 *Psylla fibulata* (?) Strickland, Can. Ent. LXX:204.

Length to tip of folded wings 2.5 to 3 mm.

**Color:** General color whitish green to yellow. Antennae dark apically. Wings more or less whitish.

**Structure:** Head small, strongly deflexed. Vertex with shallow discal impressions, roundly bulging anteriorly, slightly over 1/2 as long as wide. Genal processes small, slender, divergent, blunt, slightly over 1/2 as long as vertex. Antennae small, 1-1/3 times as long as width of head. Thorax very strongly arched. Legs small, hind tibiae with very small tubercle at base. Fore and hind wings large, greatly exceeding abdomen, membranes thickly set with minute setae. Forewings slightly over 2-1/2 times as long as wide; venation typical, pterostigma large, long.
Genitalia: Male proctiger long, slightly curved caudad. Forceps produced caudad basally as rounded lobes, caudal margins then excavate to spicis, anterior margins almost straight, spicis black, subacute. Female genital segment stout, black-tipped, longer than rest of abdomen; dorsal valve straight, sub-acute, broad, somewhat "shovel-shaped"; ventral valve shorter, broad, upcurved.

Described from numerous males and females taken at Creede, Colorado, July 14, 1940 on Willow (Salix sp.), many of the specimens are very tender and were accompanied by nymphs presumably of the same species. Other specimens at hand bear the label, Colorado, C. F. Baker.

Type, female, no. 18104 U. S. N. M.

Type examined.

Psylla cola n. sp.

Figs. 33, 34, 100.

Length to tip of folded wings 3.5 mm.

Color: General color reddish brown. Abdomen and venter darker. Thorax with more or less distinct light stripes.

Vertex light-margined. Wings whitish.

Structure: Head strongly deflexed. Vertex 1/2 as long as wide, discal impressions very broad, deep. Genal processes small, cone-shaped, subacute, less than 2/3 as long as vertex. Antennae about 1-1/2 times as long as width of head. Vertex
and thorax punctate. Thorax moderately arched. Pronotum descending but not vertical. Hind tibiae with very small basal spur. Membrane of both fore and hind wings thickly set with minute setae. Forewings over twice as long as wide; venation typical, pterostigma prominent, dark.

Genitalia: Male proctiger slightly longer than forccep, almost parallel-marginated, slightly and evenly curved caudad. Forceps heavily pubescent; in lateral view broad basally, caudal margin almost straight, cephalic margin produced in basal half then strongly excavate, spines extending cephalad as a black hook; in caudal view stout, slightly and evenly arched to truncate spines. Female genital segment shorter than rest of abdomen; dorsal valve slightly upcurved, apex blunt; ventral valve but slightly shorter than dorsal, ventral margin evenly upcurved to acute apex, dorsal margin produced dorsad as a large broad lobe midway.

Described from two males and six females from Peniff Springs, Alberta, Hubbard and Schwarz. Five other females bearing the same data are probably the same species but are atypical in structure of genitalia.

Holotype, allotype and paratypes in U. S. National Museum, paratypes in author's collection.

Holotype, male, no. 55175 U. S. N. M.
Paylla eva n. sp.

Figs. 35, 36, 100.

Length to tip of folded wings 4 mm.

Color: General color chocolate brown. Lighter to white along medial suture of vertex, base of genal processes, proximal portion of antennae, caudal half of pronotum, caudal margin of prescutum, longitudinal lines on scutum, margins of scutellum, tibiae, terai and margins of abdominal sclerites. Wings hyaline; pterostigma brown.

Structure: Head strongly deflexed. Vertex about 1/2 as long as wide, prominently impressed discally. Genal processes 2/3 as long as vertex, not divergent, parallel to plane of vertex, blunt. Antennae 1-1/3 times as long as width of head. Thorax well arched. Pronotum nearly vertical. Hind tibiae with two small basal tubercles. Forewings 2-1/2 times as long as wide; marginal cells large, pterostigma large; four radular areas on apical margin. Membrane of both fore and hind wings set with minute setae.

Genitalia: Male genitalia large. Proctiger very long, twice as long as forceps; in lateral view slender, straight to near apex then sharply flexed caudad. Forceps stout; in lateral view narrow basally, very much enlarged and bent cephalad then narrowed, spines truncate, black, produced on mesal margin; caudo-mesal margins produced caudad basally;
In caudal view very broad, straight, lateral margins incurved apically to subacute angles; median portion of each f操纵 excavate caudally leaving margins raised as sharp ridges, mesal margin produced basally and apically, lateral margin produced above mid-point. Female genital segment as long as rest of abdomen, slender; dorsal valve straight, slender from base, apex blunt; ventral valve shorter than dorsal, slightly concave ventrally in proximal half, abruptly turned dorsad to acute apex.

Described from 3 males and 13 females from Colorado, C. F. Baker and 1 male from Milford, Utah, April 24, 1934, E. W. Davis. The latter specimen bears a label C. reared.

Holotype, allotype, and paratypes in U. S. National Museum, paratypes in author's collection.

Holotype, male, no. 55176 U. S. N. M., Colo.

Psylla ribis Patch

1914 Psylla ribis Crawford, U. S. N. M. Bull. 85:143.
1917 Psylla ribis Van Duzee, Cat. Hemip. N. A. 309.

I am unable to place this species as none of Patch's specimens are available. Were it not for the fact that Crawford states definitely that it is not the same as ribesiae (a statement based on study of Miss Patch's specimens)
I would believe it to be synonymous with that species. Her pictures and his descriptions do not agree perfectly however so it remains a mystery until the type specimens are found and its identity established.

**Psylla arctica** (Walker)


1913 *Psylla arctica* Aulmann, Psy. Cat. 10.

1917 *Psylla arctica* Van Duzee, Cat. Hemip. W. A. 902.

Described from three females from St. Martins Falls, Albany River, Hudson Bay. Scott figures the head, wing and genital segment. This species seems to belong in the *americanus* complex. Just which one of the forms in this group it may be I have no idea.

Types in British Museum.

**Genus Aryzona Förster**

Read more or less deflexed, narrower to distinctly wider than thorax. Sense produced as rounded, usually short processes, strongly depressed from but parallel to plane of vertex. Antennae moderately long. Thorax arched. Pronotum large, flat, ending in a knob-like swelling laterally. Propressures equal at juncture with pronotum. Forewings often narrowly rounded apically, usually more or less maculate or
fumate, sometimes rugose and somewhat coriaceous, pterostigma present or wanting. Metatibiae sometimes with basal spur. Basal segment of metatarsi with two black claw-like spines.

Logotype: *Arytaenea genistae* (Latreille).

Originally separated from *Psylla* by the lack of a pterostigma in the forewing, a character which is not of sufficient importance in itself to warrant such a distinction. Both Förster and Scott separated the genera on this basis then with no explanation proceeded to describe species of *Psylla* such as *buxi* in which there is no pterostigma. In my opinion the principal distinguishing characters of this group are those stressed by Crawford, namely the shape of the prothoracic pleurites, the shape and position of the genital processes, the large flattened pronotum and the often more or less coriaceous forewings.

Enderlein (1926) refers all the North American species back to *Psylla*—apparently without having seen any of them.

According to the rules of nomenclature the name should be spelled *Arytaenea* as emended by Scott rather than *Arytaeina* as originally used by Förster (Int. Rules of Zool. Nom., appendix F and opinion 38).
Key to genus *Arytaena*

1. Forewings conspicuously maculate, spotted or entirely dark........................................ 2.
   Forewings not conspicuously maculate, often more or less evenly fumate.......................... 7.

2.(1) Prominent pubescence on head and thorax;
   forewing white, brown apically........ *pubescens* Crawford.
   Not heavily pubescent........................................ 3.

3.(2) Forewings entirely dark; male forceps bilobate................................. *fuscipennis* Crawford.
   Forewings not entirely dark; male forceps not bilobate........................................ 4.

4.(3) Forewings with a prominent pterostigma; male proctiger with a large angular caudal lobe
       ............................................................. *assimilis* Crawford.
   Pterostigma almost or entirely obsolete;
   male proctiger without large caudal lobe.............. 5.

5.(4) Forewings hyaline except for brown maculae;
   head broader than thorax........ *genistae* (Latreille).
   Forewings white with brown spots or maculae; head narrower than thorax..................... 6.

6.(5) Body and forewings usually pulverulent; media of forewings not sinuate........ *robusta* Crawford.
   Without white pulverulence; media of
forewings sinuate......... robusta sinuata n. subsp.

7.(1) Genal processes not contiguous basally,
    very short, rounded................................. 3.
    Genal processes contiguous, at least basally..... 11.

8.(7) Pterostigma lacking......................... singularis n. sp.
    Pterostigma prominent................................ 9.

9.(3) Male forceps simple; forewings often somewhat
    fumate apically............................... ceanothae Crawford.
    Male forceps with a large anterior lobe and
    a shorter caudal one; forewings entirely
    clear or whitish.................................... 10.

10.(9) Antennae as long as width of head; genae
    produced as blunt lobate processes visible in
    dorsal view of head.............................. amorphae Mally.
    Antennae 1-1/3 times as long as width of
    head; genae not visible in dorsal view of
    head..................................................... pallida n. sp.

11.(7) Female genital segment enlarged basally,
    slender, styliform apically............. aculeata Crawford.
    Female genital segment not styliform.......... 12.

12.(11) Male forceps deeply bifurcate; proctiger small;
    female genital segment very short, much
    shorter than abdomen......................... chelifera Crawford.
    Male forceps simple; proctiger very large;
    female genital segment very large, stout,
longer than rest of abdomen..................... 13.

13. (12) Forewings narrowed apically, pterostigma prominent................................. minuta Crawford.
Forewings broadly rounded, pterostigma obsolete..................................... tana n. sp.

Arytainea pubescens Crawford

1917 Arytainea pubescens Van Duzee, Cat. Hemip. N. A. 804.

Length to tip of folded wings 2 mm.

Color: General color light brown to red. Head mostly white. Dorsum of thorax more or less marked with white. Abdomen often green. Forewings white to hyaline, maculate with brown apically and along media.

Structure: Head and thorax with prominent white pubescence. Head slightly deflexed, as broad as thorax. Vertex 3/5 as long as wide, deeply emarginate anteriorly, lateral ocelli borne on prominently raised portions. Genal processes blunt, divergent, scarcely contiguous basally, slightly over 1/3 as long as vertex. Antennae about 1-1/2 times as long as width of head. Thorax moderately arched, broad. Pronotum slightly descending anteriorly. Forewings short,
broadly rounded, about twice as long as wide, somewhat coriaceous; Rs short, marginal cells equal, pterostigma small. Hind tibiae with very small basal tubercle.

Genitalia: Male proctiger short, broad basally then narrowed, curved caudad. Forceps short, stout, blunt, a slender black spine arising on mesal margin, as long as base, incurved apically. Female genital segment shorter than rest of abdomen; dorsal valve large basally, very abruptly narrowed to short, straight, subacute, apical portion; ventral valve largely covered by last sternite, a large lobe extending caudad overlapping dorsal valve, apex acute, nearly equalling dorsal valve.

Many specimens of this very distinct little species are at hand from California, Oregon, Nevada, Idaho and Colorado. The host plant is Purshia tridentata.

Type in Crawford's collection (?), no labeled specimen.

_Artytaena fuscipennis_ Crawford

1914 _Artytaena fuscipennis_ Crawford, U. S. W. M. Bull. 35: 123, 125.

1914 _Euglyptoneure tristis_ Crawford, ibid. 125.

1917 _Artytaena fuscipennis_ Van Duzee, Cat. Hemip. N. A. 303.

Length to tip of folded wings 2.5 to 2.75 mm.

**Color:** General color brown to black including forewings. Genal processes somewhat lighter, especially in the male.

**Structure:** Head scarcely deflexed, narrower than thorax. Vertex with very broad discal impressions, nearly twice as wide as long. Genal processes conical, divergent, from blunt to nearly acute, 1/2 to 2/3 as long as vertex, pubescent. Antennae 1-1/2 times as long as width of head. Thorax broad, well arched. Pronotum long, straight. Forewings coriaceous, somewhat rugose, twice as long as wide, broadly rounded; veins minutely setate, cubital cell larger than medial, pterostigma very small to obsolete. Hind tibiae without basal spur.

**Genitalia:** Proctiger of male broad, in lateral view broad basally, converging then slender to apex. Forceps narrow, petiolate basally then produced as two divergent, elongate lobes, medial lobe slender, acute, lateral lobe spatulate. Female genital segment short, about 1/2 as long as rest of abdomen; dorsal valve longer than ventral, excavate dorsally to slightly upturned, blunt apex; ventral valve deeply excavate mesally.

Described from numerous males and females from Lapine and Bend, Oregon; two from Los Angeles County, California; one from Palomar Mountain, California and one from Nevada.
Klyver records *Ceanothus papillosus* as a definite host.
Crawford records specimens as bearing labels of other species of *Ceanothus*.

Type, male, no. 13101 U. S. N. M., Humboldt County, California, H. S. Barber.

**Arytaena assimilis** Crawford

1917 *Arytaena assimilis* Van Duzee, Cat. Hemipt. N. A. 304.

I have seen no specimens of this species which was described from a unique male.

"Length of body 1.9 mm.; length of forewing 2.2; width of head 0.30. General color reddish brown, lighter on dorsum and head. Body rather small, long.

"Head relatively rather small, deflexed quite strongly, about as broad as thorax, punctate; vertex arcuate on posterior margin, with a deep fovea on each side of median line near center, slightly bulging in front on each side of median line, not strongly elevated on postocellar regions; genal cones rather short, contiguous at base, rounded broadly at apex, slightly pubescent. Antennae a little more than twice as long as width of head, slender."
"Thorax arched strongly, robust, punctate. Pronotum rather long, flat on dorsal surface; propleurites short. Wings small, sub-hyaline, maculate in middle end on hind margin conspicuously so, semitransparent, a little more than twice as long as broad, broadly rounded at apex and acical half of wing distinctly narrowing toward apex; first marginal cell larger than second; radial sector long and curved; pterostigma long, large at base.

"Genitalia: Male genital segment very large, about half as large as rest of abdomen; forceps moderately long, stout, roundly acute at tip; anal valve very large, larger than forceps, with a large, lobate protuberance on hind margin; pubescence short.

"Described from one male from Claremont, California (Crawford), on Ceanothus crassifolius. This form is manifestly distinct from A. ceanothae, but was taken on the same tree and together with the specimens of the other species.

"Type in author's collection." Crawford.

Klyver records this species from several localities in California on species of Ceanothus.

Arytaena genistae (Latreille)

1835 Psylla ulicis Curtis, Brit. Ent. XII: 565.
Length to tip of folded wings 3 to 4 mm.

Color: General color light green to dark brown. More or less distinctly striped on dorsum. Forewings with a brown macula between Rs and M, another along posterior margin,
following Cu nearly to base of wing.

**Structure:** Head large, deflexed, broader than thorax. Vertex nearly plane, over 1/2 as long as wide, discal impressions slight, anterior margin strongly produced each side of median line as small tubercles, laterally rounded down to genal processes. Eyes very large, protruding, appearing slightly stalked. Genal processes large, heavy, rounded apically, nearly parallel to plane of vertex, not contiguous basally, 1/2 as long as vertex. Antennae slightly over twice as long as width of head. Thorax broad, moderately arched. Pronotum nearly flat, long. Forewings long, narrowly rounded apically, 2-2/3 times as long as wide; Rs long, slightly sinuate, medial cell larger than cubital, pterostigma lacking. Hind tibiae with basal spur.

**Genitalia:** Male prostiger short, stout, curved caudad apically. Forceps as long as prostiger, stout; in lateral view bent caudad midway, truncate apically; in caudal view slender, nearly straight to black, bifurcate apices; in dorsal view black-margined, deeply emarginate, caudal tooth stout, sharp, anterior tooth longer, obliquely truncate. Female genital segment longer than rest of abdomen, stout; dorsal valve straight to blunt, slightly upturned apex; ventral valve shorter than dorsal, upturned, acute.

Described from specimens from Europe, determined as *A. genistae* by Franz Löw, in the U. S. National Museum.
Crawford records it from Woods Hole, Massachusetts, on
Spartinum sp. In Europe its hosts are Sarothamnus scoparius
(scotch broom) and Ulex europaeus (gorse) both of which
are established in eastern United States. It seems most
probable that these same species are the hosts in North
America also.

Arytaena robusta Crawford

1917 Arytaena robusta Van Duzee, Cat. Hemip. N. A. 303.

Length to tip of folded wings 2.5 mm.

Color: Coloration extremely variable. General color
from greenish or yellowish white to dark brown. Dorsum
usually light, venter and legs darker. Often with consider­
able red marking, especially the gonial processes. Forewings
white with variable brown maculation, usually taking the form
of two irregular, diffuse maculae separated by a broad im­
maculate band across wing beyond tip of clavus; often more
or less evenly covered with small brown spots, with seven
more or less persistent spots on margin. A white pulverulence
commonly covers a greater or lesser portion of the insect, especially the forewings.

**Structure:** Head more or less deflexed, narrower than thorax. Vertex with broad, deep discal impressions, bulging anteriorly each side of anterior ocellus, twice as wide as long, lateral ocelli on slightly raised areas. Genal processes variable from bluntly cone-shaped to broadly rounded, contiguous basally, about 2/3 as long as vertex. Antennae somewhat over 1-1/2 times as long as width of head. Thorax moderately arched. Pronotum deflexed, long. Forewings broad, narrowly rounded apically, slightly more than twice as long as wide (variable); costa very heavy, Rs short, sharply turned to costa, cubital cell larger than medial, pterostigma lacking or extremely small. Hind tibias with small basal spur.

**Genitalia:** Male protiger rather short, stout, slightly tapered. Forceps simple; in lateral view somewhat enlarged toward apices; in caudal view moderately stout, well arched; apices subacute, turned cephalad somewhat. Female genital segment a little shorter than rest of abdomen; dorsal valve longer than ventral, sharply concave in apical half, upturned apically, subacute, a tuft of long setae on dorsal hump; ventral valve shorter than dorsal, upturned, acute.

This species is very abundant throughout the western United States occurring in large numbers on Ceanothus fendleri and perhaps other species of Ceanothus. It is extremely
variable as is usual in such abundant and widespread species, the coloration and pulverulence being especially erratic. In general the individuals from the southern part of its range have less definite wing maculae. Many specimens are at hand from numerous localities in the following states: Colorado, Wyoming, South Dakota, Montana, Idaho, Washington, Oregon, California, and Arizona. It is also recorded from Utah and British Columbia.

Type in Crawford's collection, apparently a specimen from Colorado but no specimen so labeled.

Paratypes of both *A. snowi* Dowell and *A. montana* Crawford have been examined and they are merely robusta in which the wing maculation is diffuse.

*Arytaena robusta sinuata* n. subsp.

*Fig. 101.*

Similar to the typical form except as follows: Darker, general color chocolate brown; entirely devoid of pulverulence, including forewings; genital processes generally longer and nearer plane of vertex; veins of forewings more distinctly raised from membrane; R shorter, R₅ therefore longer, M strongly sinuate; female genital segment longer, fully as long as rest of abdomen; dorsal valve straight on dorsal margin, attenuate, upcurved to blunt apex; ventral valve almost equalling dorsal.
This form may represent a distinct species or it may be merely another variant of robusta. As I have only four female specimens I am unwilling to designate it as of specific rank but it is hoped that by naming it attention may be directed to it and its true taxonomic nature thereby determined.

Holotype, female, Moscow Mountain, Idaho, July 20, 1933, H. M. Harris, in author's collection.

Paratypes: Placer County, California, September, Koebele, (Ceanothus cordulatus) in U. S. National Museum; Big Bear Lake, California, July 26, 1932, R. H. Beamer in Snow Collection, University of Kansas; Colo. 2030, in Crawford Collection.

Arytsena singularis n. sp.

Figs. 37, 102.

Length to tip of folded wings 3 mm.

Color: General color light brown. Abdominal segments dark brown except margins. Forewings somewhat yellowish, darker along veins.

Structure: Head nearly as broad as thorax, scarcely deflexed. Vertex with small discal foveae, 3/5 as long as wide, strongly produced anteriorly each side of median suture, lateral ocelli on raised areas. Genae swollen, rounded, nearly vertical, not touching, 1/3 as long as vertex. Median
ocellus very large. Antennae twice as long as width of head. Thorax weakly arched. Pronotum long, descending anteriorly. Forewings 2-1/2 times as long as wide, broadly rounded; Rs long, somewhat sinuate, marginal cells equal, pterostigma almost obsolete. Hind tibiae with small basal spur.

Genitalia: Female genital segment stout, about as long as rest of abdomen; dorsal valve longer than ventral, dorsal margin slightly sinuate, apically attenuate, black, acute, upturned; ventral valve very sharply upturned, truncate, slightly excised apically.


Holotype, female, no. 55177 U. S. N. M. Paratypes in U. S. National Museum, University of Kansas and author's collection.

**Arytainea ceanothae** Crawford

1914 *Arytainea ceanothae* Crawford, U. S. N. M. Bull. 35:123, 130.

1917 *Arytainea ceanothae* Van Duzee, Cat. Hemip. N. A. 304.


Length to tip of folded wings 2 mm.

Color: Yellowish to brown. Forewings more or less fumate.
Structure: Head small, narrower than thorax, deflexed. Vertex nearly twice as wide as long, discal impressions broad and deep, rounded anteriorly, emarginate medially. Sense swollen as small lobes, not touching and scarcely extending beyond anterior margin of vertex. Antennae about 1-2/3 times as long as width of head. Thorax strongly arched. Pronotum descending. Forewings broadly rounded, about twice as long as wide or slightly over; cubital cell slightly larger than medial, pterostigma prominent, somewhat variable in size. Hind tibiae without basal spur.

Genitalia: Male prostiger slender, slightly tapering, curved caudad somewhat. Forceps very slender; in lateral view straight to rounded, black-tipped apices; in caudal view evenly arched. Female genital segment about as long as rest of abdomen; dorsal valve strongly concave, apical portion slender, apex subacute; ventral valve stout, dorsal margin excavate, acute.

Specimens at hand are from Los Angeles County, Siskiyou County, Mt. Shasta County and Sta. Cruz Mountains, California; Easton, Washington; Hauser, Montana.

Host: Ceanothus (Crawford and Klyver).

Type designated as in Crawford Collection but no specimen so labeled.
Arytaena amorphae (Mally)

Figs. 33, 39.

1911 Psylla ilicis Crawford, ibid. 632.
1912 Psylla ilicis Crawford, ibid. IV:634.
1913 Psylla amorphae Aulmann, Psy. Cat. 10.
1914 Arytaena amorphae Crawford, U. S. N. M. Bull. 95:35.
1914 Amblyrhina fractiforceps Crawford, ibid. 130.
1917 Arytaena amorphae Van Duzee, Cat. Hemip. N. A. 304.

Length to tip of folded wings 2.0 to 2.25 mm.

Color: General color light green to yellow, white longitudinal lines on thoracic dorsum, irregular white markings on vertex. Forewings more or less yellowish. Antennae dark apically.

Structure: Head deflexed, slightly narrower than thorax. Vertex with prominent discal impressions, definitely margined anteriorly, 3/5 as long as wide. Genae produced as short blunt processes 1/6 as long as vertex, not touching, extending forward, visible in dorsal view of vertex, a prominent suture between vertex and genae. Antennae short, about as long as width of head. Thorax well arched longitudinally, quite flat laterally. Pronotum strongly descending. Forewings long,
2-2/3 times as long as wide; cubital petiole short, cubital cell elongate, larger than medial, pterostigma large. Hind tibiae without basal spur.

Genitalia: Male proctiger straight, moderately broad in lateral view, slightly converging toward apex. Subgenital plate elongate, rounded lobe on dorsal margin, apex swollen ventrad, a stout spine on caudal margin, extending dorso-caudal between forceps. Forceps in lateral view of moderate width basally, abruptly enlarged about midway, cephalic lobe much larger than caudal, dorsal margin evenly excavate; in caudal view stout, elbowed near apices to obliquely truncate apex; in dorsal view anterior lobes slightly turned mesad, a heavy truncate median lobe bearing several small stout black spines, a sharper caudal point bearing 2 black spines. Female genital segment somewhat shorter than rest of abdomen; dorsal valve longer than ventral, sinuate dorsally, apex blunt; ventral valve upcurved, acute.

This species and the following have been confused heretofore. They are very similar and live upon closely related plants, this form on Amorpha fruticosa the other on Amorpha canescens. Due to the small size of these insects differences in structure which would be very noticeable in larger forms are easily passed by as of no consequence. In the original description of Amorpha Wally recorded the host plant as A. fruticosa. Crawford (1914) cites A. canescens labels on
amorphae, these specimens are probably the related species.
In June, 1940, large series of both species were taken on the
same date and same general locality and sufficient difference
was apparent in the field that they were kept very carefully
separated in order to determine definitely their status.
Upon microscopic examination they have proved to be distinctly
different. The most distinctive differences are in the size
and shape of the vertex and genital processes and in the length
of the antennae. Minor but apparently constant differences
occur in the genitalia also.
The cotype series (5 females) is in the Iowa State
College Collection. One of the specimens is here designated
as lectotype. Other specimens at hand are from various
localities in Iowa, Kansas, Texas, Colorado and Arizona.
Host: Amorpha fruticosa.
Type, female, I. A. C., 6/12/94, C. W. M., is in the
Iowa State College Collection.

Aryteena pallide n. sp.
Figs. 40, 41, 103.

Length to tip of folded wings 1.75 to 2.25 mm.
Color: General color greenish white to yellowish
white. Forewings whitish to slightly fumate. Hind wings
white. Antennae dark apically.

Structure: Head slightly deflexed, nearly as wide as
thorax. Vertex with broad discal impressions, about 1/2 as long as wide, rounding down anteriorly, genae swollen, but scarcely produced, separated by full width of frons, not extending forward beyond anterior margin of vertex, suture between genae and vertex indistinct laterally. Antennae 1-1/3 times as long as width of head. Thorax well arched.

Pronotum descending. Forewings 2-2/3 times as long as wide; venation as in *amorphae*, pterostigma a little shorter. Hind tibiae without basal spur.

*Genitalia:* Male genitalia similar to *amorphae* but proctiger stouter. Forceps with petiolate base more slender, anterior lobe longer, scarcely produced caudad, dorsal margin strongly sinuate; in caudal view slender basally, enlarged apically, a stout incurring truncate tooth borne at apex; in dorsal view somewhat produced medially with an almost continuous row of black teeth to caudal margin. Female genital segment similar to *amorphae* but dorsal valve less sinuate, apex upturned, subacute, ventral valve more slender.

This species while very similar to *A. amorphae* Melly may be distinguished from it by the shorter and less protruding genal processes, the longer antennae, the upturned tip of the dorsal valve of the female genital segment and the shape of the male forceps as shown in the figures.

It was taken abundantly on *Amorpha canescens*, its host plant, in June.
Holotype, male, allotype, female, numerous paratypes
Turin, Iowa, June 1, 1940, L. D. Tuthill. Other paratypes
(7) Eureka, Kansas, May 29, 1933, P. W. Oman; (1) Wilson
County, Minnesota, July 1, 1922, P. B. Lawson; (4) Oakland,
Nebraska, July 5, 1940, W. W. Wirth.

Holotype, allotype and paratypes in author's collection.
Paratypes in U. S. National Museum, University of Kansas
and University of Minnesota.

Arytaena aculeata Crawford

1914 Arytaena aculeata Crawford, U. S. N. M. Bull. 35:123, 131.
1917 Arytaena aculeata Van Duzee, Cat. Hemip. N. A. 904.

Length to tip of folded wings 2 mm.

Color: Light brown with whitish markings on head and
thorax. Forewings yellowish.

Structure: Head small, deflexed, as wide as thorax.
Vertex rounded anteriorly, produced each side of median
suture, 2/3 as long as wide, anterior margin abrupt, discal
impressions prominent. Genal processes short, rounded, con-
tiguous basally, less than 1/3 as long as vertex, scarcely
visible in dorsal view. Antennae 1-1/5 times as long as width
of head. Thorax moderately arched. Forewings narrowed
apically, somewhat rhomboidal, slightly coriaceous, about 2-1/2
times as long as broad; R 5 moderately long, straight, marginal
cells equal, pterostigma small. Hind tibiae without basal spur.

Genitalia: Male unknown. Female genital segment longer than rest of abdomen, enlarged and globose basally, apical portion attenuate, styliform, black; dorsal valve slightly longer than ventral, both acute.

Known only from the female this rare species has been taken only in California. Four specimens are at hand from Los Angeles County. Klyver records it as taken on Cerco-carpus betuloides, Napa County, California.

Type, female, no. 13103 U. S. N. M.

**Arytaena chelifera** Crawford

1914 *Arytaena chelifera* Crawford, U. S. N. M. Bull. 35:123, 128-129.

1914 *Brachypylla purshiae* Crawford, ibid. 129.

1917 *Arytaena chelifer* Van Duzee, Cat. Hemip. N. A. 304.

Length to tip of folded wings 2 mm.

**Color:** "General color greenish yellow; genitalia, tip of antennae, and venter more or less browned; forewings very slightly fumate, browned a little darker on apical fourth."

**Crawford.**

**Structure:** Head nearly as broad as thorax, moderately deflexed. Vertex swollen and rounded anteriorly each side
of median suture, 3/5 as long as wide. Genal processes cone-shaped, rounded at apex, divergent, 1/3 as long as vertex, depressed much below but parallel to plane of vertex. Antennae about as long as vertex. Thorax moderately arched. Pronotum quite flat. Forewings slightly rugose, hyaline, broadly rounded, somewhat over twice as long as wide; Rs short, slightly sinuate, marginal cells equal, pterostigma very short, but distinct. Hind wings thickly set with minute setae. Hind tibiae with prominent basal spur.

Genitalia: Male proctiger small, straight, about as long as forceps. Forceps in lateral view stout, cephalic margin straight, caudal margin swollen, deeply notched apically, anterior process straight, subacute, not heavily sclerotized, posterior process extending antero-mesally, heavily sclerotized, black, curved, acute; in caudal view broad, black tooth-like processes arising from mesal margins, touching apically. Female genital segment very short; dorsal valve somewhat concave dorsally, apex elongate, acute, with many short setae; ventral valve upturned, acute apically.

Known only from the type series from Williams, Arizona and American Fork Canyon, Utah. These specimens are now quite faded to a "museum tan". As Crawford notes, the Utah specimens were taken on Purshia tridentata, which is probably the host.

Type, female, no. 13102 U. S. N. M., Williams, Arizona,
Barber and Schwarz.

Type examined.

Arytaina minuta Crawford

1914 Arytaina minuta Crawford, U. S. N. M. Bull. 35:123, 123.
1917 Arytaina minuta Van Duzee, Cat. Hemip. N. A. 304

Length to tip of folded wings 2 to 2.5 mm.

Color: General color light brown, abdomen darker brown.
Forewings clear brown, darker apically.

Structure: Head strongly deflexed, nearly as wide as thorax. Vertex nearly flat, discal impressions shallow, sloping downward anteriorly to genae, nearly twice as wide as long. Genal processes broad, rounded, contiguous, 1/3 as long as vertex. Antennae about 1-1/2 times as long as width of head. Thorax well arched. Pronotum descending. Forewings slightly coriaceous, narrowly rounded, 2-1/2 times as long as wide; Rs long, marginal cells equal in size, pterostigma prominent, slender, long. Hind tibiae with small basal spur.

Genitalia: Male genitalia large. Proctiger triangular, broad at base. Forceps slender in lateral view, slightly sinuate, apices black, subacute; in caudal view moderately broad, arched. Female genital segment very large, longer than rest of abdomen; dorsal valve longer than ventral,
sinuate, apex attenuate, slightly upturned, subacute; ventral valve stout, acute.

Several males and females are at hand from Los Angeles County, Mint Canyon and Del Mar, California. One specimen bears a label *Ceanothus rigidus*. Klyver records *Ceanothus cuneatus* as a definite host.

Crawford records the type as in his collection but no specimen seems to have been so designated.

*Arytaena tana* n. sp.

Figs. 42, 43, 104.

Length to tip of folded wings 2.5 to 3 mm.

Color: Reddish brown. Forewings yellowish brown, darker along veins, males darker on genae and legs.

Structure: Head deflexed, narrower than thorax. Vertex nearly flat, bulging anteriorly each side of median suture, slight discal impressions, lateral ocelli borne on prominently raised areas. Genal processes parallel to plane of vertex, rounded apically, contiguous at base, 1/2 as long as vertex. Antennae slightly over 1-1/2 times as long as width of head. Thorax well arched, broad. Pronotum descending. Forewings broadly rounded, 2-1/2 times as long as wide; Rs of medium length, marginal cells large, equal, pterostigma almost completely lacking. Hind tibiae without basal spur.
Genitalia: Male genitalia very large. Proctiger long, apex slender, rest produced caudad as a large rounded lobe. Forceps in lateral view a little more than 1/2 as long as proctiger, slender, tapering apically to blunt, black tips; in caudal view slender, evenly arched to black spines, a dense fringe of setae mesally. Female genital segment very large, stout, longer than rest of abdomen; dorsal valve apically slender and upturned to subacute apex; ventral valve shorter than dorsal, strongly upturned, acute.

Holotype, male, allotype, female, 3 male and 15 female paratypes with date: S. of Mt. Shasta Cy., California, June 29, 1935, P. W. Oman. Other paratypes as follows: 1 male and 2 females, Big Bear Lake, California, July 26, 1932, R. H. Beamer; 2 females, San Jacinto Mountains, California, July 21, 1929, R. H. Beamer; 1 male, Dunsmuir, California, June 29, 1935, R. H. Beamer.


Genus Psyllopsis LÖw

1761 Charmae Linnaeus (pro parte), Fn. Suec.
1762 Psylla Geoffroy (pro parte), Hist. abr. ins. en. Paris I [non viso].


1912 *Psyllopsis* Osnain, Kat. paea. Hemip. 126 [designates type].

1913 *Psyllopsis* Aulmann, Psy. Cat. 71.


1917 *Psyllopsis* Van Duzee, Cat. Hemip. N. A. 304.

Head narrower than thorax, deflexed. Vertex rounding smoothly into genae anteriorly. Genae produced as conical processes, more or less divergent, deflexed sharply from plane of vertex. Antennae rather long, distinctly longer than width of head. Eyes hemispherical, of moderate size. Thorax well arched. Pronotum descending anteriorly, rather long. Propleural suture ending medially on lateral margin of pronotum. Forewings membranous, broadly rounded apically, pterostigma present. Metatibiae without basal armature, with a row of small black apical spines. Metatarsi with two black claw-like spines.

Logotype: *Psyllopsis fraxinicola* (Förster).
Key to the Genus *Psyllopsis*

1. Unicolorous, including wings.... *fraxinicola* ( Förster).
   Dark brown or black markings on body and forewings.... 2.

2. Male forceps in lateral view very much enlarged apically, quadrate........... *discrepans* Flor.
   Male forceps in lateral view with a caudal lobe, anterior margin nearly straight..... *fraxini* (Linnaeus).

*Psyllopsis fraxinicola* ( Förster)


1943 *Psylla viridula* Förster, ibid. 74.


1972 *Psylla viridula* Meyer-Dür, ibid. 399.


1910 *Psyllopsis fraxincola* Smith, *Ins.* *N.* *J.* *108*.

1912 *Psyllopsis fraxincola* Oshanin, *Kat.* *palae.*, *Hemip.* *126*, [type designated].

1913 *Psyllopsis fraxincola* Aulmann, *Psy.* *Cat.* *73*.

1914 *Psyllopsis fraxincola* Crawford, *U.* *S.* *N.* *M.* *Bull.* *85:132*.

1917 *Psyllopsis fraxincola* Van Duzee, *Cat.* *Hemip.* *N.* *A.* *305*.

1923 *Psyllopsis fraxincola* Patch, *Hemip.* *Conn.* *250*.


Length to tip of folded wings 3.5 mm.

**Color:** Uniformly greenish yellow except tips of antennae. Wings hyaline.

**Structure:** Head deflexed, narrower than thorax. Vertex evenly excavate, 2/3 as long as wide, anteriorly rounding down to genae without a visible suture between later and vertex, discal impressions small, distinct. Genal processes cone-shaped, subacute, somewhat divergent, nearly vertical, less than 1/2 as long as vertex. Antennae nearly twice as long as width of head. Thorax strongly arched. Pronotum broad, rather long, descending. Forewings large, very broadly
rounded apically, slightly over twice as long as wide, membrane thinly set with minute setae; Rs very long, medial cell elongate, about equal in size to cubital, pterostigma very large. Hind tibiae without basal armature.

Genitalia: Male genitalia large. Subgenital plate elongate, slender. Proctiger curved on cephalic margin, caudally produced in basal half as a triangular lobe. Forceps short with large anterior lobe, narrow at point of origin then enlarged, very broad apically, convexly rounded, caudal portion stout, converging; in caudal view posterior lobes black-tipped, serrate, touching, apices of anterior lobes touching. Female genital segment shorter than rest of abdomen; dorsal valve with a short styliform portion apically, blunt, slightly downcurved; ventral valve in lateral view upcurved, acute, in ventral view broad basally then narrow, deeply and narrowly excavate apically, heavily pubescent.

Specimens are at hand from Washington, D. C.; Atlantic City, New Jersey; Kings County, Nova Scotia; Stanford University, California. It is also recorded from Connecticut and Idaho. Felt (26th Rept. N. Y. Sta. Ent.) reported it from New York but this is based on a misidentification. It probably does occur in New York and many other states however. Outside North America its distribution embraces all of Europe in which its host occurs. In Europe it seems to be limited to Fraxinus excelsior, in North America it has been
recorded also on *Fraxinus dipetala* and *Juglans*.

**Psyllopsis fraxini** (Linnaeus)

1761 *Chermes fraxini* Linnaeus, Faun. Suec. 264.
1877 *Chermes fraxini* Thomson, Opusc. Ent. VIII:329
1877 *Chermes sorbi* Thomson (pro parte), ibid. 329 [fide Aulmann].
1903 *Psyllopsis fraxini* Oshanin, Kat. psâs. Hemip. II:343.
1913 *Psyllopsis fraxini* Aulmann, Psy. Cat. 72.
Length to tip of folded wings 3.5 mm.

Color: General body color yellow with dark brown to black markings as follows: Disc and posterior margin of vertex, two large spots on prescutum, four longitudinal stripes on scutum, abdominal tergites except margins, portions of legs, venter and genitalia. Forewings with a large, irregular, marginal, apical macula, another at apex of clavus.

Structure: Very similar to *fraxinicola* except wings smaller, pterostigma shorter, Rs shorter, medial cell less elongate, much smaller than cubital.

Genitalia: Male genitalia large. Subgenital plate slightly elongate. Proctiger produced caudad basally as a bluntly rounded lobe. Forceps erect; in lateral view narrow basally, nearly straight on cephalic margin, produced caudad as a blunt lobe, apices rounded; in caudal view stout, nearly straight, a very small mesal lobe basally. Female genital segment very similar to *fraxinicola*.

This species is represented in the Iowa State College Collection by a series of specimens collected in Buffalo, New York, July, 1936 and 1933 by E. P. Van Duzee. It has not heretofore been recorded from North America. Felt (1911) describes and figures a species occurring on ash which was determined for him as *P. fraxinicola*, it is apparent from his description and figures that *P. fraxini* was the species he had however. He reported considerable damage to the
foliage of ash (Fraxinus) its host. Recorded heretofore from all of Europe including Scandinavia and Russia, Syria and Palestine.

**Psyllopsis discrepans** (Flor)


1877 *Chermes sorbi* Thomson, Opusc. Ent. VII:329 [fide Aulmann].


A single male in the National Museum Collection from Kings County, Nova Scotia, July 1, 1921, is apparently this species. It resembles *P. fraxini* closely except in darker coloration, more extensive maculation of the forewing and in genitalia.

Male genitalia very large. Subgenital plate elongate. Proctiger with rounded caudal lobe as in *fraxini*. Forceps in lateral view erect, narrow basally, abruptly enlarged into a quadrate apical portion, slightly excavate dorsally; in caudal view very heavy, slender and incurved apically, a
small basal medial lobe.

Its recorded distribution is Central Europe and Scandinavia.

**Genus Euphaelerus Schwarz**


1913 *Euphaelerus* Arlmann, Psy. Cat. 74.

1914 *Euphaelerus* Crawford, U. S. N. M. Bull. 35:113.

1917 *Euphaelerus* Van Duzea, Cat. Hemip. N. A. 802.


Head deflexed, broad. Vertex plane or nearly so. Genae produced as large processes, rounded apically, on same plane as vertex, more or less divergent. Antennae short (less than 1-1/2 times width of head). Eyes more or less recessive over propleurites, not elongate. Thorax quite strongly arched. Pronotum not extending far down laterally, terminating in a knob-like swelling. Propleurites equal in length dorsally, suture terminating at middle of lateral margin of pronotum. Forewings membraneous or somewhat thickened and rugose, rounded or oblique apically. Metatibiae with basal spur. Basal segment of metatarsi with two black claw-like spines.

*Orthotype: Euphaelerus nidifex* Schwarz.

Some of the western species of this genus show a marked relationship to *Arytaina*.
Key to the genus Euphalerus

1. Forewings not rugose, body and forewings light in color with many minute brown spots.................................................. pridifex Schwarz.
   Forewings rugose, body and forewings not covered with minute brown spots.................................................. 2.

   Meso and metascutellum not at all or scarcely produced.......................................................... 4.

3. Forewings strongly rhomboidal........................... proningius Crawford.
   Forewings rounded apically........................... jugovenosus Tuthill.

4. Uniformly red or reddish brown in color; without a tubercle ventrad of antennal insertion; male forceps not simple.......................................................... 5.
   Not uniformly reddish in color; with a more or less prominent tubercle ventrad of antennal insertion; male forceps simple.......................................................... 6.

5. Larger species (3.75 mm. to tip of folded wings); genal processes nearly as long as vertex.......................... edustus Tuthill.
   Smaller species (2.5 mm. to tip of folded wings); genal processes 2/3 as long as vertex.................. tentillus Tuthill.

6. General color whitish; forewings with at least one dark macula at apex of clevis.......................... vermiculosus Crawford.
   General color green (sometimes reddish) with many small white spots; forewings without dark maculae
   .......................................................... rucipennis Crawford.
Euphalerus nidifex Schwarz

1913 Euphalerus nidifex Aulmann, Fay. Cat. 74.
1914 Euphalerus nidifex Crawford, U. S. N. M. Bull. 35:119.
1914 Euphalerus ficus Crawford, ibid. 120.
1917 Euphalerus nidifex Van Duzee, Cat. Hemip. N. A. 902.

Length to tip of folded wings 2 mm.

Color: "Color pale ochre-yellow varying to greenish yellow or reddish yellow, head, thorax, wings and legs speckled with minute black or brown dots, wings slightly whitish."

Schwarz.

Structure: Head narrower than thorax, vertical, finely punctate. Vertex 3/5 as long as wide, nearly plane, somewhat bulging anteriorly, discal impressions prominent. Genal processes large, on same plane as vertex, rounded apically, 2/3 as long as vertex. Antennae slightly longer than width of head. Eyes rounded, recessive. Thorax finely punctate strongly arched. Pronotum narrow, long, nearly vertical. Forewings not rugose, broadly rounded, membrane thickly set with minute setae, a little more than twice as long as wide; Rs longer, nearly straight, cubital cell larger than medial,
pteroptigma large, unusually broad, not elongate. Hind wings equalling forewings. Hind tibiae with small basal spur.

Genitalia: Male proctiger slender, straight, truncate. Forceps small; in lateral view broad basally, tapered to acute black apices, slightly turned caudally; in caudal view broad, arched to mesally truncate apposing tips. Female genital segment small; dorsal valve straight, slender apically, blunt-tipped; ventral valve nearly as long as dorsal, upcurved, acute.

Described from specimens in the U. S. National Museum from Key West, Florida. Dr. John Caldwell in a private communication informs me that he has specimens taken on Key Largo, Florida. As the latter is but a stone's throw from the mainland this beautifully spotted species undoubtedly occurs in the southern part of that state. Its host plant is *Piscidia erythrina*. Schwarz reared the nymphs but gives only a few notes concerning its habits, these chiefly concern the nest-like structure in which they live on the ventral side of the leaves.

Known from Cuba and the Virgin Islands in addition to the localities mentioned above.

Type, no. 3146 U. S. N. M. is missing.
Euphalerus propinquus Crawford

1914 Euphalerus propinquus Crawford, U. S. N. M. Bull. 35: 119, 122.

1914 Cephalopsylla latifrons Crawford, ibid. 122.

1917 Euphalerus propinquus Van Duzee, Cat. Hemip. N. A. 803.


Length to tip of folded wings 3 mm.

Color: General color white to light green with red dots and vermiculations on head and thorax. Forewings nearly transparent, dark from clavus to apex, many small brown spots in darkened area, apical margin alternately black and white, small opaque white spots on veins.

Structure: Head large, broader than thorax, rugose. Vertex broad, twice as wide as long, nearly plane, discal impressions very broad, shallow. Genal processes large, broad, swollen, continuous with vertex, roundly truncate, 1/2 as long as vertex, pubescent. Antennae 1-1/4 times as long as width of head, a small tubercle ventrad of insertion. Thorax rugose, very strongly arched. Pronotum descending anteriorly. Meso and metascutellum conically produced dorsad. Later with a small protuberance on each side. Forewings rhomboidal, rugose; Rs somewhat sinuate, sharply curved to costa, not attaining apex of wing, M somewhat sinuate, marginal cells about equal, pterostigma of moderate size.
Hind tibiae with small basal spur. Legs heavily pubescent.

Genitalia: Male proctiger short, stout, straight, parallel-sided, rounded apically. Forceps nearly as long as proctiger, with long pubescence; in lateral view broad, straight, enlarged toward apices, notched apically, anterior portion rounded, blunt, caudal part produced as a long, slender, curving black tooth, projecting cephalad and mesad, acute; in caudal view stout, curved outward basally then straight to incurving apical portion. Female genital segment about as long as rest of abdomen, with long sparse pubescence; dorsal valve strongly upcurved, subacute; ventral valve shorter than dorsal, thick, strongly upcurved from base, dorsal margin strongly sinuate, apex acute.

Numerous specimens are at hand from the Chiracahua, Huachuca and Santa Rita Mountains of Arizona, some of which were taken on *Amorpha fruticosa*, some swept from walnut. The type series was taken on *Ceanothus*. The latter is probably the host.

Type, female, no. 13100 U. S. N. M., Arizona, Morrison. Type examined.

_Euphalerus jugovenosus_ Tuthill

_Figs. 44, 45, 105._


X:70, 74.
Length to tip of folded wings 2.5 to 3 mm.

Color: Head, pronotum and prescutum white, with more or less vermiculate red markings; remainder of thorax dark red; legs somewhat lighter. Forewings hyaline except apex dark through cubital cell, latter black, apical margin alternately black and white; veins with rather regular opaque whitish areas and irregular red spots. Abdomen green, male genitalia and tip of female genital segment red.

Structure: Head, pronotum and prescutum rugose, rest of body punctate. Head broader than thorax, deflexed. Vertex nearly plane, twice as wide as long, posterior margin almost straight, discal impressions large. Genal processes large, a little more than 1/2 as long as vertex, very broad, somewhat divergent, blunt apically, moderately pubescent. Antennae about as long as width of head, a small tubercle ventral of insertion. Thorax very strongly arched. Pronotum nearly vertical. Prescutum with a small raised epiphysis on each corner caudally. Meso and metascutellum produced as a heavy conical process. Forewings short, narrowly rounded, rugose, twice as long as wide; veins very prominent, marginal cells small, cubital somewhat larger, $R_5$ sinuate, pterostigma moderately broad, very short. Small basal tubercle on hind tibiae. Legs moderately pubescent.

Genitalia: Male prostiger very stout, produced caudad as a broad lobe. Forceps straight, tapering to slender,
twisted, black apices extending mesad, acute, moderately broad in lateral view. Female genital segment shorter than rest of abdomen, large basally, strongly narrowed; dorsal valve sharply upturned, acute apically, a tuft of long setae before slender apical portion; ventral valve shorter than dorsal, upturned, acute.

In addition to the type series from Lockwood and Monterey, California, specimens from Los Angeles County, Alameda County, Santa Cruz Mountain and Delta in the same state are at hand.

Type, male, Lockwood, California, in Snow Collection, University of Kansas.

**Euphalerus adustus** Tuthill

Figs. 46, 47, 106.


Length to tip of folded wings 3.75 mm.

**Color:** Uniformly yellowish red, often with some white vermiculations on head and thoracic dorsum. Forewings hyaline, yellow. Abdomen sometimes green.

**Structure:** Body large, punctate. Head deflexed, as broad as thorax. Vertex plane, pubescent anteriorly, twice as long as wide, discal impressions slight. Genal processes cone-shaped, large, swollen, subacute, divergent, prominently pubescent, as long as vertex medially, on same plane as vertex.
Antennae 1-1/2 times as long as width of head. Thorax strongly arched. Pronotum moderately long, descending. Forewings long, rugose, 2-1/2 times as long as wide; R₃ somewhat sinuate, marginal cells about equal, pterostigma prominent, short but broad; 3 prominent radial areas on margin. Hind wings long, nearly equalling forewings. A large spur on base of hind tibiae.

Genitalia: Male proctiger short, straight, stout. Foreceps large, almost as long as proctiger; in lateral view very broad, straight, parallel-marginated; in caudal view broad basally, narrower apically, slightly arched; anterior margin heavily pubescent to roundly truncate apex, caudo-mesal margin produced as heavy, slightly bifid tooth, extending barely beyond apex. Female genital segment shorter than rest of abdomen; dorsal valve slightly longer than ventral, straight, acute; ventral valve attenuate, strongly upturned, apex black, acute.

Besides the type series from Utah and Colorado about 20 specimens of both sexes from several localities in Utah are before me. Some of those taken in the Wasatch Mountains by Koebele and accompanied by nymphs bear labels, Cercocarpus ledifolius.

Type, male, in Snow Collection, University of Kansas.
**Euphalerus tentillus** Tuthill

Figs. 49, 49, 107.


Length to tip of folded wings 2.5 mm.

**Color:** Uniformly red to brownish red, indistinct lighter markings on head and thorax. Forewings reddish fumate.

**Structure:** Head as wide as thorax, strongly deflexed. Vertex twice as wide as long, nearly plane, discal impressions very broad, somewhat bulging anteriorly, slightly pubescent on anterior margin. Genal processes large, conical, 2/3 as long as vertex, on nearly same plane as vertex.

Antennae slightly longer than width of head. Thorax moderately arched. Pronotum nearly vertical. Forewings somewhat rugose, short, slightly over twice as long as wide, 3 radular areas on margin; Rs slightly sinuate, marginal cells equal, pterostigma small. Hind wings nearly as long as forewings, thickly set with minute setae. A very small basal spur on hind tibiae.

**Genitalia:** Male procotiger large, stout, parallel-sided to truncate apex. Forceps about 2/3 as long as procotiger; in lateral view broad, enlarged apically; in caudal view broad at base, sharply narrowed, then moderately broad to
spines; caudo-mesal margin produced cephalad apically, in
dorsal view forceps appear double; heavy pubescence on
caudal margin. Female genital segment about as long as rest
of abdomen, large basally, suddenly narrowed, acuminated;
dorsal valve longer than ventral, acute, styliiform portion
slightly upcurved, radulate, spines retrorse, basal portion
with short even pubescence, a tuft of very long setae at base
of styliiform portion; ventral valve acute, a tuft of long
setae on basal portion.

Known only from the type series from Salt Lake City,
Utah.

Type, male, in Snow Collection, University of Kansas.

_Euphalkerus vermiculosus_ Crawford

1914 _Euphalkerus vermiculosus_ Crawford, U. S. N. M. Bull. 35:
119, 121.
1914 _Cephalopsylla ceanothi_ Crawford, Ibid. 122.
1917 _Euphalkerus vermiculosus_ Van Duzee, Cat. Hemip. N. A. 803.
X:72.
1937 _Euphalkerus beameri_ Tuthill, Ibid. 70, 73.

Length to tip of folded wings 3 mm.

Color: General color greenish white to yellow, more or
less brown on thoracic dorsum. Forewings hyaline, somewhat yellowish, to whitish opaque, at least one black spot at apex of clavus, usually fumate along apical margin, margin alternately black and white.

Structure: Head large, as broad as thorax, strongly deflexed, rugose. Vertex somewhat concave, over 1/2 as long as wide, discal impressions broad. Genal processes continuous with vertex, large, bluntly conical, swollen basally, 3/4 as long as vertex. Antennae less than 1-1/2 times as long as width of head, a small tubercle ventrad of insertion. Eyes large, strongly recessive. Thorax very strongly arched, both laterally and longitudinally, coarsely granular. Pronotum long, strongly descending, with small raised prominences laterally. Forewings small, slightly over twice as long as wide, broadly rounded, rugose; R₅ sinuate, long, marginal cells about equal, pterostigma of moderate size. Hind wings equalling forewings. Hind tibiae with basal spur.

Genitalia: Male proctiger moderately short, stout, straight, caudal margin slightly swollen, truncate apically. Forceps in lateral view straight, slightly swollen toward rounded spines, a large, black tooth apically, curving cephalo-mesad; in caudal view slender, strongly arched. Female genital segment almost as long as rest of abdomen, stout; dorsal valve slender apically, upturned, blunt; ventral valve nearly as long as dorsal, upturned, acute, dorsal margin sinuate.
Many specimens of this Ceanothus-inhabiting species are at hand from California, Oregon, Idaho and Montana.

The form described as *E. beameri* is not sufficiently distinct to warrant a specific designation, the chief difference being in the forewings and intermediate forms have come to light. As a matter of fact it appears that the type specimen of *vermiculosus* is the form called *beameri*.

Type, male, mountains near Claremont, California, Baker, in the Crawford Collection.

**Euphalerus rugipennis** Crawford


1914 *Euphalerus rugipennis* var. immaculatus Crawford, ibid. 121.

1914 *Cephalopsylla rugipennis* Crawford, ibid. 121.


1917 *Euphalerus rugipennis* var. immaculatus Van Duzee, ibid. 803.


Length to tip of folded wings 2.5 mm.

Color: Usual color uniformly green, more or less completely covered with small white spots, sometimes partly or entirely red.
**Structure:** Head coarsely punctate, as broad as thorax, deflexed. Vertex nearly plane, fully twice as wide as long, anterior margin slightly bulging medially, discal impressions shallow. Genal processes large, broad, bluntly rounded, divergent, not contiguous, heavily pubescent, 1/2 as long as vertex or more, on same plane as vertex. Antennae 1-1/4 times as long as width of head, a small tubercle ventrad of insertion. Thorax well arched, coarsely punctate. Pronotum descending anteriorly. Forewings coarsely rugose, thickened, semitransparent, twice as long as wide; Rs sinuate, marginal cells about equal in size, pterostigma rather small, not prominent. Hind wings nearly equalling forewings. Legs short, pubescent. A small basal spur on hind tibiae.

**Genitalia:** Male proctiger stout, somewhat swollen caudad. Forceps straight, heavily pubescent, especially on caudomesal margin; in lateral view moderately slender; in caudal view very slightly arched to spines which are black and sharply curved mesad; black apical tooth extending cephalomesad, acute. Female genital segment shorter than rest of abdomen, stout, with long sparse pubescence; dorsal valve sharply upcurved, subacute, a cluster of small setae at apex; ventral valve shorter than dorsal, strongly upcurved, acute, dorsal margin sinuate.

Many specimens of this beautiful little species are at hand from numerous localities in Arizona, California and
Oregon. Numerous specimens from California bear the label
Ceanothus cuneatus Nutt. One series of tender specimens and
nymphs from Los Angeles County, California, bears a label
Ceanothus rigidus Nutt. Apparently several species of Ceano-
thus may serve as host.

Type, male, no. 18099 U. S. N. M., Oracle, Arizona,
Hubbard and Schwarz. The type is in poor condition, the
head and wings of one side being gone.

Type examined.

The specimen which Crawford described as E. rugipennis
var. immaculatus is in the U. S. N. M. and according to Oman
is merely a tender specimen.

Genus Euphyllura Förster

1839 Thrips O. G. Costa (pro parte), Monogr. degl' insetti
ospitanti sull' olivo e nelle olive 2 ed. Napoli 23-25
(larva) [fide Aulmann].
1840 Psylla Foyer de Fons-Colombe (pro parte), Ann. Soc.
Ent. Fr. IX:111.
V:93.
1861 Euphyllura Flor, Bull. Soc. Imp. Nat. Moscou XXXIV:
337, 416-422.
403.
1912 *Euphyllura* Oshanin, Kat. paläs. Hemip. 126 [designates type].
1913 *Euphyllura* Aulmann, Psy. Cat. 67.
1917 *Euphyllura* Van Duzee, Cat. Hemip. N. A. 302.
1921 *Syntomoza* Enderlein, Ibid. 117.

Head large, strongly deflexed, not vertical, as broad as thorax or broader. Eyes large, elongate, strongly recessive, extending back over propleurites. Vertex rather flat, more or less notched above, or extending over, base of antennae, a tubercle next eye. Genal processes on same plane as vertex, very broad, blunt, usually rectangular, contiguous. Antennae shorter than width of head. Thorax very strongly arched, pronotum strongly descending, extending far down laterad. Forewings rhomboidal, coriaceous, more or less rugose, venation somewhat variable, pterostigma variable from large to obsolete. Hind tibiae without basal spur, with several black spines apically. Two black claws on basal segment of metatarsi.

Logotype: *Euphyllura olivina* O. Costa.

Enderlein erected the genus *Platystigma* for those species which have a pterostigma but are without, usually entirely
without, crossveins in the pterostigma and with the cubitus of the hind wings not branched. In this group he included all of the North American species some of which have a pterostigma and some do not. As the pterostigma is very weak and variable in the entire group I think its presence or absence certainly not of sufficient importance to warrant a separate genus. The so-called crossveins in olivina are so slight as to be scarcely significant specifically. I do not consider the venation of the hind wings of much significance as the entire wings are somewhat vestigial in some members of the family and the veins are very weak in almost all.

Syntomoza was distinct from Platystigma solely in the lack of a pterostigma.

Key to the genus Euphyllura

1. Veins R₉ and M (including branches) of forewing very strongly sinuate............................................. 2.
   R₉ and M not or but very slightly sinuate............... 3.
2. Eyes elongate, strongly recessive, extending to mesonotum; forewings brown basally, light apically.............................................. arbuti Schwarz.
   Eyes rounded, not strongly recessive, not covering prothoracic pleurites; forewings uniformly brown.............................................. arbuticola Crawford.
3. Unicolorous red to brown to black......................... 4.
    Not unicolorous red to black, forewings with
white maculae, entirely light or entire body and
forewings light with minute brown spots............... 5.
4. Vertex plane, not swollen nor rounded down anteriorly;
genital processes on same plane as vertex; antennae
2/3 as long as width of head........ arctostaphyli Schwarz.
Vertex swollen anteriorly, rounded down to genae;
genital processes deflexed from plane of vertex;
antennae 1/2 as long as width of head........ leyla n. sp.
5. Forewings red with two transverse white
maculae............... arctostaphyli bifasciata Crawford.
Forewings unicolorous................................. 6.
6. Forewings white or cream, head and thoracic dorsum red..7.
Body and forewings whitish with numerous minute brown
dots, evenly scattered over surface; more or less
covered with large flaky wax granules..... pruinosa Martin.
7. Forewings with a loose, snowy white pulverulence;
female genital segment short, dorsal valve not
sinuate, about as long as ventral...... niveipennis Schwarz.
Forewings cream, without loose pulverulence; female
genital segment long, dorsal valve sinuate, at-
tenuate, longer than ventral.............. bicolor Martin.
Euphyllura arbuti Schwarz


1913 Euphyllura arbuti Aulmann, Pay. Cat. 67.
1917 Euphyllura arbuti Van Duzee, Cat. Hemip. N. A. 802.

Length to tip of folded wings 3.25 to 4 mm.

Color: General color yellow to brown. Darker on vertex and thoracic dorsum. A broad brown macula on forewings extending from base obliquely to anal margin distal of splex of clavus.

Structure: Finely punctate, glebrous, shining. Head broader than thorax, strongly deflexed. Vertex plane, twice as wide as long, posterior margin nearly straight, emerginate anteriorly over antennae, discal impressions very slight. Genae continuous with vertex, produced as truncate, contiguous lobes 1/4 as long as vertex. Antennae slender, slightly over 2/3 as long as width of head. Eyes slender and very strongly recessive, extending back to mesonotum. Thorax
very strongly arched. Pronotum moderately long, straight, nearly vertical. Forewings coriaceous, rugose, semitransparent, obliquely rounded from apex of clavus to rounded apex at costa, twice as long as wide; R₃ and M, including branches, very strongly sinuate, medial cell slender, sinuate, cubital small, R₃ extending nearly straight to costa, no pterostigma, a slight notch in costa proximad R₁. Membrane of hind wings thickly set with minute setae.

Genitalia: Male proctiger straight, longer than forccep. Forcep long, straight; in lateral view moderately slender, apices excavate cephalically leaving a blunt black-tipped tooth. Female genital segment shorter than rest of abdomen; dorsal valve straight, evenly tapered, subacute, longer than ventral; ventral valve straight, tapered to acute apex.

This species is represented in the material at hand by specimens from Jamesburg, Sargent and Boulder Creek, California and from Grants Pass and Canyonville, Oregon. Recorded from British Columbia by Klyver. Its host plant is madrone, Arbutus menziesii. Ferris and Hyatt discuss the life history and habits in detail. The nymphs live in waxen cells, usually under scales of the bark. Breeding apparently occurs throughout the year.

Type, male, no. 3145 U. S. N. M., Santa Cruz County, California, Keboele.

Type examined.
Euphyllura arbuticola Crawford

1914 Euphyllura arbuticola Crawford, U. S. N. M. Bull. 35:113.
1917 Euphyllura arbuticola Van Duzee, Cat. Hemip. N. A. 302.

"This species resembles very closely arbuti in most respects, including size and general color, but differs in the color of the forewing, being uniformly darker brown and not bicolored, with sometimes a lighter area across the base; the venter is darker than in arbuti. Body a little more rugose. Genal lobes shorter, and more squarely truncate; antennae slightly shorter. Head and thorax similar. Wings somewhat larger, thicker, more rugose; veins even more sinuate.

"The chief difference is in the male genitalia; anal valve stouter, relatively shorter; forceps distinctly thicker, without apical emargination on anterior edge, and with a distinct tooth on posterior edge inside about 1/3 the length from apex, broadly rounded at apex.

"Described from six males and four females from Chiric Mountains, Arizona (H. G. Hubbard), on Arbutus arizonica, in September.

"Type no. 18098, U. S. N. M." Crawford.

One female which is apparently this species is at hand from the Huachuca Mountains, Arizona, Aug. 22. From it I
add the following: Antennae thicker than in arbuti. Eyes much smaller, scarcely recessive, not covering prothorax laterally. Forewing not as elongate and slender apically. Type examined.

Euphyllura arctostaphyli Schwarz

1913 Euphyllura arctostaphyli Aulmann, Psy. Cat. 67.
1914 Euphyllura arctostaphyli Crawford, U. S. N. M. Bull. 35:116.
1917 Euphyllura arctostaphyli Van Duzee, Cat. Hemip. N. A. 302.
1932 Euphyllura arctostaphyli Kliver, Pan-Pac. Ent. VIII:15.

Length to tip of folded wings 2.0 to 3.5 mm.
Color: General color reddish to reddish brown, variable from light to very dark. Legs lighter to yellowish. Forewings
generally brownish, veins red. Entire body punctate, with more or less short pubescence.

**Structure:** Head large, broad, as broad as thorax or slightly broader, strongly deflexed. Vertex plane, nearly straight-marginated posteriorly, very deeply emarginate anteriorly over insertion of antennae, forming a tubercle next the eyes, nearly twice as wide as long, discal impressions slight. Genal processes continuous with vertex, short, very broad, roundly truncate, contiguous. Antennae distinctly shorter than width of head, 2/3 as long or more. Thorax broad, very strongly arched. Pronotum sharply descending anteriorly. Forewings about twice as long as wide, thickened, coriaceous, somewhat rugose, surface very rough, somewhat rhomboidal, a more or less prominent notch on costal margin opposite furcation of R; cubital petiole longer than R, R₅ moderately long, straight, turned to costa, marginal cells large, medial broadly flaring, branches of media slightly sinuate, R₁ angling, indistinct near costa, no definite pterostigmas. Hind wings thickly set with minute setae.

**Genitalia:** Male proctiger nearly straight, slightly swollen, apex slightly produced caudad. Forceps nearly as long as proctiger, spatulate, enlarged apically; in caudal view slender, slightly arched, apices touching. Female genital segment shorter than rest of abdomen; dorsal valve
slender apically, nearly straight to blunt apex; ventral valve nearly as long as dorsal, upturned, acute.

This species is very abundant on several species of manzanita (Arctostaphylos) in the western part of North America. It shows a great deal of variation in most characters. Schwarz (1904) named the variety niveinennis which was raised to specific rank by Klyver in 1930 after a detailed study of both forms. He describes and figures the principal differences. Martin in 1931 added two more to the list of named variations. These four forms can be quite easily separated in most instances. I am not convinced that they represent distinct species however, but I believe it will be less confusing to retain the names until such time as some careful biological work shall determine the status of this complex.

In 1920 Crawford named the color variety E. arctostaphyi bifasciata which differs from the typical form solely in color and is evidently a true color variety. Specimens are at hand from numerous localities in California, Oregon, Washington, Arizona, Colorado, New Mexico, Montana and Mafeking, Manitoba. It is also recorded from Wyoming by Crawford, Nevada and British Columbia by Klyver.

and A. viscidá Parry.

Type no. 3143 U. S. N. M., several specimens on one pin, Placer County, California, Koebel.

Types examined.

Euphyllura arctostaphyli var. bifasciata Crawford


Similar to species except forewings with two white areas, one a broad band across wing basally, the other more irregular, oblique, near apex, not extending entirely across the wing to anal margin.

From the material at hand this pattern variation seems to occur ubiquitously with the typically colored individuals.

Type, female, Placer County, California, August 24, 1917, W. M. Giffard, no. 463 California Academy of Sciences (Crawford).

Euphyllura niveipennis Schwarz


1913 Euphyllura arctostaphyli niveipennis Aulmann, Psy. Cat. 67.
1914 *Euphyllura arctostaphyli niveipennis* Crawford, U. S. N. M.
Bull. 35:117.

1917 *Euphyllura arctostaphyli niveipennis* Van Duzee, Cat.

XXXII:153-160.

IV:69.


Similar to *E. arctostaphyli*, differing in the following characters: Forewings snowy white, pulverulent, due to what appears to be a loose wax deposit (Klyver, 1930, states that it is "small colorless cutinized plates"), often a few bright red spots on margin; female genital segment distinctly shorter, valves equal in length, dorsal valve not slender and attenuate but more nearly acute and slightly downcurved apically, entire segment thickly set with short fine setae, of equal length, giving it a very distinctive appearance; male forceps broader from base, not enlarged apically, more tapered apically in lateral view and slightly curved cephalad.

For an exhaustive discussion of the differences between these two forms see Klyver, 1930. In the large series of *arctostaphyli* at hand the range of size is so great that it includes that of *niveipennis* also.
Specimens are at hand from several localities in California, some of them from *Arctostaphylos viscosa* Perry.

Types, 12 specimens on 1 pin, no. 8144 U. S. N. M., Placer County, California, Koebel.

Types examined.

**Euphylleura pruinosa** Martin


Similar to *E. arctostaphyli* except as follows: More pubescent, entire body including forewings more or less covered with a flaky white wax deposit apparently secreted by the setae which cover the body; general color of body light yellow, with scattered red punctations, medio-anterior portion of prescutum and four broad longitudinal stripes on scutum brown, forewings white with numerous very small brown spots, slightly more dense apically; female genitalia similar to *arctostaphyli*; male more like *niveipennis*, forceps even broader in lateral view.

Specimens are at hand from numerous localities in California taken on *Arctostaphylos pungens* H. B. K., *A. glauca* Lindl., *A. tomentosa* Pur.

It should be noted that although this form is very distinct in appearance from *arctostaphyli* the differences are almost solely in color, greater pubescence and presence of a
prominent waxy deposit.

Type, male, San Diego County, California, in Snow Collection, University of Kansas.

Euphyllura bicolor Martin


Similar to E. arctostaphyli from which it differs as follows: Larger (3.5 to 4.5 mm. in length); general color yellow, with small red spots, eyes and thoracic dorsum almost entirely red; forewings cream colored, opaque, (not appearing pulverulent as in niveipennis and rugee of wing more apparent); medial cell very large; female genital segment longer, dorsal valve sinuate, attenuate, downcurved to blunt tip, pubescence more as in niveipennis but not as thick. Male genitalia as in niveipennis.

This form is consistently larger than the preceding three in the material at hand. The female genitalia is its most distinctive feature other than color.

Numerous specimens are before me from various localities in California, from several species of Arctostaphylos including A. glauca Lindl., A. menzanita Perry, A. zacensia East, A. patula Greene and A. glandulosa East.

Type, male, Alpine, California, in Snow Collection, University of Kansas.
Euphyllura leya n. sp.

Figs. 50, 51, 108.

Length to tip of folded wings 2.25 to 2.75 mm.

Color: General color red to black. Forewings very thickly streen with small brown spots except at tip of clavus.

Structure: Head and thorax punctate. Head and prothorax vertical. Vertex with broad discal impressions, twice as wide as long, swollen anteriorly, rounded down to anterior ocellus, and smoothly to genal processes, produced as a blunt lobe next to eyes. Genal processes very short, quadrate, scarcely contiguous, not deflexed from plane of vertex. Antennae very short, not much over 1/2 as long as width of head. Thorax very strongly arched. Prothorax straight. Prescutum strongly deflexed. Forewings slightly rhomboidal, rounded apically, rugose, thickened, not notched on costal margin, twice as long as wide; Rs straight to near apex then curved to costa, branches of media strongly divergent, straight, medial cell larger than cubital, pterostigma lacking.

Genitalia: Male proctiger long, slightly tapering apically. Forceps spatulate, straight; in lateral view broad, narrowed apically. Female genital segment very large, much longer than rest of abdomen; dorsal valve tapering to acute, upturned apex, dorsal margin sinuate; ventral valve thick,
shorter than dorsal, evenly upcurved to acute apex.

Described from 2 females and 8 males bearing the data, 10 miles west of Bend, Oregon, June 21, 1939, Gray and Schuh.

Holotype, female, allotype, male, and paratypes in the collection of Oregon State College. Paratypes in author's collection.

Genus Pachypsylla Riley

1861 Psylla Osten-Sacken (pro parte), Ent. Zeit. XXII:422.
1895 Pachypsylla (Elastophyza) Riley, ibid. 74.
1913 Pachypsylla Aulmann, Psy. Cat. 29.
1914 Pachypsylla Crawford, U. S. N. M. Bull. 85:109
   [designates type].
1917 Pachypsylla Van Duzee, Cat. Hemip. N. A. 799.

Head small, vertical. Eyes hemispherical, lateral. Ocelli large. Vertex plane or somewhat rounded anteriorly, quadrate, broader anterior to eyes than on posterior margin. Sense produced as short lobate processes, depressed strongly from plane of vertex. Antennae short, about as long as width of head. Thorax large, strongly arched. Forewings more or less rhomboidal, often opaque or semipaque, rugose, punctate, or covered with disc-shaped cuticular thickenings, M + Cu
with common base, marginal cells more or less elongate, pterostigma present, small to moderate size. Hind wings with prominent venation, at least basal vein (R + M + Cu) heavily sclerotized. Hind tibiae without basal spur, with several small black spurs apically. Basal segment of metatarsi with two black claws. Metacoxal spurs, large, stout, blunt.

Logotype: *Pachysylla venusta* Osten-Sacken.

Riley in 1933 mentioned, in a short article on the galls of *Celtis*, that these insects belong to a new genus which in a paper he had prepared was called *Pachysylla*. He then proceeded to give a short characterization of the genus. The aforementioned paper did not appear until two years later.

The genus is composed entirely of gall-forming species which inhabit *Celtis* spp., the hackberries. It is known only from North America. Boselli (1929) described the nymph of an unknown species of psyllid forming galls on *Celtis sinensis* in China which may belong to *Pachysylla*.

The subgenus *Blastophyssa* was erected by Riley for *P. celtidis-gemma*. The differences between it and the other species are insufficient to warrant any such distinction however.

**Key to genus Pachysylla**

1. Head and thoracic dorsum with short stiff pubescence, not shining; marginal cells of forewings very elongate;
forewings not rugose................................. 2.

Head and thorax appearing glabrous, shining (often with sparse, minute pubescence); marginal cells less elongate, broad; forewings more or less rugose.......... 4.

2. Large species (5.5 to 6 mm.).............. venusta Osten-Sacken.

Smaller species (4 mm. or less)...................... 3.

3. Length to tip of folded wings 3 to 4 mm.

...................................................... celtidis-wamma (Fletcher).

Length to tip of folded wings 2.5 mm. or less

...................................................... celtidis-vesiculum Crawford.


Forewings maculate.................................. 5.


Branches of media not sinuate...................... 6.

6. Forewings finely mottled apically.............. dubis Patch.

Forewings with large maculae (sometimes finely mottled also)................................. pallida Patch.

Pachypsylla venusta (Osten-Sacken)

1861 Psylla venusta Osten-Sacken, Ent. Zeit. XXII:422.

1876 Psylla celtidis-grandis Riley, Johnson's Univ. Cycl.

(gall) [fide Riley].

1883 Pachypsylla venusta Riley, Can. Ent. XV:157 (gall only).

1883 Psylla venusta Fyles, ibid. 84, 199.
Length to tip of folded wings 5 to 5.5 mm.

Color: General color tawny with numerous black markings, latter often so extensive that general color black, markings tawny would be more accurate. Dorsum of thorax longitudinally
striped. Forewings whitish, maculate in well colored specimens with black as follows: a broad band of small spots across apical third becoming more dense apically, a clear rectangular area on margin between the apices of each pair of veins; small single maculae at base of pterostigma, along basal vein and R, at fuscation of M and Cu and two or three on anal margin. Antennae with dark annules on apex of each segment.

Structure: Entire body punctate, head coarsely. Head much narrower than thorax, vertical. Eyes large, hemispherical. Vertex plane, quadrate, emerginete posteriorly, rounded to genae anteriorly, 3/4 as long as wide, discal impressions small, foveate. Genal processes lobate, strongly divergent, heavily pubescent, about 1/3 as long as vertex, much depressed from plane of vertex but parallel to it. Antennae slightly longer than width of head. Thorax very strongly arched, very short sparse pubescence dorsally. Pronotum strongly descending, nearly vertical, long. Prescutum large, descending anteriorly. Forewings large, hyaline, rhomboidal, slightly over 2-1/2 times as long as wide, membrane thickly set with minute setae, veins biseriately set with small setae; R₃ long, slightly sinuate, marginal cells elongate, cubital larger than medial, M + Cu 1/2 as long as R, pterostigma of moderate size. Hind wings nearly equalling forewings, thickly set with minute setae, venation prominent,
R + M + Cu heavily sclerotized. Legs large, heavily pubescent, hind tibiae with small basal tubercle.

**Genitalia:** Male proctiger short, stout, roundingly produced caudad, near apex sharply emarginate, apical epiphysis thus formed sharply flexed caudad. Forceps in lateral view broad basally, strongly narrowed then slightly tapering to subacute apices; in caudal view moderately broad basally, tapering to incurved subacute tips. Female genital segment very large, longer than rest of abdomen; dorsal valve straight, apical third slender, roughened, apex acute, unturned; ventral valve roughened toward apex, gently unturned, acute.

Baron Osten-Sacken in an article on the Galls of North America describes the galls he found on the leaf petioles of *Celtis occidentalis* and then says, "I reared therefrom a beautiful large *Psylla*, (*P. venusta* n. sp.) with black-flecked wings. The peculiar form of the apex of the metasternum and of the wing veins will no doubt make it necessary to erect a new genus for this species." Since this mention of the insect constitutes a description under the rules of nomenclature it is fortunate that he was dealing with this species since the gall is quite typical in this instance.

The galls are large (av. 1 to 1.5 cm. in diameter), more or less spherical, not completely closed on one side and form on the leaf petioles. They remain attached to the tree usually, the mature insects emerging in the spring when the
temperature becomes sufficiently high. They may be brought out during the winter by bringing them into a warm room. The last stadium nymph crawls from the gall and emerges as the adult very shortly thereafter. The galls are polythelsamous.

Known from Iowa, Kansas, Colorado, Texas, New Mexico, Ohio, Mississippi, Tennessee, North Carolina, New Jersey and Connecticut. It is undoubtedly much more widespread throughout the range of its host.

**Pachypsylla celtidis-mamma** (Fletcher)

1876 **Psylle celtidis-mamma** Riley, Johnson's Univ. Cycl. (gall) [fide Riley, Can. Ent. XV:157].

1883 **Psylle celtidis-mamma** Fletcher, Rept. Ent. Soc. Ont. 1882, 13th:79-80 [reprint of Riley 1876 and describes insect].

1883 **Psylle celtidis-mamma** Fletcher, Can. Ent. XV:40.

1893 **Pachypsylla celtidis-mamma** Riley, ibid. 157-158 [gall].

1893 **P. celtidis-mamma** Fyles, ibid. 199.


1890 **Pachypsylla c. memma** Riley, 5th Rept. U. S. Ent. Comm. 615, 616, 619.


1895 **Pachypsylla celtidis-mamma** Mally, ibid. II:154.

1910 **Pachypsylla rohweri** Cockerell, Ent. News XXI:130.

1913 Pachypsylla celtidis-mamma Aulman, Psy. Cat. 30.

1914 Pachypsylla c.-mamma Crawford, U. S. N. M. Full. 35:110.

1917 Pachypsylla celtidis-mamma Van Duzee, Cat. Hemip. N. A. 300.


Length to tip of folded wings 3 to 4 mm.

Color: General color dull brownish yellow with many variable black and brown markings. Antennae with dark annulus apically on each segment. Forewings white with numerous small round brown spots usually more or less fused each side of an oblique subapical band almost free of them. Markings extremely variable, especially on the forewing. Very commonly a large irregular macula appears centrally, occasionally this is very sharp and dark with the remainder of the wing almost immaculate.

Structure: Entire body punctate and with short pubescence, most prominently on head and thoracic dorsum. Head narrower than thorax, vertical. Vertex plane, nearly
quadrate, 2/3 as long as wide, discal impressions broad, shallow. Genal processes depressed from plane of vertex but parallel to it, short, strongly divergent, bluntly rounded, 1/3 as long as vertex, heavily pubescent. Antennae about 4/5 as long as width of head, arising far down on head. Thorax strongly arched. Pronotum nearly vertical. Prescutum large. Forewings 2-1/2 times as long as wide, very slightly rhomboidal, surface covered with minute circular plates, veins very prominent, biseriately setate; R₉ long, somewhat sinuate, marginal cells very elongate, equal in length, medial broader, M + Cu very short, 1/3 as long as R, pterostigma large, yellowish. Legs long.

**Genitalia:** Entire genital segment of male heavily pubescent. Proctiger stout, slightly enlarged from base to near apex then sharply emarginate on caudal margin, a large apical epiphysis thus formed, flexed caudad. Forceps stout; in lateral view anterior margin somewhat sinuate, narrowed apically to subacute spicules; in caudal view moderately stout basally, arched and tapered to acute spicules. Female genital segment shorter than rest of abdomen, slender; dorsal valve straight, attenuate apically, tip acute; ventral valve shorter than dorsal, slightly, evenly, upcurved to acute apex.

The galls formed by this species occur on the leaves of hackberry developing into a more or less mammiform growth on the underside of the leaf. On the upper surface of the leaf
a depression forms, cupping down into the gall. The shape of
the gall itself is quite variable, often with a nipple-like
tip, sometimes conical, glabrous or pubescent, etc. Usually
they are monothalamous.

The adults emerge in the fall, overwinter in crevices of bark etc., early in the spring they fly to the twigs and
after mating the females begin to deposit eggs about as soon
as the leaves begin to appear. The nymphs feed on the lower
side of the leaves and are soon enclosed in the gall. There
is but one generation per year, the nymphs reaching maturity
in September.

In 1876 Riley in an article on "Galls" in Johnson's
Universal Cyclopaedia (which I have not seen) discussed the
gall formation of this entire group in a very general way.
Fletcher (1883) purports to "reproduce this in full", but his
excerpt does not contain the name celtidis-mamme at all.
However Riley (1883) credits the use of the name to that
article. Fletcher in the above mentioned article unfortune-
tely proceeds to discuss the coloration and some of the structure
of the insect and thus becomes the author of the species since
Riley's original use of the name is an utter nomen nudum and
his detailed description which he headed "n. sp." did not
appear until 1835. Fletcher mentions no specific specimens
and undoubtedly kept none and so Riley's designated types in
the U. S. National Museum stand as the type specimens. There
are numerous cotypes in the series on four pins, the type
number being 657.

The type of *Pachypsylla rohweri* Cockerell (no. 13476) is in the National Museum and is in my opinion identical with *celtidis-mamma*.

The variation in this species is quite marked, especially
the coloration, most markedly the wing pattern, so much so
that when first encountered it appears that several species
must be present. Fortunately the insect is very abundant
throughout its range and thus almost all of those who have
dabbled in the group have come to the conclusion that the
variants are so numerous and diverse that they are in-
distinguishable and inconstant.

Riley, apparently assuming that the shape of a gall was
an extremely accurate and highly constant specific character
(even more so than the structure of the insect) proposed
names for a species of *Pachypsylla* for each different shape of
gall that he found. With these names he described the galls
in detail but made no mention whatsoever of the insects. In
a preliminary statement however he said "the yet undescribed
species are all so closely allied to *P. c-mamma* that they
can only be distinguished with difficulty." Elsewhere (Can.
Ent. XV:159) he says of one of them "*P. c-mamma* so closely
resembles another species (*P. c-cucurbite* M. S. mini), how-
ever, that without the galls it would be difficult, if not
impossible, to separate them—a not uncommon occurrence among
gall-making species." Anyone rearing these insects from the
galls and not blinded by the above assumption of infallible
gall specificity must soon come to the conclusions reached
by Kelly (1994) that, "the shape and size of the gall is not
at all constant............. It was found that P. c.-mamma
occurred in all the different variations, thus showing that
these variations are not of specific importance." Fortunately
the series of names proposed by Riley stand as nomina nuda.
Some few of them have cluttered up the literature of galls,
however, and do until the present time.

This species frequently becomes a nuisance in the house
in autumn when seeking hibernation quarters. Large numbers
often collect on the screens, which barrier they readily
penetrate and then move into the household to hide for the
winter. Typically they seek shelter in the rough bark of the
hackberry and other trees.

I have seen specimens of this very abundant animal from,
or definite records are available of its occurrence in, the
following states and provinces: Colorado, Texas, Arizona,
Utah, Oklahoma, Kansas, Nebraska, Iowa, Minnesota, Illinois,
Indiana, Ohio, North Carolina, New Jersey, New York, Con­
nnecticut and Ontario.

It undoubtedly occurs, however, throughout the range of
its host species, hackberry (Celtis occidentalis L.).
Pachypsylla celtidis-vesiculum Crawford

1890 *Pachypsylla celtidis-vesiculum* Riley, 5th Rept. U. S. Ent. Comm. 618 [gall].


1913 *Pachypsylla celtidis-vesiculum* Aulmann, Psy. Cat. 30 [lists].

1914 *Pachypsylla c.-vesiculum* Crawford, U. S. W. M. Bull. 85: 112 [describes].

1917 *Pachypsylla celtidis-vesiculum* Van Duzee, Cat. Hemip. N. A. 801.


Length to tip of folded wings 2 to 2.5 mm.

This form is very similar to *celtidis-mamma* but seems to be a distinct species. It is distinctly smaller; the wing pattern is often more or less diffuse. Other minor differences have been noted by Crawford and Caldwell none of which will hold when a large series from various localities is studied. The sudden narrowing midway of the ventral valve of the female genital segment is the most consistent of these.

The gall formed on the leaves of the hackberry is of a quite different type than that of *celtidis-mamma*, it is
blisterner-like and more prominent on the upper than on the
lower surface. Very many galls are frequently found on the
same leaf and they are found on the same leaf with celtdis-
memme galls. This species is extremely abundant. It
overwinters in the adult stage as does its relative and in
company with it sometimes becomes a household nuisance in
the fall.

All uses of the name celtidis-vesiculum until 1914 are
nomina nuda. Although the gall was often described no one
mentioned the insect until Crawford discussed it briefly in
his monograph.

It is known from Iowa, Nebraska, Kansas, Oklahoma,
Arizona, Louisiana, Ohio, New York, New Jersey and Connecti-
cut. It doubtlessly occurs throughout the range of its host
(Celtis).

No type has ever been designated, the cotypic series is
presumably in Crawford's collection.

Pachypsylla celtidis-gemma Riley

Soc. Wash. 11:74-75.

615, 616, 618.

1913 *Pachypsylla* (Blastophyesa) *celtis-gemma* Aulmann, Psys. Cat. 30.
1917 *Pachypsylla celtidis-gemma* Van Duzee, Cat. Hemip. N. A. 801.
1933 *Pachypsylla celtidis-gemma* Primley, Ins. N. C. 104.

Length to tip of folded wings 3 to 3.5 mm.

**Color:** General color brownish yellow, vertex and legs darker, forewings evenly brown, opaque.

**Structure:** Head much narrower than thorax, vertical, coarsely punctate, shining. Vertex straight on posterior margin, quadrate, rounded down to genal processes anteriorly, 2/3 as long as wide, discal impressions small, foveate. Genal processes short, rounded, strongly divergent, 1/3 as long as vertex, pubescent, much depressed from plane of vertex but on nearly parallel plane. Antennae a little longer than width of head. Thorax large, very strongly arched, shining, glabrous. Pronotum nearly vertical. Prescutum large. Forewings slightly over twice as long as wide, narrowly rounded.
apically, costal margin slightly concave at pterostigma, rugoso-punctate, strongly convex, veins scarcely raised from surface except basally; R₂ short, nearly straight, marginal cells of moderate size, equal, not extremely elongate, M₁ slightly sinuate, R nearly twice as long as M + Cu, pterostigma very small. Hind wings nearly equalling forewings, thickly set with minute setae, venation prominent. Legs long, heavily pubescent.

**Genitalia:** Male proctiger stout, roundly swollen caudal, with a prominent epiphysis. Forceps short; in lateral view straight, broadest basally, apically tapered to subacute tips; in caudal view stout, strongly arched to acute apices. Female genital segment slender, shorter than rest of abdomen; dorsal valve slightly upcurved, tip subacute; ventral valve evenly upcurved to acute apex, nearly as long as dorsal.

The shining head and thorax of this species and those following, readily distinguish them from the preceding forms. The adults appear in the spring (April and May in Iowa) having overwintered as nymphs in the galls. The galls are formed from the axillary buds on the twigs, usually they are polythalamous. Weiss (1921) gives a detailed account of the life history.

Specimens are at hand from Maryland, New Jersey, St. Catharine's Island, Georgia, Iowa, Nebraska, Kansas, Oklahoma and Louisiana. It is also recorded from Virginia, District
Numerous cotypes (galls, nymphs and adults), no. 659
U. S. N. M.

**Pachypsylla celidis-inteneris** Mally

1913 *Pachypsylla celidis-inteneris* Aulmann, Psy. Cat. 30.
1914 *Pachypsylla inteneris* Crawford, U. S. N. M. Bull. 35:113.
1917 *Pachypsylla inteneris* Van Duzee, Cat. Hemip. N. A. 301.

Length to tip of folded wings 3.5 to 4 mm.

**Color:** General color dark brown to black. Vertex and thoracic dorsum with more or less yellow, sometimes entirely yellow. Forewings hyaline except for an irregular macula usually as follows: black along pterostigma becoming dark brown and continuing around apex as a broad band onto tip of clavus, extending along Cu and basal vein, sometimes extending across to costa leaving an isolated clear area medially, or entire basal 2/3 dark.
Structure: Head narrower than thorax, vertical. Vertex coarsely punctate, shining, with sparse minute pubescence, quadrate, strongly rounded down anteriorly, posterior margin straight, 2/3 as long as wide, discal fovea very small. Genal processes short, blunt, scarcely divergent, 1/3 as long as vertex, sparsely pubescent, strongly depressed from plane of vertex. Antennae stout, slightly longer than width of head. Thorax strongly arched, shining. Pronotum descending but not vertical. Forewings somewhat rugose (less so than in _celtis-gemma_), shining, 2-1/2 times as long as wide, rounded apically; Rs nearly straight, long, marginal cells large, equal, branches of M sinuate, M₁ more strongly so, pterostigma small. Hind wings thickly set with minute setae, venation prominent. Legs large, heavily pubescent.

Genitals: Male proctiger in lateral view stout, straight, slightly swollen caudally, with a prominent epiphysis apically. Forceps in lateral view moderately broad, basally enlarged, then tapered to apices; in caudal view broad basally, arched, narrowed on lateral margins in apical 1/3 to acute apices. Female genital segment slender, shorter than rest of abdomen; dorsal valve straight, apical portion slender to subacute apex; ventral valve shorter, suddenly narrowed 2/3 of way to apex, acute.

This species is quite similar to _celtis-gemma_ from which it can be distinguished by the maculate forewings and
the venation, chiefly the sinuate branches of media. The adults emerge in the spring from the galls which are located beneath the bark on the twigs or bases of the larger limbs.

The type series, three females, is in the Iowa State College Collection. A female bearing Mally's type label, reared from a gall by him, at Ames, is designated as the lectotype. When Caldwell was working with this genus in Ohio he inquired as to the whereabouts of the type of this species. At that time Mally's specimens were hidden away where they had gone unnoticed apparently since his departure from Ames, and Caldwell was informed that none of Mally's specimens were here; he therefore proceeded with his description of P. unguiculata. I have at hand a specimen of unguiculata and it is without doubt inteneris although much better colored than any of the types which are all somewhat tenereal.

Known from Iowa, Illinois and Ohio.

Pachysylyle dubia Patch

1914 Pachysylyle dubia Crawford, U. S. N. M. Bull. 35:113.
1917 Pachysylyle dubia Van Duzee, Cat. Hemipt. N. A. 301.

Crawford who saw the types of this species has the following to say concerning it. "I have examined a paratype of
this and the following species (pallida) and both seem to be
distinct from c.-gemma though closely related. The chief
difference is in the mottled appearance of the forewing
instead of being uniformly brown.

"Seven paratypes in the collection of Cornell University,
but the locality is not given for any of them."

Miss Patch in her original description says no more—
rather a little less—as she apparently had no specimens of

\textit{c.-gemma}.

There are no further records of the occurrence of this
form.

\textbf{Pachypsylla pallida} Patch

\hspace{1cm} 202:225.


1917 \textit{Pachypsylla pallida} Van Duzee, Cat. Hemip. N. A. 301.

Length to tip of folded wings 3.5 mm.

Color: General color greenish yellow to yellowish brown.

Prescutum especially of a green cast. Forewings hyaline or
somewhat whitish except for dark maculae as follows: three
broad transverse bands, one apical, one crossing base of
medial cell, the third arising at costal angle, extending
obliquely to apex of clavus, all three converging on anal
margin at tip of clavus, latter two quite irregular.

Pterostigmas dark.

**Structure:** Head narrower than thorax, vertical. Vertex plane, coarsely punctate, shining, somewhat rounded down anteriorly, over 1/2 as long as wide, discal foveae small, prominent. Genal processes elongate, blunt, slightly pubescent, somewhat divergent, about 1/3 as long as vertex. Antennae a little longer than width of head. Thorax well arched. Pronotum nearly vertical. Prescutum large. Forewings broad, a little over twice as long as wide, finely rugose, set with minute setae, at least basally, broadly rounded; R₃ short, slightly sinuate, marginal cells equal, broad, R over twice as long as M + Cu, pterostigma small, costal margin slightly concave. Hind wings thickly set with minute setae. Legs heavily pubescent.

**Genitalia:** Male genitalia very similar to *celtidis-internus*. Proctiger somewhat swollen caudally, with a caudally flexed epiphysis. Forceps enlarging from moderately narrow base, then converging to subacute spicula; in caudal view strongly arched, tapered to acute spicula. Female genital segment long, slender, upcurved; dorsal valve slender, evenly upcurved, attenuate in apical half, apex subacute; ventral valve long but shorter than dorsal, evenly upcurved to slender, acute tip.

Numerous specimens are at hand from several localities.
in Arizona and New Mexico which seem undoubtedly to be this species. Two of them, from Organ Mountains, New Mexico, are accompanied by galls. The latter are on the twigs and appear to be very densely pubescent; on closer examination this pubescence seems to be a dense growth of asporangiophores of a white fungus, completely covering the galls. There is no evidence to indicate whether this is accidental or whether there is some significance to this association.

**Genus Tetragonocephala Crawford**

1914 *Tetragonocephala* Crawford, U. S. N. M. Bull. 35:103.
1917 *Tetragonocephala* Van Duzee, Cat. Hemipt. N. A. 799.


Orthotype: *Tetragonocephala flava* Crawford.

Placed in the subfamily Psyllinae by Crawford this genus seems to be related to *Pachyopsylla*. One of the cardinal characters of this subfamily is, however, lacking. The basal
segment of the metatarsi is without spines. At least for
the present, however, it is left in this subfamily.

_Tetragonoccephala flava_ Crawford

_Figs. 52, 53._


1921 _Tetragonoccephala flava_ (??) Ferris, _Can. Ent._ LVIII:16
[describes nymph of unknown sp.].

Length to tip of folded wings 3.75 to 4.25 mm.

**Color:** General color of newly emerged individuals green,
more mature specimens yellow to brown, darkest dorsally. Six
round black spots on scutum, one on scutellum. Membrane of
wings milky, veins yellow.

**Structure:** Head vertical. Vertex flat, rectangular.
Genal processes large, blunt, 1/2 as long as vertex. Anten-
nae slender, 1-1/4 times as long as width of head. Thorax
strongly arched. Pronotum large, almost vertical, extending
down laterally beyond antennal insertion. Forewings rounded,
tapering somewhat apically, about 2-1/2 times as long as wide;
no pterostigma, furcation of media about even with furcation
of cubitus, medial cell very long. Legs long. Proximal
segment of metatarsi without claws. Small tubercle at base
of hind tibiae.

**Genitalia:** Male proctiger long and slender, almost twice as long as forceps, slightly swollen in lateral view, anus borne on long, prominent epiphysis. Forceps in lateral view broad basally, narrowed and curved caudally to blunt, black-tipped spines; in caudal view broad, strongly arched to convergent, sharp, black spines; tips in dorsal view seen to be broad and flattened. Female genital segment short; ventral valve very small, broadly produced apically; dorsal valve large, deeply concave caudally as if collapsed (six females are at hand and all present this same peculiar appearance), margins of depression with many long, curling, hair-like setae; ovipositor pointing ventrad.

Described from one male and four females from Brownsville, Texas, one female from the Santa Rita Mountains, Arizona, and a pair from Mexico intercepted at Brownsville on incoming produce. The type specimen is a female rather than a male as stated by Crawford. The male from Brownsville, Texas, collected June 29, 1933, R. H. Beamer, is designated the allotype. It is deposited in the Snow Collection at the University of Kansas.

**Type, female, no. 13096 U. S. N. M., Brownsville, Texas.**

Type examined.
Genus *Spanioneura* Förster


1912 *Spanioneura* Oshanin, Kat. palæ. Hemip. 129.

1913 *Spanioneura* Aulmann, Psy. Cat. 32.


From available descriptions and figures the principal points of distinction between this genus and *Psylla* are the shape of the forewings and the recessive eyes. The forewings are strongly narrowed apically, almost rhomboidal, R₅ terminating at apex.

Haplotype: *Spanioneura fonscolombii* Förster.

*Spanioneura fonscolombii* Förster


1913 *Spanioneura fonscolombii* Aulmann, Pay. Cat. 32.


1923 *Spanioneura fonscolombii* Patch, Memip. Conn. 247.


This species was reported by Britton (1916) as occurring on box (Puxus), its host plant in Connecticut. I have been unable to obtain any specimens. No adequate descriptions and only fragmentary drawings are available in the literature.

Outside of North America it has been reported from France, Germany and England.

Subfamily *Tricizinae* Löw


1896 *Tricizaria* Puton, Cat. Hés. Faune Pales. 93.


1911 *Tricizinae* Crawford, ibid. III:347, 422.


1913 *Tricizinae* Aulmann, Pay. Cat. 36.
Head more or less deflexed, usually small and narrower than thorax. Vertex usually sharply margined, not flat. Genae produced as usually conical processes or somewhat swollen, more or less pubescent. Frons covered by genae except small portion bearing median ocellus. Eyes hemispherical. Antennae ten-segmented, slender. Thorax strongly arched usually (not in Leurincota). Forewings membranous, hyaline, typically angulate apically, sometimes narrowly rounded, radius, media and cubitus arising from basal vein (R + M + Cu) at same point or very nearly so (Hemitrichoe and Ceropsylla), no pterostigma, usually with three radular areas on margin, between branches of M, between M₄ and Cu₁ and between branches of Cu. Caudal metacoxal spurs present, anteriorly metacoxae often developed as spinose or flattened processes. Metatibiae usually with basal spurs or serrate carinae, with three or four apical spines, one on outer (lateral) margin and either two or three on inner (mesal) margin. Basal segment of metatarsi without black spines. Male proctiger usually with caudal lobes.

This subfamily is characterized chiefly by the shape of the forewings, the absence of a medial-cubital petiole and the lack of claw-like spines on the basal segment of the metatarsi.
A few of the species are gall-forming, but the majority are free living and somewhat active as nymphs. The latter secrete more or less wax and honeydew. They are characterized by a fringe of wax-secreting setae (sectasetae) on the margin and by the shape of the wing pads, the margins of which are almost continuous with those of the head and abdomen.

Secretion of wax is not entirely limited to the nymphal stages as many of the adults produce small quantities. This is often quite noticeable as a white band on the first abdominal tergite; this white band is very marked in some species, *Trioza rubra* and *Paratriciza cockerelli*, for example.

Key to genera of *Triozinae*

1. Radius, media and cubitus arising from basal vein at same point................................. 2.
2. Radius, media and cubitus not arising at same point, radius and media or media and cubitus with a short common petiole........................................... 7.

2. Thorax scarcely arched; pronotum long, flat, a prominent medial epiphysis on cephalic margin........... *Leuroloma*

3. Thorax well arched; pronotum shorter, descending cephalic, usually depressed below vertex and prescutum, without an epiphysis.................................................. 3.

3. Head narrower than thorax........................................ 4.
Head as broad as thorax or broader................. 6.

4. Vertex smooth, rounded, no anterior margin...... Levides.
Vertex not perfectly smooth and rounded, anterior
margin more or less abrupt............................... 5.

5. Genae produced as usually conical processes at least
moderately long (usually 1/2 as long as vertex or
longer).................................................. Triozza.
Genal processes, if present, very short, conical or
pad-like, sometimes lacking.............................. Parastriozza.

6. Genae produced as long, slender, closely appressed
processes; vertex not deeply concave between eyes
............................................................ Neotriozella.
Genal processes short, divergent; vertex deeply concave
between eyes............................................. Metatriozza.

7. Radius and media petiolate; basal vein (R + M + Cu)
very long; antennal insertions anterior........... Ceropsylla.
Media and cubitus petiolate; basal vein not unusually
long; antennal insertions lateral................. Neotriozza.

Genus Triozza Förster

1851 Psylla Pitch (pro parte), 4th Rept. N. Y. St. Mus. 64.
1861 Triozza Flör, Bull. Soc. Imp. Nat. Moscou XXXIV:335,
336, 337-409.
Head usually narrower than thorax, sometimes as wide, somewhat deflexed. Vertex much broader than long, usually deeply impressed discally, more or less emarginate medially in front. Genae produced as processes of varying length and shape, more or less divergent, depressed from plane of vertex and usually deflexed more or less. Antennae slender, variable.
in length from about as long as width of head to 2/1/2 times as long. Eyes hemispherical. Thorax usually strongly arched. Pronotum short, descending cephalad, often depressed below plane of head. Propleurites not equal, suture not extending to middle of pronotum. Prescutum usually about as long as broad, sometimes longer. Forewings membranous, hyaline, typically acutely angled apically, sometimes rounded; radius, media and cubitus arising from basal vein (R + M + Cu) at same point, no pterostigma. Metatibiae often with a basal spur or carina, one outer and either two or three inner apical spines. Metatarsi without spines. Metacoxae often developed anteriorly as flat plates or spurs.

**Logotype: Trioza urticae** (Linnaeus).

In 1884 Riley (Proc. Am. Assoc. Adv. Sci. 1893 XXXII:319) used the name Phylloplecta tripunctata with no characterization or indication, leaving it a *nomen nudum*. Subsequently (Proc. Biol. Soc. Wash. II:67-79, 1885) he lists all of the species "actually described" (13 in all) from North America and makes no mention of Phylloplecta. In this paper he refers Psylla tripunctata Fitch to Trioza. Wally in 1894 (Proc. Ia. Acad. Sci. II:154), in a footnote, points out that Riley used the name Phylloplecta without any description and raises the question as to whether it was meant to be the same as Trioza *tripunctata* (Fitch) or some other species.
The next use of the name was by Zacher in 1913 (Ent. Mitt. II:148). In indicating omissions from Aulmann's catalogue he lists "Phylloplecta für Trioza tripunctata Fitch, cf. Riley, 1883." This was not a proposal of the name Phylloplecta for Trioza tripunctata by Zacher but a reference to Riley's nomen nudum. Ferris (Can. Ent. LVIII:16, 1927) considers this as the designation of a type for a new genus, Phylloplecta Zacher. It is my opinion, however, that this listing of a nomen nudum does not constitute the proposal of a new genus with tripunctata as the type. Ferris misspells the name and so actually establishes the genus Phyllopecta Ferris. Caldwell (Ohio Biol. Surv. Bull. 34, 1938) resurreets Phylloplecta Riley refusing to recognize it as a nomen nudum. He likewise credits Zacher with Phyllopecta apparently following Ferris' reference.

The cephalically projecting spurs on the metacoxae of this species (tripunctata) have apparently been the chief basis on which the genus Phyllopecta has been maintained. The presence of these spines has been considered by a number of workers to be of more importance than I believe is valid. As Caldwell (1938) recognizes, many species of Triozinae exhibit a pair of spurs or an apparent tendency toward such processes between the hind legs. Trioza minute, Trioza maura, Trioza rubra, to mention a few, have short but distinctly developed processes in this position. In the genus Paratrozoa
these spurs are well developed in most of the species, especially in *P. arholensis* and *P. cockerelli*. These spurs may even be found on members of other subfamilies, in the genus *Rhinopsylla* for example. I fail to agree therefore that the mere presence of such a spur is of generic importance and so consider *Phylopecta* and *Phyllopecta* as synonyms of *Trioza*.

The genus *Mepatrioza* was established by Crawford in 1915 (Phil. Jour. Sci. X:264) for a Philippine species. Subsequently (Phil. Jour. Sci. XV, 2:193, 1919) he referred the North American species *Trioza diospyri* (Ashmead) to this genus where it seems to belong on the basis of his characterization and figures of the genus. *Mepatrioza* seems to be a natural group of species but I am somewhat doubtful of its being of generic rank. The characters given for the genus are all apparently extremely variable within the group with the exception of the number of inner apical spines and the presence of "a small or large spur at base" of hind tibia, the presence of a pair of spiniform processes projecting cephalad on the metacoxae and the reduction in size of the hind wings. Since I have seen few specimens of *Mepatrioza* other than *diospyri*, I am unwilling to abolish it, but I feel that it is probably worthy of no more than subgeneric rank.

Ferris in 1927 (Can. Ent. LVIII:16) considered *Mepatrioza* a synonym of *Phyllopecta*, stating that *diospyri* and *tripunctata* are "actually congeneric, all of the
characters given by Crawford for *Mestrioza* being equally well developed in both, if not even more strongly in *tripunctata.* This is not true, as *tripunctata* has only two inner spines at the apex of the tibia (a character hardly of generic significance, however), the anterior metacoxal spines while present are small while the caudal metacoxal spines are unusually small for the Triozineae. Large basal tibial spurs are present in *tripunctata* but this character occurs in some species of most of the genera with which I am familiar. They are entirely lacking in *diospyri.* Furthermore, the head is quite different, as is the wing venation, the latter being as distinct in the two species as in any of the North American Triozineae. If these two species are congeneric, it must be within the genus *Trioza,* which contains other species more similar to *tripunctata* than *diospyri.*

Enderlein's genera *Spanioza* and *Colcpeles* were based on characters which are too minor to be valid.

Crawford considered *Petalolyma* Scott as a synonym of *Trioza.* There is nothing in Scott's description to distinguish the two, but his figure of the wing does not appear to be that of a species of *Trioza.*

**Key to the genus *Trioza***

1. Hind tibiae with two inner apical spines............ 2.
   Hind tibiae with three inner apical spines............ 20.
2.(1) Forewings not maculate, hyaline or evenly infuscated
(except radular areas)............................. 3.
Forewings distinctly maculate........................ 17.
3.(2) Genal processes longer than vertex........ nulla Tuthill.
Genal processes not longer than vertex (usually
distinctly shorter).................................... 4.
4.(3) Antennae at least twice as long as width of head.... 5.
Antennae less than twice as long as width of head
(rarely over 1-3/4 times as long)...................... 3.
5.(4) Antennae 2-1/2 times as long as width of head; R₇
very short, arcuate to costa; small species, 2.5 to
2.75 mm................................................. viridis Crawford.
Antennae twice as long as width of head; R₇ long,
slightly sinuate or straight; large species, 3.25 to
4.5 mm..................................................... 6.
6.(5) Preascutum longer than wide........ magnolise (Ashmead).
Preascutum wider than long............................ 7.
7.(6) Head almost as wide as thorax........ singularis n. sp.
Head much narrower than thorax... longicornis Crawford.
8.(4) Genal processes not over 1/2 as long as vertex...... 9.
Genal processes over 1/2 (usually 2/3) as long as
vertex....................................................... 11.
9.(3) Genal processes strongly divergent, acute; wings
short.......................................................... 10.
Genal processes contiguous or very slightly diver-
gent, blunt; wings long and slender........ aliasris Flor.
10. (g) Rs more than 1/2 as long as entire forewing; green species......................... sturma Tuthill.
Rs less than 1/2 as long as entire forewing; brown species....................... shepherdiae Tuthill.

11. (8) Marginal cells of forewings very small; female genital segment over 1/2 as long as rest of abdomen................................. 12.
Marginal cells of forewing typical size for Trioza; female genital segment less than 1/2 as long as remainder of abdomen.............................. 13.

12. (11) Genital processes 2/3 as long as vertex; forewings 2-1/2 times as long as wide; female genital segment 2/3 to 3/4 as long as rest of abdomen................................. occidentalis Tuthill.
Genital processes slightly over 1/2 as long as vertex; forewings short (scarcely more than twice as long as wide); male forceps much enlarged apically................................. styliferae Patch.

13. (11) Antennae 1-1/2 times as long as width of head... 14.
Antennae at least 1-3/4 times as long as width of head.............................. 16.

14. (13) General color black; female genital segment straight and acute..................... incerta n. sp.
General color green to orange, head often black; female genital segment shorter, strongly curved ventrad............................... 15.
15.(14) Vertex strongly bulging anteriorly; caudal lobes of male proctiger short, only 1/2 as long as axial portion. \textit{minute} Crawford.
Vertex not strongly bulging; caudal lobes of male proctiger as long as axial portion
\textit{msura} Förster.

16.(13) Body unicolorous, red to almost black
\textit{rubra} Tuthill.
Body black with extensive yellow to red markings including longitudinal stripes on dorsum of thorax.
\textit{varius} Crawford.

17.(2) Dorsum of head and thorax pubescent (sparsely);
maculation of forewings extensive, maculae brown with many small darker brown spots. \textit{lobata} Crawford.
Dorsum of head and thorax not pubescent; maculation less extensive, maculae not spotted...... 13.

18.(17) Marginal cells of forewing small, extremely short but wide; brown maculae along cubitus, media and apical portion of \(R_5\), more or less continuous along margin. \textit{tripunctata} (Pitz).
Marginal cells normal; maculation otherwise..... 19.

19.(13) Entire posterior margin of forewing brown; \(R_5\) long, sinuate. \textit{minute} var. \textit{arizonae} Aulmann.
Basal vein \((R + M + Cu)\), \(R_1\) and posterior margin of clavus, brown; \(R_1\) short, arched to costa
\textit{californica} Crawford.
20. (1) Antennae no longer than width of head.............. 21.
Antennae distinctly longer than width of head... 23.

21. (20) Small species (2.75 mm.), not pubescent,
uniformly yellow in color........ phoradendrace Tuthill.
Large species (4 to 4.5 mm.), sometimes pubescent

22. (21) Light colored species, vertex and thoracic
dorsum more or less pubescent........... bakeri Crawford.
Dark species, at least the vertex black, not
pubescent..................... breviantennata Crawford.

23. (20) Vertex and thoracic dorsum with long conspicuous
pubescence............................................... 24.
Vertex and thoracic dorsum not conspicuously
pubescent.................................................. 25.

24. (23) Black; medial cell of forewing much larger than
cubital............................... diospyri (Ashmead).
Light colored; cubital cell of forewing larger
than medial............................... beameri Tuthill.

Genal processes shorter than vertex............. 27.

26. (25) Antennae twice as long as width of head; genal
processes divergent...................... chlora Tuthill.
Antennae 1-1/2 times as long as width of head;
genal processes contiguous or nearly so

......................... phoradendrace acuminata n. subsp.
27.(25) Genal processes very short, about 1/2 as long as vertex or less, scarcely divergent; pronotum not depressed below plane of vertex; female genital segment elongate, styliform. .............................. 28.
Genal processes more than 1/2 as long as vertex, about 2/3 as long or longer; pronotum depressed below plane of vertex; female genital segment not unusually long and styliform. .............................. 30.

28.(27) Female genital segment 3/4 as long as rest of body; smaller species (3 to 3.5 mm.)

................................................. approximata Crawford.
Female genital segment 1/2 as long as rest of body; larger species (4 to 4.5 mm.) .............................. 29.

29.(23) Female genital segment with a prominent ventral hump on basal portion.............. collaria Crawford.
Female genital segment without ventral hump

................................................. longistylus Crawford.

30.(27) Anterior margin of vertex smoothly rounded down to genal cones; female genital segment with a short styliform projection; male proctiger arcuate posteriorly, without a caudal lobe. mexicana minor n. n.
Anterior margin of vertex abrupt ......................... 31.

31.(30) Thorax very strongly arched; male proctiger arcuate caudal but not produced into an extended lobe; both valves of female genital segment
straight, about equal in length, ventral valve not upcurved to meet dorsal valve................. 32.
Thorax moderately arched; male proctiger with a prominent caudal lobe (either axical or basal);
female genital segment with at least the ventral valve strongly upcurved (Amelanchier inhabiting species except possibly sembla).................... 33.
32(31) Forewings with four dark spots on posterior margin.......................... quadripunctata Crawford.
Forewings immaculate.................. albifrons Crawford.
33.(31) Apex of male forceps produced cephalad, rounded caudally............................. sembla Caldwell.
Male forceps otherwise.......................... 34.
34.(33) Female genital segment short, lateral aspect

sub-globose........................................ 35.
Female genital segment usually elongate (not styliform), lateral aspect not globose............ 36.
35.(34) Male proctiger with very long caudal lobe; forceps touching most of their length...... trola n. n.
Caudal lobes of male proctiger much shorter;
forceps not incurved and touching..trola curta n. subsp.
36.(34) Male proctiger with caudal lobes as long as or nearly as long as axial portion, lobe never entirely basal.......................... 37.
Caudal lobe of male proctiger much shorter than
axial portion, lobe basal in origin. **Inversa** Tuthill.

37. (36) Caudal lobes of male proctiger in lateral view very broad, dorsal margin straight. ............... 33.
Caudal lobes of male proctiger slender, uncurved. 39.

38. (37) Forceps of male in lateral view parallel-sided, not enlarged apically, small species (3 mm.)
...................... **sulcata** Crawford.
Forceps of male slender basally in lateral view, enlarged apically, larger species (3.5 mm.)
...................... **frontalis** Crawford.

39. (37) Caudal lobes of male proctiger very long and slender, with a very prominent tuft of large setae apically. ...................... **sylmeriae** Patch.
Caudal lobe of proctiger shorter, without such a tuft of setae. ...................... **obtusa** Patch.

**Trioza pulla** Tuthill

Figs. 54, 55, 109.


Length to tip of folded wings 3.5 mm.

**Color:** Head, thorax, femora and apical half of antennae fuscous. Remainder of legs and antennae pale. Abdomen green. Wings milky. Females lighter, vertex and thoracic dorsum fusco-testaceus.
Structure: Head broad. Vertex quite flat for *Trloza*. Antennae long, almost twice as long as width of vertex. Genal processes slender, acute, slightly longer than head, projecting downward, straight, not touching at all. Genal processes, legs and genitalia very pubescent. Thoracic dorsum not very strongly arched. Hind tibiae with large serrate basal carina, 2 inner apical spines. Anterior portions of metacoxae weakly developed. Forewings large, 2-1/2 times as long as wide, narrowly rounded apically; Rs long.

Genitalia: Male genitalia small. Proctiger with long, blunt, caudal lobes. Forceps quite broad at base, sharply narrowed midway, then tapering to truncate apices with small anterior tooth. Female genital segment about 1/3 as long as remainder of abdomen; dorsal valve rounding down to acute black apex; ventral valve shorter.

Known only from the type series from Washington and Oregon.

Holotype, male, no. 55179 U. S. N. M.

*Tricosa viridis* Crawford


1911 *Allotricosa viridis* Crawford, ibid. III:444, 446.

1913 *Tricosa viridis* Aulmann, Psy. Cat. 57.
1914 *Triozoa viridis* Crawford, U. S. N. M. Bull. 85:95.

1917 *Triozoa viridis* Van Duzee, Cat. Hemipt. N. A. 797.


1926 *Spazioza viridis* Enderlein, Ent. Mitt. XV:400.

Length to tip of folded wings 2.5 to 2.75 mm.

**Color:** Greenish yellow except apical 2/3 of antennae and tip of female genital segment, black.

**Structure:** Head large, not deflexed. Vertex long, with two longitudinal sulcate impressions. Genal processes large, blunt, extending forward, almost on same plane as vertex, slightly over 1/2 as long as vertex. Antennae slender, almost 2-1/2 times as long as width of head. Thorax rather flat and broad. Pronotum long and flat, somewhat below plane of vertex. Forewings acute, 2-1/2 times as long as wide; Rs very short, arched. Hind tibiae with 2 inner apical spines.

**Genitalia:** Male proctiger long, almost parallel-sided, slightly produced caudad. Forceps shorter than proctiger; in lateral view broad basally, slightly narrowed and flexed caudad in apical 2/3; in caudal view slender, almost straight to black, truncate spicula. Female genital segment large, about as long as rest of abdomen; ventral valve straight to acute black apex; dorsal valve longer than ventral, basal portion swollen, distal portion acuminate and upcurved, black.

Six specimens from Monrovia and one from Claremont,
California, are at hand. These are the only specimens reported besides the type series (3), one female from Los Angeles and one female taken on Mt. San Antonio, California. Type locality Claremont, California.

Type in Crawford Collection, Mountains near Claremont, California, Baker.

_Trioza magnoliae_ (Ashmead)


1913 *Psylla magnoliae* Aulmann, Psy. Cat. 19.

1914 *Trioza magnoliae* Crawford, U. S. N. M. Bull. 35:96.

1917 *Trioza magnoliae* Van Duzee, Cat. Hemip. N. A. 797.


Length to tip of folded wings 3.5 to 4.5 mm.

**Color:** General color green to light brown with brown stripes on thoracic dorsum. Tips of antennae dark. Eyes reddish. Wings hyaline.

**Structure:** Head large, as broad as thorax, scarcely deflexed. Vertex large, flat except for discal impressions, medial suture prominent. Genal processes short, blunt, divergent, about 1/2 as long as vertex. Antennae twice as
long as width of head. Vertex and dorsum of thorax often with sparse short pubescence, most apparent near eyes. Thorax somewhat arched, long. Prothorax not depressed below plane of vertex, caudal margin upcurved, carinate. Prescutum distinctly longer than wide, anterior angle very sharp and abrupt. Forewings large, straight, sharply angulate, almost 3 times as long as wide. Hind tibiae with large, serrate, basal carina, 2 inner apical spines.

Genitalia: Male proctiger small, arcuate posteriorly from near apex. Forceps slightly longer than proctiger; in lateral view broad, somewhat pyriform, anterior margin strongly curved caudad, apices blunt, black, in line with posterior margin; in caudal view almost straight, slightly arcuate, apices touching. Female genital segment large, 2/3 as long as rest of abdomen, valves almost equal in length, acute.

Ashmead described this gall-forming species from Magnolia glauca, a synonym of M. virginiana L., the "laurel magnolia" or "sweet bay."

Specimens are at hand collected by E. A. Schwarz on Persea carolinensis, a synonym of P. Borbonia (L.), "red bay," a member of the laurel family. Three specimens from Orlando, Florida, bear the label Tamala borbonis. I am unfamiliar with these trees, but it would seem that there has been some error in the determination of the host plant (see Barber, 1919).
Specimens are before me from several localities in Florida and from Mobile, Alabama. It is also recorded from southern Georgia.

Ashmead gives a brief account of the biology, including a description of the galls and nymphs. He remarks that the nymphs do not have the fringe of hairs on the body which most Trioza do have; cast skins accompanying some of the specimens at hand do bear such setae although they are quite short.

Type, female, no. 14819 U. S. N. M. is a very poor, terminal specimen.

Type examined.

Trioza singularis n. sp.

Figs. 56, 56a, 110.

Length to tip of folded wings 3.5 mm.

Color: General color of body black. Tibiae, abdominal sternites, antennae (except tips and segments I and II) white.

Structure: Head large, almost as broad as thorax. Vertex strongly bulging and overhanging anteriorly each side of median line, discal impressions large. Genal processes blunt, divergent from base, 2/3 as long as vertex. Antennae about twice as long as width of head. Thorax strongly arched, coarsely punctate. Pronotum much depressed below plane of
vertex. Forewings sharply angulate, almost 3 times as long as wide, venation typical. Hind tibiae with 2 inner apical spines. Anterior portions of metacoxae broadly produced, truncate.

Genitalia: Male proctiger very short, produced on each side into long blunt caudal lobe, no anal epiphysis. Forceps longer than proctiger; in lateral view broad basally, constricted midway; slightly curving cephalad to acute apices; in caudal view broad and divergent basally, at about 1/2 their length suddenly narrowed and directed dorsad to acute apices, with a sharp lateral hook near apex, appearing almost T-shaped.

Described from a unique male collected in Cheboygan County, Michigan, by H. E. Hungerford, July 23, 1931. Type in Snow Collection, University of Kansas, Lawrence, Kansas.

_Trioza longicornis_ Crawford


1912 _Trioza forcipula_ Patch, ibid. 227.

1913 _Trioza longicornis_ Aulmann, Psy. Cat. 48.

1914 _Trioza longicornis_ Crawford, U. S. N. M. Bull. 35:92.
1917 **Trioza longicornis** Van Duzee, Cat. Hemip. N. A. 797.
1926 **Spanioza forcipula**, Enderlein, Ent. Mitt. XV:400.

Length to tip of folded wings 3.75 mm.

**Color:** Described as greenish yellow, now faded to a uniform tan.

**Structure:** Head narrower than thorax. Vertex plane, edges raised, plate-like, discal impressions and medial suture prominent. Genal processes subacute, about as long as vertex. Antennae twice as long as width of head. Thorax strongly arched. Pronotum depressed below plane of vertex. Forewings hyaline, 2-1/3 times as long as wide, apex scarcely angulate. Hind tibiae with 2 inner apical spines.

**Genitalia:** Female genital segment with ventral valve as long as preceding sternite, straight; "dorsal valve longer than ventral," Crawford.

The dorsal valve of the type and only specimen is apparently broken off. I have examined the type (no. 13039 U. S. N. M.).

Crawford (1914) refers **Trioza dubia** to minute, but from Miss Patch's picture of the female genital segment I think it more probable that it belongs here. It is quite possible that **Trioza incerta** is synonymous with **dubia** or **forcipula** or both, but as no specimens of these species have been
available I am unwilling to further confuse the literature
by resurrecting these names.

**Trioza alacris Flor**


1912 *Trioza alacris* Oshanin, Kat. palee. Hemip. 129.


1913 *Trioza alacris* Aulmann, Psy. Cat. 38.

1914 *Trioza alacris* Crawford, U. S. N. M. Bull. 35:94.


1917 *Trioza alacris* Van Duzee, Cat. Hemip. N. A. 797.

1918 *Trioza alacris* Weiss and Dickerson,Psyche XXV:59-63.

1926 *Spanicza alacris* Enderlein, Ent. Mitt. XV:400.


Length to tip of folded wings 4 mm.

**Color:** General color of specimen at hand yellow-white, brown markings on abdomen and dorsum of thorax, latter
forming longitudinal stripes. Lighter specimens "greenish yellow to light brown." Tip of antennae black. Wings hyaline.

**Structure:** Head large, almost as broad as thorax. Vertex with two very prominent discal foveae. Genal processes projecting forward, blunt, 1/2 as long as vertex. Antennae about 1-1/3 times as long as width of head. Thorax rather flat for genus. Pronotum not at all depressed below vertex. Forewings long and slender, acute, almost 3 times as long as broad; Rs short. Hind tibiae with 2 inner apical spines. Metacoxae with short, broad, anterior processes.

**Genitalia:** "Male anal valve (proctiger) a little longer then forceps, hind margin arcuate, with long pubescence; forceps rather stout, sides almost parallel (from side), terminating in a subacute, black point at apex." Crawford.

Female genital segment about 1/2 as long as rest of abdomen ("nearly as long as" - Crawford); valves subequal in length, dorsal valve slightly excavate.

This species apparently occurs in North America only on bay trees (*Laurus nobilis*). It was recorded from California in 1912 by Crawford. Essig subsequently (1917) discusses it in some detail, gives life history notes and figures. Weiss and Dickerson record the occurrence of this insect in New Jersey, give notes on its life history there and describe the immature stages.
Outside of North America it is recorded from France, Spain, Portugal, Italy, Dalmatia, Hungary, Germany.

Trioza stugma Tuthill
Figs. 57, 53, 111.


Length to tip of folded wings 2.5 mm.

Color: General color green. Eyes, antennae, distal portions of leg segments, etc., light fulvous. Forewings slightly infuscated.

Structure: Head almost as wide as thorax. Vertex with two prominent foveae, very strongly protruded in front on each side of medial sulcus, overhanging the short genal processes, latter 1/2 as long as vertex. Antennae 1-1/4 times as long as width of head. Thorax not strongly arched. Pronotum short, depressed below plane of vertex. Forewings rounded at apex, 2-1/2 times as long as wide; venation typical. Hind tibiae with 2 inner apical spines and basal carina.

Genitalia: Male genitalia small. Proctiger short, somewhat produced caudally. Forceps very short and broad in lateral view, spines rounded and bearing a large, medially projecting, black-pointed tooth. Female genital segment
short, valves subequal in length, dorsal straight, ventral concave dorsally.

Known only from the type series from California. Host plant unknown.

Holotype, male, no. 55130 U. S. N. M.

**Trioza shepherdis** Tuthill

Figs. 59, 60, 112.


1939 *Phylloplecta multidinia breviradia* Caldwell, Can.

Ent. LXXI:211.

1939 *Phylloplecta multidinia breviradia* Strickland, ibid.

214.

1940 *Phylloplecta minuta breviradia* Caldwell, Ohio Jour. Sci.

XL:50.

Length to tip of folded wings 2.5 mm.

**Color:** General color of head, thoracic dorsum and legs light testaceous to fulvous. Vertex light except discal impressions. Genal processes, eyes, distal half of antennae dark. Prescutum with a pair of brown stripes on cephalic half. Scutum with 2 inverted V-shaped, brown marks. Wing membranes slightly fumete; veins brown. Abdomen brown to black.
Structure: Head and thoracic dorsum coarsely granular. Head of medium size, narrower than thorax. Vertex decidedly emarginate in front, with very prominent discal impressions, postero-lateral angles, which bear ocelli, raised. Genal processes short, about 1/2 as long as vertex, conical, almost parallel to plane of vertex. Antennae about 1-1/2 times as long as width of head. Pronotum depressed below plane of vertex. Prescutum strongly arched. Forewings 2-1/2 times as long as wide, membrane rather thick, slightly rugose; venation typical. Hind wings more rugose than forewings. Legs of medium length. Hind tibiae with a serrate basal carina, 2 inner apical spines. Anterior portions of metacoxae bluntly produced.

Genitalia: Male genital segment small. Proctiger as long as forceps, almost right-triangular in lateral view, posterior lobe of medium length. Forceps slender, irregularly narrowed to sharp spines, with medium pubescence. Female genital segment short, dorsal valve decidedly longer than ventral, terminating in a heavy, black, upcurved hook, usually exceeded by partially extended ovipositor sheath.

The type series from Lake City, Colorado, and additional specimens from Wolf Creek Pass, Colorado, are at hand. Examination of paratypes of Caldwell's Trioza multidubiata breviradia prove it to be synonymous with shepherdiae. Host, Shepherdia canadensis (L.) Nutt.

Type, female, in author's collection.
Trioza occidentalis Tuthill

Figs. 61, 113.


Length to tip of folded wings 4 mm.

Color: Golden brown, lighter ventrally.

Structure: Head narrower than thorax. Vertex plane, raised. Antennae not quite twice as long as width of vertex. Genal processes large, thick, conical, 2/3 as long as vertex. Thorax very strongly arched, preascutum almost projecting over pronotum. Forewings broad, blunt, 2-1/2 times as long as wide; marginal cells small. Hind tibiae with small serrate basal carina, 2 inner spical spines.

Genitalia: Female genital segment 2/3 as long as rest of abdomen, conical, upcurved.

Known only from the 2 original specimens from California and British Columbia. Host (?) Corylus rostrata Ait.

Holotype, female, no. 55181 U. S. N. M., Marin County, California.

Trioza stylifera Patch

1914 *Trioza stylifera* Crawford, U. S. N. M. Bull. 35:93.
1917 *Trioza stylifera* Van Duzee, Cat. Hemip. N. A. 797.

Length to tip of folded wings 2.75 mm.

**Color:** General color dark brown. Margins of vertex, median line on scutum, legs and venter, lighter. Forewings somewhat yellowish.

**Structure:** Head narrower than thorax. Vertex broad, margins raised. Genal processes slightly over 1/2 as long as vertex, somewhat divergent, blunt. "Antennae about one and one half times as long as width of head" (Crawford). Pronotum strongly descending cephalad, depressed below plane of vertex. Dorsum of thorax punctate. Forewings short, slightly over twice as long as wide, very slightly and broadly angulate, costal margin strongly arched; Rs slightly sinuate, short, medial cell somewhat smaller than cubital. Hind tibiae with 2 inner apical spines, serrate basal carina.

**Genitalia:** Male genital segment large. Proctiger short, bearing on each side a swollen bladder-like caudal lobe which extends dorsad, equalling axial portion. Forceps heavy; in lateral view large basally, a blunt tooth on caudal edge, narrowed and sharply curved cephalad at 1/3 their length, apical third much enlarged, apices roundly truncate, anterior margin of enlarged portion straight to apex, there produced as a small tooth; in caudal view stout, broad basally, produced into a blunt tooth both mesad and laterad, narrowed
somewhat, swollen apically, apices truncate and flatly produced mesad. "The female cauda is relatively long and acutely pointed. The upper plate extends a bit beyond the ovipositor and is slender at tip." (Patch).

Described from one rather poor male specimen in the collection of the University of Minnesota collected at Herchmer, Manitoba, August 1, 1937, by D. G. Denning. The peculiar male forceps make the determination of this male almost certain, although I have seen none of Miss Patch's specimens. Her type series was from Brockville, Ontario.

**Trioza maura Förster**


1910 **Trioza helvetina** Meyer-Dür, ibid. 333, 391.


1910 **Trioza fulvata** Crawford, ibid. 231, 353.

1910 **Trioza fulvata similis** Crawford, ibid. 231, 359.

1910 **Trioza aurantiaca** Crawford, ibid. 231, 360.

1911 **Trioza aurantiaca** Crawford, ibid. III:623.


1912 **Trioza maura** Oshanin, Kat. paläa. Hemip. 129.
1913 *Trioza maure* Aulmann, Psy. Cat. 49.
1913 *Trioza eurenticae* Aulmann, ibid. 39.
1913 *Trioza fulvida* Aulmann, ibid. 46.
1913 *Trioza nigriifrons* Aulmann, ibid. 50.
1914 *Trioza maure* Crawford, U. S. N. M. Bull. 85:89.
1914 *Trioza saliciperda* Crawford, ibid. 89.
1917 *Trioza maure* Van Duzee, Cat. Hemip. N. A. 795.
1929 *Trioza maure* Leonard, Ins. N. Y. 133.
1932 *Trioza maure* Klyver, Pan-Pac. Ent. VIII:14.
1939 *Trioza maure* Strickland, Can. Ent. LXX:204.

Length to tip of folded wings 3.5 to 4 mm.

**Color:** Color extremely variable, most typical coloration reddish brown, but often darker. Head testaceous to black. Genal processes vary from almost white to black. Antennae white basally, dark distad. Abdomen usually darker than thorax but often white ventrad, entire abdomen frequently green. Forewings sometimes fumose.

**Structure:** Head narrower than thorax, somewhat deflexed. Vertex somewhat plate-like, discal impressions from very shallow to prominent, anterior margin abrupt, scarcely bulging. Genal processes broad basally, acute, divergent, about 2/3 as long as vertex. Antennae about 1-1/2 times
as long as width of head. Thorax strongly arched. Pronotum depressed below plane of vertex. Forewings variable in length, from 2-1/2 to almost 3 times as long as wide, roundly angulate. Hind tibiae with basal spur, 2 inner apical spines. Anterior portions of metacoxae bluntly produced.

**Genitalia:** Male genitalia small. Proctiger short, produced into two long lobes, as long as or longer than vertical axis of proctiger, blunt. Foropes in lateral view slender, curved cephalad distally, apices acute; in caudal view swollen basally, distal half very slender, arched apices touching. Female genital segment typically shorter than preceding abdominal sternite; ventral valve somewhat upcurved, with acute black tip; dorsal valve longer, curved ventrad, black at apex, acute.

This, one of the few northern species of psyllids, was described from Europe. As can be judged from the foregoing description most of the characters are quite variable, as one would expect in such an abundant and widespread species. Like the three following species, it lives upon *Salix* spp.

All four of these *Salix*-inhabiting species are very closely related and somewhat difficult to distinguish one from another. *Trioza minuta* is very much like *maura*; in fact they seem to intergrade, but until their identicalness is established by biological evidence I am unwilling to abolish *minuta*. The female genitalia are almost
indistinguishable. In typical specimens of *minuta* the anterior margin of the vertex is swollen and the genital processes are shorter than in *maura*. The male genitalia of typical specimens of the two are also sufficiently different to be readily separated. The color and markings of *varians* and *incerta* make them quite distinct from the other two species. In addition the male genitalia of *varians* are easily distinguished; the female genital segment, however, is much like *maura* in structure; the larger size and more rounded wings (almost as round as a *Psylla* wing) are quite distinct. The male genitalia of *incerta* are very similar to *maura* but the female genital segment is distinctive; also the genital processes are more slender and placed farther back under the head.

Many of these distinguishing characters are largely differences in degree and are therefore difficult to describe and even to figure. If typical specimens of the different species are at hand, they can be quite readily separated. It is possible that these species hybridize with one another, thus causing much of the difficulty of separating them. It would not be strange if they did hybridize, as they occur on the same host plants and in enormous numbers. The chief difficulty in explaining some of the variations that occur as being a result of hybridization is that several short distinct series of what appear to be intermediates are at hand.
While collecting on willow near Creede, Colorado, I noted two forms of psyllids that I thought to be distinct, one red with a green abdomen occurring in enormous numbers on Salix longifolia, another yellowish, abundant on a broad-leaved, yellow-stemmed willow. I can, however, find no significant structural differences between the two forms; both are apparently maure. Patch, noting the same color variations, concluded that the lighter forms were tender but this is not the case. Much the same sort of variation has been noted by Caldwell in minuta.

Specimens of maure are at hand from the following states and provinces: California, Oregon, Washington, British Columbia, Alaska, Montana, Idaho, Utah, Nevada, Wyoming, Colorado, New Mexico, and Minnesota. It is also recorded from Alberta, Illinois, and New York.

Trioza minuta Crawford

1910 Trioza nigra Crawford, ibid. 232, 353.
1910 Trioza minuta Crawford, ibid. 232.
1910 Trioza assimilis Crawford, ibid 233.
1911 Trioza minuta Crawford, ibid. III: 425, 427, 432.
1911 *Trioza nigra* Crawford, *ibid.* 427, 429.
1911 *Trioza salicis* Crawford, *ibid.* 426, 423, 432.
1911 *Trioza florl* Crawford, *ibid.* 503 (n. n. for *assimilis*).
1911 *Trioza nigrella* Crawford, *ibid.* 503 (n. n. for *nigra*).
1912 *Trioza louisianae* Aulmann, *Ent. Rund.* 22 (n. n. for *nigra*).
1912 *Trioza pomonae* Aulmann, *ibid.* (n. n. for *assimilis*).
1913 *Trioza minuta* Aulmann, *ibid.* 49.
1913 *Trioza pomonae* Aulmann, *ibid.* 51.
1913 *Trioza salicis* Aulmann, *ibid.* 53.
Length to tip of folded wings 3 to 3.5 mm.

Color: Head usually black, or orange with some black markings. Genal processes sometimes white. Thorax orange, often with black markings. Abdomen typically green but frequently dark orange brown. Females lighter colored than males.

Structure: Head small, narrower than thorax. Vertex with discal impressions shallow, strongly bulging in front, overhanging median ocellus. Genal processes short, acute, divergent from base, 3/5 as long as vertex. Antennae about 1-1/2 times as long as width of head. Thorax strongly arched, pronotum depressed below plane of vertex. Forewings slender, angulate, almost 3 times as long as wide. Hind tibiae with 2 inner spical spines, a serrate basal carina. Metacoxae somewhat produced anteriorly.

Genitalia: Male proctiger shorter than forceps, caudal lobes only 1/2 as long as axil portion. Forceps in lateral view slender, tapering from base to acute spines, apical third slightly flexed cephalad; in caudal view broad basally, slightly arched to acute spines. Female genital segment short; ventral valve upcurved, scarcely sharp at apex; dorsal valve strongly downcurved, longer than ventral, blunt.

This willow-inhabiting form was described by Melly in 1895 from specimens taken at Ames, Iowa, and named Trioza salicis. This name is preoccupied, however, by Löw's use of
the name in 1932. Crawford in 1910 proposed three new names, nigra, assimilis and minuta, for variants of the same species. In 1911 he changed the name nigra to nigrilla and assimilis to floriflori as these names were both preoccupied; subsequently (1914) he suppressed all of these names as synonyms of Trioza salicis Mably. As salicis is preoccupied, this leaves minuta as the oldest available name which has been applied to the species and therefore the name by which it must be designated.

Caldwell in 1938 referred the species to the genus Phylloplecta and erroneously resurrected the homonym salicis; this error was corrected in 1939, but he added another name, multidubius, to the already long list of synonyms which this species carries. Subsequently (1940) he correctly attributed the name minuta to the species.

Specimens are at hand from the following localities: Iowa, Illinois, Maryland, Louisiana, Oklahoma, Colorado, Arizona, California, Utah, Oregon, Washington, Idaho, and Montana. Caldwell records it from Ohio, gives the life history and describes the immature stages. It is also recorded from New York and doubtlessly occurs over most of North America.

The type of minuta is assumed to be in the Crawford Collection. Type of Trioza salicis Mably, female, Ames, Iowa, September 8, 1894, is in the Iowa State College Collection.
at Ames, Iowa.

The types of Crawford's various synonymic species are also assumed to be in his collection if they were ever selected.

**Trioza minuta var. arizonee Aulmann**


1912 *Trioza arizonee* Aulmann, Ent. Rund. Heft 22 [fide Aulmann].

1913 *Trioza arizonee* Aulmann, Psy. Cat. 39.

1914 *Trioza arizonee* Crawford, U. S. N. M. Bull. 35:33.

1917 *Trioza arizonee* Van Duzee, Cat. Hemip. N. A. 735.

The brown posterior margin of the forewing is the character separating this variety from the typical form. This band, while quite distinctive, is hardly of specific value. Specimens are at hand from Arizona and from Oklahoma.

Type, female, no. 13087 U. S. N. M., has all the wings broken off.

Type examined.
**Trioza variana** Crawford


1913 *Trioza variana* Aulmann, Psy. Cat. 57.

1917 *Trioza variana* Van Duzee, Cat. Hemip. N. A. 796.

1938 *Trioza variana* Strickland, Can. Ent. LXX:204.

1939 *Trioza variana* Strickland, ibid. LXXI:214.

Length to tip of folded wings 4 to 4.25 mm.

**Color:** General color black. Tibiae, first tarsal segment, segment III of antennae, broad subapical band on dorsal valve of female genital segment, yellow. Vertex and dorsum of thorax with extensive testaceous markings. Vertex testaceous on margins and usually along median sulcus. Pronotum, posterior margin and mid-line of prescutum, longitudinal stripes on mesoscutum, scutellum, testaceous. Veins of forewings black.

**Structure:** Head narrow. Vertex raised, plate-like, discal impressions prominent. Eyes appearing slightly stalked. Genal processes long, slender, acute, somewhat divergent, 4/5 as long as vertex. Antennae 1-3/4 times as long as width of head. Thorax strongly arched. Pronotum entirely depressed below plane of vertex. Forewings about
2-1/2 times as long as wide, very large, almost twice as long as body, spines rounded; Rs long and sinuate. Hind tibiae with 2 inner apical spines, prominent, serrate, basal carina. Metacoxae moderately produced anteriorly.

Genitalia: Male proctiger shorter than forceps, caudal lobes large, almost as long as vertical portion. Forceps in lateral view long, slender, sinuate, evenly tapering to rounded spines; in caudal view very broad basally, constricted and incurved midway, thence straight to spines. Female genital segment short; ventral valve straight, apex produced as a large tooth; dorsal valve twice as long as ventral, terminating as a blunt tooth.

Numerous specimens of this beautiful species are at hand from Colorado where it seems to be limited in distribution to altitudes of about 11,000 feet or more. In addition to these specimens I have one from California and one from Ungava Bay, H. B. T. It is also recorded from Utah and Alberta.

Type, female, Colorado, C. F. Baker, no. 18033 U. S. N. M.

Type examined.

Triozia incerta n. sp.

Figs. 62, 63, 114.

Length to tip of folded wings 3.25 to 3.5 mm.

Color: Color very much like variana. General color
black. Markings orange red, almost identical pattern as varians. Females generally lighter. Male forceps apparently always white.


Genitalia: Male proctiger short, caudal lobes as long as vertical portion. Forceps longer than proctiger; in lateral view slender, evenly narrowed from base to acute apices, very strongly curved cephalad; in caudal view very large basally, constricted, then straight to apices. Female genital segment as long as rest of abdomen; ventral valve swollen basally, slender apical portion 3/4 as long as base; dorsal valve longer than ventral, somewhat attenuate apically, blunt.

This form, while much like varians in coloration, is smaller, less robust and has genitalia quite distinct from the latter species. It occurs on willow at quite high altitudes (10,000 ft.) in southern Colorado. Specimens are also at hand from California, Oregon, Washington, British Columbia and Alaska.
Holotype, female, and allotype, male, Spring Creek Pass, Colorado, June 29, 1937, L. D. Tuthill. Numerous paratypes with the same data and also from the localities listed above. Holotype, allotype and paratypes in author's collection; paratypes in U. S. National Museum and Snow Collection, University of Kansas.

*Trioza rubra* Tuthill

Figs. 64, 65, 65a, 115.


Length to tip of folded wings 3.75 mm.

**Color:** General color red to almost black, males darker in general. Distal portions of legs lighter. Antennae white except distal third black.

**Structure:** Vertex almost plane, bulging in front, medial suture prominent. Genal processes large, divergent, blunt, 2/3 as long as vertex. Antennae almost twice as long as width of head, basal portion somewhat swollen. Thorax weakly arched. Pronotum short, depressed below plane of vertex. Forewings rather bluntly angled, almost 3 times as long as wide. Hind tibiae with large serrate carina basally, 2 inner apical spines. Metacoxae developed anteriorly as blunt processes.

**Genitalia:** Male proctiger with rather sharp caudally
projecting lobes, surrounding forceps. Forceps large at base, tapering to long slender black-tipped spicula, curving cephalad throughout their length; in caudal view broad basally, lateral margins straight, mesal margins bearing a triangular tooth midway, spicula acute. Female genital segment short, about 1/3 as long as remainder of abdomen, dorsal valve somewhat concave, black apically, slightly longer than ventral.

Specimens are at hand from Colorado, New Mexico, Arizona, and Oregon.

Type, female, Creede, Colorado, in author's collection.

_Trioza lobata_ Crawford

1914 _Trioza lobata_ Crawford, _U. S. N. M. Bull._ 35:76, 36.

Length to tip of folded wings 3.25 to 3.5 mm.

Color: General color yellow to yellowish brown. Abdomen green ventrally. Tip of each antennal segment dark. Forewings with irregular brown maculae as follows: a broad vitre extending from anal margin between apex of clavus and _Cu₂_ obliquely to basal angle of costa, another following margin from center of cubital cell across apex, a third arising at tip of _R₅_ extending to cubital cell. Maculae with darker brown dots.
Structure: Head broad, somewhat deflexed, narrower than thorax, with hair-like pubescence. Vertex flat with 2 prominent discal impressions, produced anteriorly each side of median ocellus. Genal processes short, very strongly divergent, rounded, parallel with and not much below plane vertex, 1/2 as long as vertex including antero-lateral portion. Antennae slightly less than twice as long as width of head. Thorax strongly arched, sparsely pubescent. Pronotum depressed below plane of vertex. Forewings short and broad, less than 2-1/2 times as long as broad, bluntly angulate. Hind tibiae with serrate basal carina, 2 inner apical spines. Metacoxae with stout spiniform processes anteriorly.

Genitalia: Male genital segment small. Proctiger short, produced into 2 long attenuate lobes. Forceps about as long as proctiger; in lateral view rather broad basally, constricted midway, spines enlarged; in caudal view broad at base, tapering and arched to acute spines. Female genital segment short; ventral valve very short, apically produced as a large black tooth; dorsal valve strongly curved downward, apex black, beak-like.

Crawford records the type series of this very distinctive species as taken on "a species of Ceanothus." Klyver lists one specimen from Chrysothamnus. Specimens are at hand from Mojave, Mint Canyon, Tehachapi and Los Angeles, California;
Santa Rita Mountains, Arizona; Organ, New Mexico; Rattlesnake Buttes in eastern Colorado.

Type, male, no. 13036 U. S. N. M.

Type examined.

**Trioza tripunctata (Fitch)**

1851 *Psylla tripunctata* Fitch, 4th Rept. N. Y. Mus. 64.
1910 *Trioza tripunctata* Smith, Ins. N. J. 110.
1913 *Trioza tripunctata* Aulmann, Psy. Cat. 55.
1917 *Trioza tripunctata* Van Duzee, Cat. Hemip. N. A. 795.
Length to tip of folded wings 3.5 to 4 mm.

Color: General color yellow to brown. Tip of antennae dark. Forewings marked with brown vittae as follows: along distal half of Rs, along M and including cell M₂, along Cu and including cell Cu₁, latter 2 continuous at margin, also a spot on anal vein.

Structure: Head large, somewhat deflexed. Vertex plate-like with very broad shallow discal impressions. Genal processes large, subacute, parallel to plane of vertex, between 1/2 and 2/3 as long as vertex. Antennae about 1-1/2 times as long as width of head. Thorax broad, strongly arched. Pronotum depressed below plane of vertex. Forewings broad, about 2-1/4 times as long as wide, angulate; Rs long, sinuate, marginal cells very short and broad. Hind tibiae with basal spur, 2 inner apical spines. Metacoxae with anterior portion produced as blunt process.
Genitalia: Male genital segment of medium size. Process short, produced into 2, long, distally rounded lobes. Forceps as long as process, evenly narrowed to acute apices curved cephalad, scarcely arched. Female genital segment about 1/2 as long as rest of abdomen; dorsal valve excavate on dorsal margin, somewhat longer than ventral, latter straight, both acute, black-tipped.

One of the first species of psyllids to receive attention in North America was this "bramble flea-louse" or "blackberry psyllid." It has attracted considerable attention in the eastern part of the United States as a pest on blackberries. Peterson's paper (1923) is a most complete account of the damage, life history and control. It includes figures of the various stages and a complete bibliography up to 1923. The common blackberry (Rubus) is the summer host and Peterson apparently proved that coniferous trees are an essential host for the over-wintering females. There is but one generation per year. Specimens are at hand from South Carolina, Maryland, New Hampshire, and Minnesota. It has also been recorded as occurring in Virginia, District of Columbia, New York, Connecticut, Maine, New Jersey, Ontario, Florida, North Carolina, Ohio, Michigan, and probably occurs throughout all the eastern portion of North America wherever Rubus and conifers occur together.

Type no. 1345 U. S. N. M., male and female on one pin.
Types examined.
Trioza californica Crawford


1911 Triozoida californica Crawford, ibid. III:492.

1913 Trioza californica Aulmann, Psy. Cat. 40.

1914 Ceropsylla californica Crawford, U. S. N. M. Pull. 35: 102.

1914 Trioza ichneumonia Crawford, ibid. 103.

1917 Ceropsylla californica Van Duzee, Cat. Hemip. N. A. 793.

Length to tip of folded wings 4 mm.


Structure: Head of medium size, narrower than thorax. Vertex plane with broad discal impressions. Genital processes large, straight, subacute, only slightly divergent, barely shorter than vertex. Antennae slightly less than twice as long as width of head. Eyes protruding rather more than usual. Thorax strongly arched. Anterior margin of pronotum depressed below plane of vertex. Forewings about 2-1/2 times as long as wide, acute at apex; Rs short. Hind tibiae with
2 inner apical spines, large serrate basal spur. Anterior portion of metacoxae slightly produced.

Genitalia: Male genital segment small. Proctiger short, with long, blunt posterior lobes. Forceps large at base, slender and laterally flattened abruptly at about half their length, apical third curved cephalad, spines acute. Female genital segment very short, dorsal valve slightly longer than ventral, acute.

This species is represented in the material before me by several specimens from Southern California and one from Gila County, Arizona. Crawford also records it from Colorado on Salix. He placed this species in the genus Ceropsylla on the basis of a tendency toward a petiolate condition of M and Cu in the forewings. This petiole is very slight or entirely wanting in the specimens I have examined. It is quite unlike C. sideroxyli in head and thoracic characters, and even in wing venation it is more typically triozine; hence I am referring it back to Triozia.

Type, male, mountains near Claremont, California, Baker, is in the Crawford Collection.

_Trioza phorodendraceae_ Tuthill

_Figs. 66, 67, 116._

Length to tip of folded wings 2.5 mm.

Color: Uniformly yellow except eyes, tip of female genital segment, ovipositor and margins of male forceps, black. Forewings yellowish, veins yellow.

Structure: Vertex somewhat rounding. Genal processes acute, slightly divergent, 2/3 as long as vertex, pubescent. Antennae about as long as width of head. Thorax scarcely arched. Pronotum moderately long, depressed below plane of vertex. Legs short. Hind tibiae with large basal spur, 3 inner apical spines. Forewings small, narrowly rounded apically, almost 3 times as long as wide; marginal cells small, Rs very long.

Genitalia: Male proctiger quite broad, posterior margin curved, anterior margin straight. Forceps in lateral view curving cephalad; "folded" so as to appear double in apical half from caudal view, lateral folds evenly narrowed to spines, medial folds with heavy, black, truncate spines, bearing many, very heavy medially projecting setae basally. Female genital segment as long as rest of abdomen, rounded, produced at apex into a brown styliform portion, at least tip of ovipositor protruding.

Known only from the type series and one additional female all from Mesa Verde National Park, Colorado. Host Phoradendron juniperinum Engelm. The original spelling of the name as phorodendrace was an error of transcription and should be
Trioza phoradendrace acuminata n. subsp.

Similar to typical subspecies but apparently greenish in color (the specimen at hand is old and therefore quite faded). Head smaller and narrower proportionately. Genal processes fully as long as vertex, slightly divergent, acute. Antennae 1-1/3 times as long as width of head. Male genitalia similar.

Holotype, male, Los Angeles County, California, May, collected on "Phorodendron pubescens", no. 55132 U. S. N. M.

The genitalia are somewhat obscured on the one specimen at hand but seem to be very much like the typical form. This may be a distinct species but until more material is available to certify such an opinion I prefer to consider it as a subspecies.

Trioza bakeri Crawford


1911 Trioza bakeri Crawford, ibid. III:424, 428.

1911 Trioza montana Crawford, ibid. 631.

1913 Trioza bakeri Aulmann, Psy. Cat. 39.
1914 *Triozoa bakeri* Crawford, U. S. N. M. Bull. 35:77.
1914 *Triozoa puberula* Crawford, *ibid.* 78.
1917 *Triozoa bakeri* Van Duzee, *Cat. Hemip. N. A.* 792.

Length to tip of folded wings 4 to 4.5 mm.

**Color:** Variable from yellow to brown, tip of antennae black, abdomen of female green when alive. Variable brown markings on dorsum. Wings hyaline.

**Structure:** Head large, almost as broad as thorax. Vertex plane, rectangular, discal foveae and medial suture prominent. Genal processes on approximately same plane as vertex. Antennae about as long as width of head. Thorax broad and flat for genus. Pronotum large, not depressed below vertex. Forewings about 2-2/3 times as long as wide, acutely angled; R5 long and sinuate. Hind tibiae with serrate basal tubercle, 3 inner apical spines. Metacoxae with short, stout, anterior processes.

**Genitalia:** Proctiger of male produced caudad as a blunt triangle, widest basally, with truncate apex. Forceps shorter than proctiger; in lateral view almost straight; in caudal view arched to black-margined spines, posterior edges produced as blunt tooth. Female genital segment large, 1/2 as long as rest of abdomen in fresh specimens, about as long as rest of abdomen in dried specimens, valves straight, equal in length.
Described and recorded heretofore only from California, this species has been taken on *Pinus abies*, *Arctostaphylos*, etc. In 1933 (July 19) I swept numerous specimens from *Rhamnus smithii* Green near Paposa Springs, Colorado. Since the bushes upon which they occurred were quite isolated and tender specimens occur in the series, I believe this shrub to be the host plant. Unfortunately I did not determine whether or not nymphs were present.

Type, male, Claremont, California, Baker, in Crawford Collection. Colorado specimens compared with type.

*Triozoa breviantennata* Crawford

1914 *Triozoa breviantennata* Crawford, U. S. N. M. Bull. 35: 75, 78.

1917 *Triozoa breviantennata* Van Duzee, Cat. Hemip. N. A. 792.


Crawford describes this species as similar to *Triozoa bakeri* but differing in color, pubescence, punctuation, and in minor details of structure. I do not believe that these differences are of specific value as Crawford describes them, but as I have seen none of the specimens on which the species was based I hesitate to throw it into synonymy. His description follows:
"Very similar in size and general proportions to T. bakeri; wings relatively a little shorter. General color light to dark brown, often very dark; legs and antennae lighter, except latter black at tip; in light forms the vertex is dark brown to black. Vertex and dorsum not pubescent as in bakeri, but very coarsely punctate.

"Similar in many respects to bakeri, but vertex very conspicuously bulging on each side of median line; genal cones relatively shorter; antennae a little shorter, scarcely as long as width of head. Thorax as in bakeri, but not pubescent. Hind tibiae with three apical spines within. Wings large, resembling bakeri.

"Genitalia.—Male—Anal valve as in bakeri, but base of triangle shorter; forceps similar, subacute at apex, sides almost parallel. Female—Genital segment similar, but dorsal valve a little longer than ventral.

"Described from two males and one female from Claremont, California (mountains), collected by C. P. Baker, no data with them."

Type in Crawford Collection.

_Trioza (Megatroicoza) diospyri_ (Ashmead)

1891 _Psylla diospyri_ Ashmead, Can. Ent. XIII:222.
1911 *Trioza diospyri* Crawford, ibid. III:424, 429.
1913 *Psylla diospyri* Aulmann, Psy. Cat. 14.
1914 *Trioza diospyri* Crawford, U. S. N. M. Bull. 85:73.
1917 *Trioza diospyri* Van Duzee, Cat. Hemip. N. A. 792.
1926 *Spanioza diospyri* Enderlein, Ent. Mitt. XV:400.
1938 *Trioza diospyri* Brimley, Ins. N. C. 103.

Length to tip of folded wings 4.5 mm.

**Color:** General color shining black. Meso and meta-
tibiae, all tarsi, genital processes and antennae except tip, white.

**Structure:** Entire body sparsely clothed with long hair-like setae. Head broad but narrower than thorax. Vertex plane, with slight discal impressions. Genal processes short, about 1/2 as long as vertex, rounded, slightly divergent.

Antennae about 1-1/2 times as long as width of head. Thorax strongly arched. Pronotum strongly depressed, entirely below
level of vertex. Forewings very large, almost twice as long as body, about 2-3/4 times as long as wide, acutely angled at apex; marginal cells unusually large, especially medial, Rs short, less than 1/2 total length of wing, straight. Hind wings very small, less than 1/2 as long as forewings. Legs longer than in most species. Hind tibiae with 3 inner apical spines, without basal spur or carina. Posterior metacoxal spurs large, curved. Anterior margins of metacoxae produced into spurs, larger than posterior ones.

**Genitalia:** Male genital segment small. Proctiger somewhat longer than forceps, produced caudad as large blunt lobes, anus borne on a prominent epiphysis. Forceps almost straight in lateral view; in caudal view broad, basal 2/3 straight, apical 1/3 curved inward, spines with several small black teeth. Female genital segment of medium size, about 1/2 as long as rest of abdomen, valves acute, ventral upward curved to meet dorsal, latter longer, entire segment usually pointing ventrad.

This species is quite distinct in many respects from other North American Tries. It is abundant throughout the range of the common persimmon, Diospyros virginiana L., which is its host. Specimens are at hand from the following states: Florida, Georgia, Alabama, Mississippi, Louisiana, Texas, Oklahoma, Kentucky, Tennessee, New Jersey. It is also recorded from Missouri, Virginia, North Carolina, Ohio, New York.
Ashmead gives the life history in Florida in some detail:

"By the middle of April this is found in considerable numbers on the leaves of the young trees, with beaks inserted, almost standing on their heads, and swaying from side to side like the motion of a vessel in a stormy sea. This motion is evidently intended to assist either in inserting the beak or in pumping up the juices of the tree.

"At this time they are also caught copulating, soon after which the female begins depositing her eggs. These are very minute, 0.01 inch in length, elongate ovate, pale greenish in color, with a wavy beak beneath at thick end, and a long filament at tip of smaller end, nearly the length of the egg, and extending backwards over it. These are laid along the margin of the leaf, without regard to regularity, the female first preparing for their reception by secreting a thread-like, transparent, gummy substance along the extreme edge of the leaf; she then fastens them in place by the beak, which adheres securely to the gummy substance.

"These hatch in from 5 to 6 days (actual observation) and the leaf from their punctures curls completely over them; under this they reside until just before the final transformation. The pupa then comes forth, attaches itself to a leaf or twig, and changes into the perfect fly, escaping through a longitudinal slit in the head and thorax. The young take from four to five weeks to mature and breed
throughout the whole summer.

"Like the Fig Psylla, the fall brood probably lay their eggs in crevices of the bark and twigs; these hatch at the first breath of spring, feed on the tender new shoots and leaves, and are those found fully matured by the first and second week in April."

The fifth stadium nymph has been described and figured by Ferris (1926).

Type, female, no. 14820 U. S. N. M., is moldy and in poor condition but it is unmistakable.

Type examined.

**Triozia beameri** Tuthill

Figs. 69, 69, 117.


Length to tip of folded wings 5 mm.

**Color**: General color whitish-yellow except eyes and tips of antennae dark.

**Structure**: Entire body pubescent, least prominently on abdomen. Vertex rather flat with 2 prominent sulcate depressions. Antennae about 1-1/3 times as long as width of head. Genal processes large, extending forward, 3/4 as long as vertex. Thorax not very strongly arched. Pronotum very long, scarcely depressed. Forewings very large, twice as
long as body, acute, almost 3 times as long as broad; cubital cell larger than medial. Posterior tibial with serrate carina basally, 3 inner apical spines. Anterior processes of metatibiae scarcely developed.

Genitalia: Male proctiger in lateral view broad in basal 1/2, then obliquely truncate to apex. Forceps in lateral view almost straight to apices, latter produced caudad as blunt black teeth; in caudal view broadest at base, bowed out, evenly narrowed to apices. Female genital segment about as long as rest of abdomen, valves straight to acute apices, dorsal slightly longer than ventral, very pubescent.

Known only from the type series from the San Jacinto Mountains, California.

Type, male, in Snow Collection, University of Kansas.

**Trioza chloris Tuthill**

Figs. 70, 71, 118.

1933 *Trioza chloris Tuthill*, Ent. News XLIX:244.

Length to tip of folded wings, 3.25 to 3.50 mm.

Color: General color white to yellow except eyes and apical 2/3 of antennae black. Thoracic dorsum and vertex deeper yellow to orange. Wings hyaline.

Structure: Head medium in size, post-ocular occipital
region very large giving the eyes the appearance of projecting forward. Vertex somewhat rounding, rather deeply emarginate in front, extending forward over front ocellus. Genal processes vertical, about as long as vertex, rather acute. Antennae twice as long as width of head. Thorax strongly arched. Pronotum short, descending, depressed below plane of vertex. Forewings almost 3 times as long as broad, sharply angled; venation typical trionzine. Hind tibiae with large basal spur, 3 inner apical spines.

Genitalia: Male genitalia small. Proctiger broad at base, tapered to slightly produced apex, bearing a black spine at base on each side. Forceps slightly shorter than proctiger; in lateral view broad, anterior margin almost straight, posterior margin slightly curved, apices roundly truncate and slightly produced anteriorly, apical margin brown. Female genital segment shorter than rest of abdomen, basal portion subglobular, apex a short, brown, styliform elongation; dorsal valve slightly longer than ventral.

Holotype and allotype in the Snow Collection, University of Kansas, are from Arizona and are the only known specimens.

Trioza proximata Crawford

Length to tip of folded wings 3 to 3.5 mm.

**Color:** Testaceous to almost white, perhaps greenish when fresh. Tips of antennae and styliform portion of female genital segment black.

**Structure:** Head narrower than thorax. Occiput large, posterior margin of eyes opposite lateral ocelli. Vertex with 2 discal sulci, medial suture deep. Genal processes short, heavy, blunt, 1/2 as long as vertex. Antennae twice as long as width of head. Thorax broad, quite strongly arched. Pronotum strongly descending but not at all depressed below plane of vertex. Forewings almost 3 times as long as wide, rounded apically. Hind tibiae with large serrate basal tubercle, 3 inner apical spines.

**Genitalia:** Male prostiger long, caudal margin arcuately produced, a prominent epiphysis at apex. Forceps long; in lateral view moderately broad, curved cephalad, tapering, apices black, with small black tooth; in caudal view almost straight-sided, slightly arched, a prominent row of setae on inner margins. Female genital segment very long, 3/4 as long as remainder of body, proximal 1/3 large, tapering, distal portion of valves very slender, acuminate and appressed to ovipositor, latter extending somewhat beyond valves; dorsal valve longer than ventral.

A number of specimens are at hand from Ramsey Canyon, Huachuca Mountains, Arizona, October 30, 1937, collected by
P. W. Oman, which seem undoubtedly to be this species described from southwestern Mexico. No host plant data are available.

Type in Crawford Collection.

**Trioza collaris** Crawford


1911 *Trioza collaris* Crawford, ibid. III:424, 429.


1913 *Trioza collaris* Aulmann, Psy. Cat. 44.


1917 *Trioza collaris* Van Duzee, Cat. Hemip. N. A. 793.


Length to tip of folded wings 4 to 4.5 mm.

**Color:** General color green to yellowish green, occasionally with some darker markings on dorsum of thorax. Tips of antennae, styliform portion of female genitalia and spines of male forceps dark.

**Structure:** Head large, only slightly narrower than thorax. Vertex scarcely plane, discal impressions prominent. Genal processes short, not over 1/2 as long as vertex, appressed, blunt to acute. Antennae twice as long as width of head. Thorax large, flat. Pronotum long, strongly
descending cephalad, not depressed below vertex. Forewings large, angular at apex, almost 3 times as long as wide. Hind tibiae with basal tubercle bearing 2 small spines, with 3 inner apical spines. Anterior portions of metacoxae short, stout.

**Genitalia:** Male proctiger slightly, roundingly produced on caudal margin. Forceps about as long as proctiger, slender, bent cephalad, slightly bowed, spines sharp, black. Female genital segment large, about twice as long as rest of abdomen, about half as long as remainder of body, consisting of a large basal portion and a styliform projection, latter about as long as base, black; basal portion produced ventrally just before constriction.

This species is apparently quite common in California and neighboring states. Klyver gives data indicating *Baccharis* app. as the probable host. Numerous specimens are at hand from California, Arizona, New Mexico and El Paso, Texas. Some of these specimens bear labels "collected on Baccharis viminalis."

Type in Crawford Collection.

**Trioza longistylus** Crawford


1913 *Triozas longistylus* Aulmann, Psy. Cat. 43.

1914 *Triozas longistylus* Crawford, U. S. N. M. Bull. 35:32.

1917 *Triozas longistylus* Van Duzee, Cat. Hemip. N. A. 793.

An examination of the type (no. 18033 U. S. N. M.), a female, fails to show any apparently significant difference between this form and *collaris* except that the ventral hump present on the genital segment of the female of *collaris* is lacking. That this is a distinct species is extremely doubtful but it is retained pending further collection in the type locality.

**Triozas mexicana minor n. n.**


1914 *Triozas mexicana minute* Crawford, U. S. N. M. Bull. 35:30.

Length to tip of folded wings 2.75 to 3.0 mm.

Color: General color red. Abdomen darker. Legs and genital processes testaceous.

Structure: Head large but narrower than thorax. Vertex with medial suture prominent, discal impressions very shallow, rounding in front to genital processes. Latter straight, slender, acute, scarcely divergent, 2/3 as long as vertex. Antennae
about 1-1/4 times as long as width of head. Thorax broad, well arched, with very short, sparse pubescence, scarcely visible. Pronotum long, scarcely depressed below vertex. Forewings broad, rounded apically, slightly less than 2-1/2 times as long as wide, finely punctate. Hind tibiae with large basal spur, 3 inner apical spines.

Genitalia: Male prostiger roundly produced caudad, with very distinct apical epiphysis. Forceps in lateral view rather broad to near apex then curved cephalad, spines broad, black; in caudal view broad, almost straight, spines incurved, touching, postero-mesal margins with a row of very large heavy setae. Female genital segment longer than rest of abdomen, basal portion large, swollen, spines of valves acuminate, black; prominent short setae on all of basal portion, a tuft of very long setae on dorsal valve at base of acuminate portion.

This insect was described by Crawford from Mexico. Numerous specimens are at hand from southern Arizona and have been compared with the type. Although this subspecies is like the typical form except for slight differences in the genital processes, it is so consistently smaller that it is maintained. The name minor is proposed to replace the name minute which is preoccupied by Trioza minute, Crawford. Crawford records the typical form as taken on Rhus sp.

Type (type of Trioza mexicana minute Crawford) in Crawford Collection.
**Trioza quadripunctata** Crawford


1913 *Trioza quadripunctata* Aulmann, Psy. Cat. 51.

1914 *Trioza quadripunctata* Crawford, U. S. N. M. Pull. 85:32.

1917 *Trioza quadripunctata* Van Duzee, Cat. Hemip. N. A. 793.

1926 *Spanoza quadripunctata* Enderlein, Ent. Mitt. XV:400.


1938 *Trioza quadripunctata* Strickland, Can. Ent. LXX:204.

1939 *Trioza quadripunctata* Strickland, ibid. LXXI:214.

Length to tip of folded wings 4 mm.

Color: General color of summer form greenish-white to yellowish, winter form darker, brownish. Apical 1/2 of antennae and tips of tarsi black. Hind margin of forewing with four black spots, 3 distal ones coinciding with radial areas typical for genus, remainder of wing hyaline or somewhat milky.

Structure: Head small, narrower than thorax. Vertex with prominent discal impressions, anterior margin
produced, overhanging. Genal processes short, stout, divergent, about 1/2 as long as vertex. Antennae twice as long as width of head. Thorax strongly arched. Pronotum long, anterior margin below plane of vertex. Forewings short, slightly less than 2-1/2 times as long as wide, costal margin rounded, apex scarcely angulate, Rs short, straight. Hind tibiae without basal armature, with 3 inner apical spines.

Genitalia: Male proctiger arcuately produced caudal, an apical epiphysis. Forceps long, slender; in lateral view straight; in caudal view strongly arched to acute black spines. Female genital segment 2/3 as long as rest of abdomen, valves straight, acute, dorsal slightly longer than ventral, black-tipped.

Numerous specimens of this nettle (Urtica) inhabiting species are at hand from the following localities: Minnesota, Iowa, Missouri, Kansas, Colorado, and Wyoming. It is also recorded from California, Montana, Alberta, Ohio, and New York. It is very much like albifrons but can readily be distinguished from it by the dark maculae in the forewings. This may be simply a variety of albifrons but it seems doubtful from collecting and distribution data. I have swept great numbers of albifrons in Colorado and Minnesota without finding a single specimen of quadripunctata; in Iowa pure populations of quadripunctata have been observed.

Type, male, no. 13034 U. S. N. M.
Type examined.
Trioza albifrons Crawford


1910 *Trioza rotundipennis* Crawford, *ibid.* 231, 236.


1911 *Trioza albifrons* Crawford, *ibid.* III:426, 429, 433

[female described].


1911 *Trioza similis* Crawford, *ibid.* 426, 429.


1913 *Trioza albifrons* Aulmann, Psy. Cat. 39.

1913 *Trioza fovealis* Aulmann, *ibid.* 46.

1913 *Trioza rotundipennis* Aulmann, *ibid.* 52.

1913 *Trioza similis* Aulmann, *ibid.* 55.

1914 *Trioza albifrons* Crawford, U. S. N. M. Bull. 35:83.

1917 *Trioza albifrons* Van Duzee, Cat. Hemip. N. A. 793.


1933 *Trioza similis* Strickland, Can. Ent. LXX:204.

Length to tip of folded wings 3 to 3.5 mm.

Color: General color from green to light yellow through brown to black. In lighter forms only eyes, distal 1/2 of antennae and last segment of tarsi dark. In dark forms rim
of vertex, male genitalia and usually legs, light. (Between these extremes all variations in color occur).

**Structure:** Head small, narrower than thorax. Disc of vertex depressed, edges carinate, protruding in front. Genal processes acute, divergent, on approximately parallel plane to vertex, about 2/3 as long as vertex. Antennae 1-1/2 times as long as width of head. Thorax strongly arched. Pronotum depressed below plane of vertex. Forewings varying from angular to round apically; Rs rather short to long. Hind tibiae without basal armature, with 3 inner apical spines.

**Genitalia:** Male proctiger slightly longer than forceps, basal 3/4 roundingly produced. Forceps stout, arched to heavy, apparently black-tipped apices (see Klyver, 1930), anterior margins excavate near apices. Female genital segment 1/2 to 2/3 as long as rest of abdomen, valves approximately equal in length, almost straight to usually sharp apices, somewhat rounded in some specimens.

Crawford states that there are sometimes only 2 inner apical spines on the tibiae instead of 3. I have examined several hundred specimens from various localities and have seen this condition on only 2 specimens, 1 collected by Crawford at Stanford University and 1 other. In both these specimens 1 tibia bears 3 spines and the other only 2. This condition I believe to be only an aberration of such infrequent occurrence as to be of no significance.
I have examined Crawford's types (?) of *similis* and *rotundipennis* which are in the National Museum (specimens with red labels) and find them to be *albifrons*. The type of *similis fovealis* is a malformed specimen.

This is apparently a widely distributed species of western North America. Numerous specimens have been examined from the following localities: California, Oregon, Washington, British Columbia, Alaska, Idaho, Utah, Montana, Colorado, Arizona, New Mexico, and Minnesota. Strickland records it (*similis*) from Alberta. It occurs in large numbers on various species of *Urtica*. As would be expected in such a widespread species there is considerable minor variation in characters.

The type, a male from Claremont, California, is in the Crawford Collection.

Crawford (1914) gives a general description of the egg and nymph together with some biological notes. Klyver (1930) compares *albifrons* with *urticæ* in detail, describes and figures the nymphs.

**Trioza sembla** Caldwell

Fig. 72.

1940 *Trioza sembla* Caldwell, Ohio Jour. Sci. XL:49.

"Length to tip of forewing 2.7 mm.; forewing 2.2 mm."
"Color: Light orange except for black eyes, black antennae beyond second segment, brown terasi, and yellow margin around vertex.

"Head as broad as thorax, both finely pubescent. Genal cones 2/3 as long as vertex, acute, slightly divergent. Antennae a little longer than width of head. Forewings little over twice as long as broad; apices subacute.

"Proctiger of male with large caudal lobes. Forceps shorter than proctiger. In lateral aspect: Caudal margin practically straight, cephalic margin slightly produced cephalad, apices slightly rounded rather than truncate. In caudal aspect: Thick basally, slightly bowed, narrowed evenly to apices.

"Male holotype, Painted Desert, Arizona, VI-25, D. J. and J. N. Knoll, collectors, is in the Ohio State University Collection." Caldwell.

I have not seen the specimen on which this species is based. Caldwell has supplied me with the additional information that there are 3 inner apical spines on the hind tibiae.

Trioza frontalis Crawford


1913 *Trioza frontalis* Aulmann, Psy. Cat. 46.
1914 Trioza frontalis Crawford, U. S. N. M. Bull. 35:84.
1917 Trioza frontalis Van Duzee, Cat. Hemip. N. A. 794.
1932 Trioza frontalis Klyver, Pan-Pac. Ent. VIII:14.

Length to tip of folded wings 3.5 mm.

Color: General color orange red to brown. Antennae, genital processes and abdomen darker.

Structure: Head large, deflexed. Vertex broad, discal foveae and medial suture prominent, front margin abrupt. Genal processes acute, divergent, 2/3 as long as vertex at middle, on parallel plane with vertex. Antennae rather heavy, 1-1/2 times as long as width of head. Thorax not very strongly arched. Pronotum narrow, depressed. Forewings about 2-1/2 times as long as wide, apices subacute. Hind tibiae with small serrate carina basally, 3 inner apical spines. Metacoxae only slightly produced anteriorly.

Genitalia: Male genitalia large. Proctiger longer than forceps, produced caudad as large lobes with dorsal margins slightly upcurved, apices blunt. Forceps large; in lateral view stalk slender, straight, apical portion evenly enlarged; in caudal view slightly arched; apices excavate on mesal margins, anterior portion more or less of a truncate tooth.
Female genital segment large, almost as long as rest of abdomen; ventral valve upcurved, acute; dorsal valve longer than ventral, apical portion attenuate, blunt.

This species is quite typical of a number of Amelanchier-inhabiting forms all of which have quite massive heads, large bodies and are more or less powdered with a waxy bloom as adults.

Specimens are at hand from the following localities: California, British Columbia, Manitoba, Minnesota, North Dakota, South Dakota, and Colorado. It has also been recorded from Nevada.

Many of the California specimens (including nymphs) bear the label Amelanchier alnifolia which Klyver also records as the host. The California specimens show some variation from those taken in Colorado but not a significant difference.

Type, male, no. 13035 U. S. N. M.
Type examined.

Trioza sulcata Crawford
Figs. 73, 74, 119.

1910 Trioza sulcata similis Crawford, ibid. 233.
1913 *Trioza sulcata* Aulmann, Psy. Cat. 55.

1913 *Trioza sulcata similis* Aulmann, Ibid. 55.

1914 *Trioza frontalis sulcata* Crawford, U. S. N. M. Bull. 85:35.

1917 *Trioza frontalis sulcata* Van Duzee, Cat. Hemip. N. A. 794.

1933 *Trioza frontalis sulcata* Strickland, Can. Ent. LXX:203.

Length to tip of folded wings 3 mm.

**Color:** General color most typically orange with black tarsi and antennae. Often much darker with brown markings on vertex and thorax, abdomen, femora, etc. dark. Frequently with a wax bloom.

**Structure:** Head large, almost as wide as thorax. Vertex with 2 sulcate impressions. Genal processes slender, straight, acute, divergent from base, about 4/5 as long as vertex. Antennae about 1-2/3 times as long as width of head. Thorax strongly arched, often with short sparse pubescence. Pronotum depressed below plane of vertex. Forewings slender, 2-3/4 times as long as wide. Hind tibiae with small serrate carina basally, 3 inner apical spines. Anterior portions of metacoxae enlarged, prominent.

**Genitalia:** Male genitalia large. Proctiger produced caudally from base to apex, dorsal margin straight, crenellated, ventral margin upcurved. Forceps in lateral view very broad, parallel-sided, apically curved cephalad, apices with a slight notch; in caudal view straight, broad basally, tapered
to sharp apices. Female genital segment short, about 1/2 as long as abdomen; ventral valve strongly upcurved, acute; dorsal valve slightly longer, blunt.

Crawford originally separated this species from *frontalis* because of the more divergent genal processes and the deeper sulci on the vertex. Subsequently he decided these differences were insufficient to constitute a species and maintained it as a variety chiefly on color. Unfortunately he had no males, the genitalia of which are quite distinct from *frontalis*. The type specimen is a dark colored individual but a majority of the specimens at hand are of an orange-red color. They were taken on *Amelanchier* sp. in the arid portions of southwestern Colorado.

Specimens are at hand from the following localities:
Durango and Mesa Verde, Colorado; Arizona; Utah; Nevada; California; Oregon. Strickland records it from Alberta. (?)

Holotype, female, Colorado, C. F. Baker, no. 55183
U. S. N. M. Allotype, male, Durango, Colorado, July 4, 1937,

Type examined.

*Trioza trola* n. n.
Figs. 75, 76, 120.

Length to tip of folded wings, 3 mm.

**Color:** Dorsum orange-red except center of abdominal tergites, 2 incomplete lines on thorax, discal foveae and medial suture of vertex and antennae black. Venter black except tips of genal processes and tibiae.

**Structure:** Head wide, almost as wide as thorax. Discal foveae and medial suture of vertex prominent. Genal processes 2/3 as long as vertex. Antennae slightly over 1-1/4 times as long as width of head. Thorax weakly arched. Pro-notum short, strongly descending, depressed below plane of vertex. Forewings a little more than twice as long as wide, rather bluntly angled. Hind tibiae with very small basal spur, 3 inner apical spines. Metacoxae slightly produced anteriorly as very broad flat processes.

**Genitalia:** Proctiger of male with very long, upcurved, posterior lobes, with a prominent apical tuft of spines. Forceps bent forward and also inward, touching most of their length, spines deeply notched, anterior tooth larger. Female genital segment short, almost globose in lateral aspect, spines of valves black; dorsal valve slightly produced; ventral valve truncate and concave about ovipositor.

In addition to the type series from Colorado and Washington additional specimens are at hand from scattered
points in Colorado and Utah. As do the foregoing and fol­
lowing species this form inhabits Amelanchier.

Type, male, in author's collection.

*Trioza trole curta n. subsp.*

Similar to species except male genitalia. Caudal lobes
on proctiger much shorter, forceps not incurved and touching,
apical notch much shallower. Female genitalia similar to
typical subspecies.

Described from 7 specimens from Placer and Nevada County,
California, September, collected by A. Koebele, all of which
are somewhat tender and are faded, the thoracic markings
of the typical subspecies show faintly however.

Holotype, male, allotype, female, (same mount) no. 55184
U. S. N. W., Lake Tahoe, Placer County, California, September
30, 1895; 5 female paratypes, 1 additional male (doubtful)
Placer and Nevada Counties, California, 1 of the paratypes
bears the label *Amelanchier alnifolia* Nutt. Holotype,
allotype and paratypes in the U. S. National Museum; paratypes in author's collection.

*Trioza inverse* Tuthill

Figs. 77, 73, 120.

Length to tip of folded wings 3 mm.

Color: General color of dorsum ferrugineous with a pair of fuscous markings on vertex, a pair on scutum, another pair on scutellum. Venter, femora and antennae fuscous, remainder fulvous. Wings hyaline.

Structure: Head broad, almost as wide as thorax. Genal processes long, quite sharp, projecting downward, 4/5 as long as vertex. Antennae 1-1/3 times as long as width of head. Thorax moderately arched. Pronotum short, not depressed below plane of vertex. Forewings only slightly angulate, almost 3 times as long as wide. Hind tibiae with small basal spur, 3 inner apical spines. Metacoxae with anterior processes moderately developed.

Genitalia: Proctiger with a basal caudal projection, apex very narrow. Forceps in lateral view large at base, narrowed to spatulate apices; in caudal view broad at base, laterally concave to apices, touching most of their length. Female genital segment about 1/2 as long as remainder of abdomen, acute, dorsal valve slightly longer than ventral.

This Amelanclhier inhabiting species was described from specimens from Colorado, Utah, and British Columbia and is no doubt much more widespread in distribution.

Type, male, in author's collection.
Trioza obtusa Patch

1914 Trioza obtusa Crawford, U. S. N. M. Bull. 95:35.
1917 Trioza obtusa Van Duzee, Cat. Hemipt. N. A. 795.
1932 Trioza obtusa Klyver, Ibid. XLIII:36.
1933 Trioza obtusa Brimley, Ins. of N. C. 103.

Length to tip of folded wings 4 mm.

Color: General color ranging from green in newly emerged adults to red and reddish brown. Typically colored individuals, orange-red, antennæ, genal processes, femora and genitalis darker, often with antero-lateral margins of prescutum dark. Wings from transparent to brownish opaque.

Structure: Head large, almost as wide as thorax. Vertex with medial suture prominent and very deep discal fovea, posterior margin raised. Genal processes heavy, sharp, 2/3 as long as vertex, apices divergent. Antennæ short, about 1-1/3 times as long as width of head. Thorax broad, well arched. Pronotum depressed below plane of vertex. Forewings very bluntly angulate, 2-1/2 times as long as wide; Rs very long. Hind tibiae with prominent, serrate, basal corina, 3 inner apical spines. Metacoxae somewhat produced anteriorly.

Genitalia: Male genital segment of medium size. Proctiger with large caudal lobes, latter as long as axial portion,
ventral margin of lobes almost straight, apices narrow but blunt, setae prominent, especially on dorsal margin of lobes. Forceps shorter than proctiger, very heavy; in lateral view enlarged at apices, apices notched on mesal margin to form 2 black tooth-like lobes. Female genitalic segment large, about as long as rest of abdomen; ventral valve upcurved to black, acute apex; dorsal valve longer than ventral, attenuate, tip blunt.

This form while much like Trioza frontalis is even more robust of head and body, the forewings are more rounded apically and are more or less brown, in hibernating forms very dark.

Specimens are at hand from the following localities: Raquette Lake and White Face Mountain, New York; Washington, D. C.; Maryland; Alabama (taken on pine in February, Schwarz); Park Rapids, Minnesota. The Minnesota specimens (including nymphs) were taken from Amelanchier sp. in company with Trioza frontalis (August 1), apparently the ranges of the two species overlap in this region. Additional records are Maine, Nova Scotia and North Carolina.

Host Amelanchier sp.

Types (lost?), Orono, Maine.

Miss Patch briefly described the nymphs and gave a few life history notes.
**Trioza sylmerise** Patch


1914 *Trioza sylmerise* Crawford, W. S. N. M. Bull. 35:93.

1914 *Trioza amelanchieris* Crawford, ibid. 96.

1917 *Trioza sylmerise* Van Duzee, Cat. Hemip. N. A. 797.


Length to tip of folded wings, 4 mm.

Very closely related to *Trioza obtusa* but wings larger, marginal cells larger, Rs straighter. Caudal lobe of male protiger much more elongate and upcurved, bearing a prominent tuft of large setae at apex. Female genital segment similar but more slender in lateral view.

One pair from Maryland and one pair without locality data in the U. S. National Museum are apparently this species. Described by Miss Patch from Aylmer, Ontario on "Hillberry".

Types (?).

**Genus Paratpioza Crawford**


1911 *Alloptliaza* Crawford (pro parte), ibid. III:423, 442.
1911 Kuwayama Crawford, ibid. 530.
1914 Paratrioza Crawford, U. S. N. M. Bull. 35:70.
1914 Kuwayama Crawford, ibid. 65.
1917 Paratrioza Van Duzee, Cat. Hemip. N. A. 791.
1917 Kuwayama Van Duzee, ibid. 791.


Logotype: Paratrioza cockerelli (Sulc).

This genus while exhibiting distinctive characters of its own seems to represent an intermediate between Trioza and
Rainopsylla, the latter belonging to the Carisiderineae of Crawford. *P. dorsalis* shows a very great similarity to *Rainopsylla antennata* in all characters except the head which is slightly cleft in antennata.

*Kuwayama* Crawford is suppressed as a synonym of *Paratriozia* because in the series of species at hand there is no line of distinction between the two. Of the species known *dubia* n. sp. is most like *medicaginis* except in the shape of the gense which are produced as distinct though small processes; *dorsalis* is very typically paratriozine except that the gense are utterly devoid of any processes, they are not even swollen as much as in *medicaginis*. Therefore, even though *medicaginis* is quite distinctive I feel it unworthy of generic distinction since the characters in which it differs become so difficult of definition.

The 3 Hawaiian species which Crawford assigned to *Kuwayama* are entirely unknown to me but I doubt their being congenors of *medicaginis*. They probably represent a distinct genus which would bear the name *Paraisconus* Enderlein, 1926 (Ent. Mitt. XV:401).

**Key to the genus Paratriozia**

1. Forewings maculate.................. *maculipennis* (Crawford).
   Forewings not maculate.................. 2.
2. Cubital cell larger than medial; large species (4 to 4.5 mm. to tip of folded wings).... *abrolensis* Crawford. Cubital cell not larger than medial; smaller species (3.75 mm. or less to tip of folded wings)............. 3.

3. *R* of forewings short, not reaching furcation of media........................................... *dorsalis* Crawford. *R* of forewings longer, extending at least to furcation of media, more or less sinuate............. 4.

4. Genae entirely without processes, somewhat spherically swollen; male proctiger roundly swollen caudal, forceps with an acute, slender, entero-lateral process; female genital segment slender, elongate ........................................... *medicaginis* Crawford. Genae produced as small conical or pad-shaped processes; male proctiger with elongate caudal lobes, forceps simple; female genital segment short, stout, dorsal valve downcurved................................. 5.

5. Genae produced as small, conical processes; small species (3 mm. to tip of folded wings)

........................................... *cockerelli* (Sulc). Genae very slightly produced as pad-like lobes; larger species (3.25 to 3.75 mm.)................................. 6.

6. Ventral valve of female genital segment produced as a large blunt tooth; caudal lobes of male proctiger perpendicular to axial portion.. *levatense* (Van Duzee).
Ventral valve of female genital segment not produced apically; caudal lobes of male proctiger slanting ventrad, touching subgenital plate............. dubia n. sp.

*Paratrioza maculinennis* (Crawford)


1911 *Paratrioza maculinennis* Crawford, ibid. III: 446, 450.

1913 *Trioza maculinennis* Aulmann, Psy. Cat. 43.

1914 *Paratrioza maculinennis* Crawford, U. S. N. M. Bull. 95: 73.

1917 *Paratrioza maculinennis* Van Duzee, Cat. Hemip. N. A. 792.


Length to tip of folded wings 3.5 mm.

Color: General color brown, darkest on abdomen and thoracic dorsum. Antennae black-tipped, apices of segments dark. Thoracic dorsum more or less prominently striped. Wings somewhat milky. Forewings with prominent brown maculae as follows: A narrow irregular one along anal margin from apex to cubital cell; another including most of cubital cell, more or less continuous across wing to furcation of R; an oblique one at tip of R; several small ones in clavus.

Structure: Head large, narrower than thorax. Eyes large. Vertex pubescent, almost flat, 2 discal foveae,
margins prominent. Genal processes well developed but small, parallel to plane of vertex, divergent, less than 1/2 as long as vertex. Clypeus visible from front. Antennae about twice as long as width of head, first segment unusually large. Thorax moderately arched, pubescent. Pronotum depressed below plane of vertex. Prescutum broad. Forewings acutely angled, 2-3/5 times as long as wide; Rs very short, slightly arcuate to costa, media strongly curved, marginal cells somewhat flattened, cubital larger than medial. Hind tibiae with 2 inner apical spines, a prominent tubercle at base, scarcely a spur. Metacoxae with caudal spurs of moderate size, anterior processes well developed.

Genitalia: Male protactor short, with long sloping caudal lobes surrounding forceps, axis through lobes longer than axial portion. Forceps in lateral view broad curved cephalad to acute spines; in caudal view broad basally, narrowed and arched, spines touching. Female genital segment about as long as preceding sternite; ventral valve produced as a broad truncate tooth; dorsal valve longer than ventral, downcurved, acute, black-tipped.

This beautifully marked species is easily distinguished from other members of the genus by the maculate wings. Specimens are at hand from Anaheim, Sargent and Strawberry, California. Originally described from California, it has been recorded from numerous localities in that state but
from nowhere else. It has been taken on numerous plants but the host is still unknown.

Type, male, San Mateo County, California, Baker, in Crawford Collection.

*Paratrioza arbolensis* Crawford


1911 *Allotrioza arbolensis* Crawford, ibid. III:442, 444.


1914 *Paratrioza arbolensis* Crawford, U. S. N. M. Bull. 95:72.

1917 *Paratrioza arbolensis* Van Duzee, Cat. Hemip. N. A. 792.

Length to tip of folded wings 4 to 4.5 mm.

**Color:** General color light green to greenish gray. Abdomen darker green to brown. Vertex with anterior band and discal spots typical of genus, dark. Thoracic dorsum with brown longitudinal stripes. Portions of pleurae, ventral side of head and femora brown. Antennae black at tip and at apices of segments. Wings hyaline.

**Structure:** Head large, narrower than thorax, not deflexed, flat. Vertex broadly excavate, anterior margin abrupt, medial suture prominent, 2 very prominent discal sulci. Genal processes definite but very short, projecting
forward, strongly divergent. Clypeus large, easily visible from in front. Antennae from 2-1/4 to 2-1/2 times as long as width of head. Thorax broad, not strongly arched. Pronotum long, weakly descending cephalad, not depressed below plane of vertex. Forewings large, acutely angled, almost 3 times as long as wide, costal margin arched; R₇ moderately long, reaching furcation of media, slightly sinuate, cubital cell very large and long. Legs very large. Hind tibiae with 2 inner apical spines, prominent basal spur. Tarsal segments very long, claws unusually large. Caudal metacoxal processes small, anterior pair larger.

Genitalia: Male proctiger very short with broad irregularly margined caudal lobes, no epiphysis. Forceps longer than proctiger, flattened; in lateral view broad, spines curved cephalad, beak-like, very sharp pointed, apical margins black; in caudal view broad at base, narrowed apically.

Female genital segment longer than preceding sternite; ventral valve broad, with sharp black median tooth; dorsal valve longer than ventral, narrowed in apical 1/2, dorsal margin almost straight, apex sharp, slender, black, uncurved.

I have a long series of this species, including nymphs, collected on *Shepherdia argentea* Nutt. near Durango, Colorado, July 17, 1933. Other specimens are at hand from various points in Colorado; Green River, Wyoming; Poplar, Montana.

Host *Shepherdia argentea* Nutt.
Type, female, Arboles, Colorado, C. F. Baker, in Crawford Collection.

Paristrozoa dorsalis (Crawford)
Figs. 79, 80, 121.

1914 Kuwayama dorsalis Crawford, U. S. N. M. Bull. 35:67.
1917 Kuwayama dorsalis Van Duzee, Cat. Hemipt. N. A. 791.

Length to tip of folded wings 3.5 to 3.75 mm.

Color: Male shining deep brown on head, dorsum of thorax and dorsum of abdomen; venter of abdomen lighter to green, pleuræ and venter of thorax brownish to yellow; antennæ light, segments black-tipped; margin of first abdominal tergite prominently white; proctiger and forceps white; wings hyaline. Female dark brown only on dorsum of abdomen, remainder of body reddish, legs lighter, with brown reticulate markings on prescutum, scutum and scutellum, pattern much as on Paristrozoa cockerelli.

Structure: Head narrower than thorax, short. Vertex twice as wide as long, somewhat flattened, discal impressions shallow, margins somewhat sharp, sparsely pubescent. Sense scarcely swollen beneath antennæ. Clypeus small, visible from front. Antennæ slender, slightly over twice as long as width of head. Thorax moderately arched. Pronotum short and depressed below plane of vertex. Prescutum broad,
rounding anteriorly. Forewings 2-1/2 times as long as wide, angulate, costal margin strongly arched; Rs short, almost straight, not reaching fork of media. Legs sturdy. Hind tibiae with double basal spur, 2 inner apical spines. Metacoxae with caudal spurs small, erect, a small anterior pair.

**Genitalia:** Male proctiger with broad caudally projecting lobes reaching almost to base of forceps, axis through lobe as long as axial portion, prominent epiphysis apically. Forceps in lateral view almost parallel-margined to near apices then strongly curved cephalad to acute apices; in caudal view broad in basal half then narrower to apices, slightly arched. Female genital segment short; ventral valve shorter than preceding sternite, broad, broadly excavate apically with a median tooth; dorsal valve longer, narrow, overhanging, "hood-shaped", apex acute, black.

Described from 1 male from Cochise County, Arizona which was compared with the male type by Dr. Oman, and from 4 females. One of the females bears the same data as the male and is designated as the allotype, Cochise County, Arizona, July 29, 1927, R. H. Beamer. Allotype in Snow Collection, University of Kansas. The three parallatypes bear data as follows: Chiricahua Mountains, Arizona, July 9, 1932, R. H. Beamer (1 female); Arizona, A. Koebele (2 females). The latter 2 are in the U. S. National Museum, the former in the author's collection.
Type, male, no. 13030 U. S. N. M.
Type examined.

Paratrioza medicarinis Crawford

1911 Epitrioza medicarinis Crawford, ibid. III:452.
1914 Kuwayama medicarinis Crawford, U. S. N. M. Bull. 35:66.
1917 Kuwayama medicarinis Van Duzee, Cat. Hemip. N. A. 791.

Length to tip of folded wings 3 mm.

Color: General color sordid white to yellowish. Flavous markings on vertex and thorax, latter forming incomplete longitudinal stripes. Apical tarsal segments and apical 2/3 of antennae fuscosus. (Crawford records the color as "yellowish green throughout". This is possibly the color of living specimens).

Structure: Head narrower than thorax. Vertex long, discal impressions very deep; anterior margin overhanging median ocellus, somewhat rounded down. Gense swollen ventrally, (rarely with any suggestion of a cone-shaped projection), not touching. Clypeus plainly visible from front. Antennae about 1-2/3 times as long as width of head. Thorax moderately arched. Pronotum not depressed below plane of vertex.
Forewings slender, straight, angulate, almost 3 times as long as broad; Rs long, sinuate. Hind tibiae with 2 inner apical spines, prominent basal spur.

Genitalia: Male proctiger short, curved caudad, caudal margin roundingly produced, narrow apical epiphysis. Fore- ceps almost as long as proctiger, broad basally, narrowed to obliquely truncate apices, flattened apically, apical margin heavy, crenate, black; a prominent, acute, antero-lateral projection shorter than principal portion; base heavily pubescent. Female genital segment almost as long as rest of abdomen; apical portion of ventral valve very slender, acute, dark; dorsal valve longer, roundly blunt, black apically.

Numerous specimens are at hand from various localities in Arizona, New Mexico and Texas. Originally described from Colorado (?) and subsequently recorded from California by Crawford.

Judging from the material at hand it appears that this species occurs in large numbers. Whether alfalfa (Medicago sativa) is a true host or not is undetermined.

Type, male and female on same point, in Crawford Collection, no locality label.

Paratrioza cockerelli (Sulc)


1910 Paratrioza pulchella Crawford, Ibid. 229.

1910 Paratrioza pulchella flava Crawford, Ibid. 229.

1911 Paratrioza cockerelli Crawford, Ibid. III: 446, 448.

1911 Paratrioza ocellata Crawford, Ibid. 447.

1911 Paratrioza ocellata nigra Crawford, Ibid. 447, 448.

1911 Paratrioza ocellata flava Crawford, Ibid. 447, 448.


1913 Triosa cockerelli Aulmann, Psy. Cat. 44.

1914 Paratrioza cockerelli Crawford, U. S. N. M. Bull. 35:71.


1917 Paratrioza cockerelli Van Duzee, Cat. Hemip. N. A. 792.


[desc. and figs. nymph].

1931 Paratrioza cockerelli Klyver, Pan-Pac. Ent. VII: 142.


1932 Paratrioza cockerelli Klyver, Ent. News XLIII: 34.


1934 Paratrioza cockerelli Knowlton and Thomas, Jour. Ec. Ent. XXVII: 547.

Length to tip of folded wings 3 mm.

**Color:** General color black typically, with lighter markings varying from white to red. Vertex black except margin and transverse discal area light, dorsum of thorax with light longitudinal stripes. At least posterior portion of pronotum light. Prescutum with a medial longitudinal band and a horseshoe-shaped macula on each side, light. Scutum with a pair of broad medial stripes, a narrow one laterad, lateral margins, light. Posterior margins of abdominal tergites white, first one most prominently so. Extent of pattern somewhat variable, often appearing as dark markings on light ground color. Genal processes and legs usually light. Apices of antennal segments black. Wings hyaline.

**Structure:** Head of moderate size, narrower than thorax. Margins of vertex raised and abrupt; vertex discally impressed, median suture prominent. Genal processes very small but distinct, divergent, acute. Clypeus visible from anterior or lateral view. Antennae 1-1/2 times as long as width of head. Thorax strongly arched. Pronotum strongly descending cephalad but not entirely depressed below plane of vertex.
Forewings straight, roundingly angular, about 2-1/2 times as long as wide; venation typical triozone, $R_5$ long and sinuate. Hind tibiae with 2 inner apical spines, large basal spur. Caudal spurs of metacoxae small, erect, straight, an anterior pair of about the same size but flattened.

**Genitalia:** Male proctiger in lateral view produced caudal as a lobe of variable size and shape, from slender to almost triangular, length through lobe not greater than that of vertical axis, with distinct apical epiphysis. Forceps as long as proctiger in lateral view, slightly curved cephalad apically to acute spines, flattened and somewhat incurved apically; in caudal view straight, narrow. Female genital segment short, about as long as last abdominal sternite; dorsal valve downcurved, black-tipped, acute, anal pore 1/2 total length; ventral valve shorter, black and acute apically, slightly produced.

This species is quite variable in color and to a lesser extent in other characters. I have at hand a series of specimens sent to me by Mr. J. R. Eyer of the New Mexico State Agricultural College in which 2 quite distinct, color "phases" occur. In addition to the typical black individuals there are numerous specimens so light in color that the general color appears to be yellow. Mr. Eyer reports that these yellow forms occur over the states of New Mexico and Arizona on potatoes in conjunction with the typical ones. He adds
that he can find no difference in the nymphs nor in the effect that they have on the potato plants. It is my opinion after examination of the specimens that they do not constitute a species but simply a color variant such as is found in other species of psyllids (Trioza minute for example). It is possible but improbable that they are merely tender forms but as the specimens at hand are mounted on slides or are in alcohol this is difficult to determine. As Knowlton and Janes have pointed out, for 2 or 3 days after emerging the adults are greenish or amber colored, subsequently attaining the typical black coloration.

This is the widely known "potato psyllid" or "tomato psyllid" which has developed into one of the most important potato and tomato insects in the western part of North America. The feeding of the nymphs causes the diseased condition known as "psyllid yellows". Numerous solanaceous plants have been recorded as definite hosts supporting the nymphal stages as well as the adult. The adults have been taken on several other plants (see Knowlton, Jour. Ec. Ent. XXVI:730, 1933).

The life history has been worked out in detail by Knowlton and Janes (loc. cit.) in Uta. The following brief account is taken from Knowlton (Utah Agr. Exp. Sta. Leaflet 36, 1934).

"The winter is passed in the adult stage, the psyllids finding shelter over winter in the various favorable places
which are available. Lack of excess moisture is important to successful survival. As the early spring host plants, such as matrimony vine, begin to produce their first leaves, the adult potato psyllids congregate upon them, beginning to lay eggs when the leaves are only 1/4 to 1/2 developed. A part of the first generation usually is matured before the last of the early potato crop has sprouted from the ground. Where breeding plants are not available, adult psyllids will survive for several weeks, feeding upon conifers, grasses, or upon almost any other succulent plant until the potato crop is available. The average number of eggs laid by an individual female is between 300 and 400 most of which hatch under favorable conditions. The eggs of the potato psyllid hatch in from 3 to 9 days in warm weather but may require a longer time if the weather is cool. Upon hatching, the nymph crawls from the egg, creeps down the pedicel supporting the egg, and soon settles down to feeding. Under favorable conditions each nymph passes through 5 molts and instars, or growth periods, requiring from 12 to 19 days for completion. If conditions for growth are unfavorable, the number of molts may vary from four to six; the developmental period may also be longer. No pupal or rest stage occurs in the development of this insect, the winged adult developing directly from the last nymphal stage or instar. Newly emerged adults are usually pale green or light amber in color, darkening to brown and then to blackish-brown during the first 2
or 3 days. The proportion of developing adults is approximately 50 per cent females and 50 per cent males.

"Males of the potato psyllid seldom live longer than 1 month; however, 1 female which was under observation lived for more than 6 months, depositing 1362 eggs over a period of 179 days. Females usually begin laying eggs in from 5 to 12 days after becoming winged; on the average, they continue to lay eggs for the next three weeks, usually depositing from 5 to 50 eggs per day. In northern Utah, 3 to 4 generations develop in 1 season, depending both upon the host sequence available and the length of the season."

For a discussion of "psyllid yellows", the condition caused by feeding of the nymphs, "Psyllid yellows of the Potato" Richards and Blood, (1933) should be consulted.

Numerous specimens are at hand from many localities in Colorado, New Mexico, Arizona, California. Mr. Oman records the following additional localities from the material in the U. S. National Museum: Utah, Texas (Winter garden section of Rio Grande Valley), Oklahoma (Stillwater), Nebraska (Lincoln, Scottsbluff), South Dakota (Brookings). It has also been recorded from Idaho, Montana, Wyoming, Alberta and Minnesota. As can be judged from the above distributional records it occurs throughout the western portions of North America wherever the winters are neither too cold nor too damp.
Paratriozes lavaterae (Van Duze)

1925 Kuwayama lavaterae Van Duze, Pan-Pac. Ent. I:22.

Length to tip of folded wings 3.25 to 3.75 mm.

Color: "Male mostly black; edge of vertex, antennae, frontal cones (sense), clypeus, lateral tubercle of pronotum, some marks at base of wings, hind margin of tergal segments one and six and legs, whitish; apical segment of antennae, tips of four preceding and base of first, and the hind femora, except apex, black; anterior and intermediate femora with a brown cloud above; tarsal claws black; wings clear, veins pale, the marginal scarcely darker. Sometimes the mesonotum shows four longitudinal vittae and there may be one on the prescscutum. Female paler, yellowish fulvous to brown, more or less varied with darker; antennae as in male." Van Duze.

Structure: Head and thorax sparsely pubescent. Head narrower than thorax. Vertex sharply margined, "plate-like" slightly less than twice as wide as long, discal impressions prominent. Sense produced as small tubercles or pads, not conical. Antennae slender, twice as long as width of head. Thorax strongly arched, prominently punctate. Pronotum strongly descending, short. Prescutum acute anteriorly. Forewings rounding apically, barely angulate, somewhat over 2-1/2 times as long as wide; R₈ long, sinuate, exceeding point
of furcation of media, medial cell somewhat larger than
cubital. Hind tibiae with small basal spur, 2 inner apical
spines. Small anterior metasomal processes.

Genitalia: Male proctiger short, with large caudal
lobes, latter broad basally then attenuate and overlapping,
longer than axial portion. Forceps in lateral view narrow
basally, slightly enlarged, then narrowed to acute spines,
slightly curving cephalad; in caudal view fairly stout,
parallel-margined, somewhat incurved apically. Female
genital segment about as long as 2 preceding segments; ventral
valve produced as large, blunt, black tooth; dorsal valve
exceeding ventral, slender apically, blunt, black-tipped.

Described from a pair of paratypes. This species was
described by Van Duzee from specimens taken on its host plant
Lavatera asurgentiflora from San Francisco, California.
Known only from California.

Type, male, no. 1592, Museum of the California Academy
of Sciences.

Paratarioza dubia n. sp.

Figs. 81, 82, 122.

Length to tip of folded wings 3.5 to 3.75 mm.

Color: General color of head and thorax whitish with
orange to brown markings. Vertex light with a narrow band
anteriorly and a short transverse band posteriorly, latter

**Structure:** Head narrower than thorax. Vertex almost twice as wide as long, margins sharply raised, discally strongly depressed, 2 foveae near caudal margin, medial suture prominent. Sense slightly swollen, pad-like, not conical. Antennae twice as long as width of head. Thorax well arched. Pronotum short, depressed below plane of vertex. Prescutum acute anteriorly. Forewings large, straight, angular, 1-3/4 times as long as wide; Rs long, sinuate, reaching point of furcation of media, marginal cells about equal. Legs large. Hind tibiae with small basal spur, 2 inner apical spines. Metacoxae with caudal spurs of moderate size, a small anterior pair.

**Genitalia:** Male proctiger with large slanting caudal lobes, axis through lobes longer than axal portion, lobes enclosing forceps, anus on an oblique epiphysis. Forceps shorter than proctiger; in lateral view slender, very strongly curved cephalad to sharp spicis; in caudal view broad basally than slender, slightly arched to spicis. Female genital segment short, ventral valve quite flat, rounded and dark apically; dorsal valve narrower, hood-shaped, overhanging, apex black.
Holotype, male, allotype, female, Patagonia, Arizona, June 24, 1933, R. W. Bean; 4 paratypes same data; 2 male, 3 female paratypes same data collected by P. W. Oman; 1 male and 2 female paratypes Tubac, Arizona, June 24, 1933, P. W. Oman.

Holotype, allotype and paratypes in Snow Collection, University of Kansas, paratypes in U. S. National Museum and author's collection. One male and 1 female are also at hand from California which are perhaps this species. This is apparently a distinct species although it resembles both cockerelli and lavaterae.

**Genus Neotricozella Crawford**

1934 *Tricoza* Forbes (pro parte), 14th Rept. Sta. Ent. Ill. 92.


1911 *Neotricozella* Crawford, ibid. 503.

1914 *Neotricozella* Crawford, U. S. N. M. Bull. 35:93.

1917 *Neotricozella* Van Duzee, Cat. Hemip. N. A. 793.


Head as broad as or broader than thorax, deflexed. Vertex nearly plane, lateral ocelli borne on raised portions of vertex. Senses produced as elongate, slender, vertical processes, contiguous throughout their length or nearly so. Antennae moderately long. Body small, slender. Thorax very
strongly arched. Pronotum short, very strongly descending cephalad. Proepisterna strongly produced lateral as a flat plate behind eyes. Forewings membranous, long, acutely pointed, venation trizone. Hind wings slender, much shorter than forewings. Metatibiae with 1 or more basal spurs, 2 or 3 inner and 1 outer apical spine.

Orthotype: Neotricoza pyrifoliæ (Forbes).

Key to the genus Neotricoza Crawford

1. Genal processes as long as vertex or longer.......... 2.
   Genal processes shorter than vertex...................... 4.
2. Body pubescent, very light colored........ hirsuta Tuthill.
   Body glebrous, red to brown in color................... 3.
3. Genal processes white, acuminate........ pyrifoliæ (Forbes).
   Genal processes black, rather thick, sculptoconus Crawford.
4. Genal processes black....................... laticens (Crawford).
   Genal processes white....................... virginiæa Caldwell.

Neotricoza pyrifoliæ (Forbes)

1911 Neotricoza immaculata Crawford, ibid. III:450.
1914 Neotriozeis immaculata Crawford, U. S. N. M. Bull. 95:93.
1914 Trioe proboscides Crawford, ibid. 99.
1917 Neotriozeis immaculata Van Duzee, Cat. Hemip. N. A. 793.

Length to tip of folded wings 3.5 mm.

Color: General color of thorax orange red, head and abdomen brown. Vertex brown to black discally, white to orange on margins. Genal processes white, sometimes brown apically. Antennae black. Pronotum light. Scutum with more or less distinct brown stripes. Legs light to brown.

Structure: Body slender. Head large, about as broad as thorax. Disc of vertex almost flat. Lateral ocelli very prominently raised, medial suture very prominent. Vertex and pronotum sparsely pubescent. Genal processes slender, attenuate, vertical to retrorse, as long as vertex, or longer. Post-ocular portion of occiput swollen, prominent. Antennae slender, not quite twice as long as width of head. Thorax strongly arched. Pronotum short, depressed below plane of
vertex. Forewings long, slender, blunt, about 3 times as long as wide; Rs very long, sinuate. Hind wings very long, twice as long as abdomen. Legs slender. Hind tibiae with 3 inner apical spines, with 2 basal spurs.

Genitalia: Male genitalia small. Proctiger pyriform, longer than forceps. Forceps short, broad, spatulate in lateral view; in caudal view slender, straight. Female genital segment almost as long as rest of abdomen; ventral valve slender, acute, dark at apex; dorsal valve longer than ventral, attenuate, not as sharp as ventral.

Originally described from Illinois by Forbes this species has also been recorded from Iowa (Ames), District of Columbia, Ontario and Nova Scotia. Specimens are at hand from all the above localities and from Tallulah, Louisiana. The latter series was taken in airplane traps by F. C. Click.

Type, male, in Illinois Natural History Survey Museum.

Male paratype examined.

**Neotrichozella hirsuta** Tuthill

Figs, 33, 123.


Length to tip of folded wings 3 mm.

Color: General color yellowish white. Eyes, lower edge
of margin of vertex, tips of antennal segments and tergi dark. Pescutum and scutum with yellow stripes. Wings hyaline.

Structure: Head, thoracic dorsum, legs and genital segments with sparse, rather long, silky pubescence. Head large, as wide as thorax. Anterior margin of vertex very abrupt and protruding, disc distinctly concave. Genal processes longer than vertex, closely appressed, rather thick, moderately acute at apex. Antennae slightly over 1-1/2 times as long as width of head. Thorax strongly arched. Forewings about 3 times as long as wide, veins setaceous. Hind wings long, prominently punctate. Hind tibiae with 1 very large basal spur, 2 inner apical spines.

Genitalia: Male genitalia moderate in size, covered with very long, fine pubescence. Proctiger greatly produced caudad into enveloping posterior lobes. Forceps as long as proctiger; in lateral view broadest at base, strongly curved caudad to acute black apices; in caudal view evenly incurved, broadest before apex, inner anterior margin produced medially into a blunt, black-margined tooth. Female genital segment rather short, quite suddenly narrowed to black tip; dorsal valve longer than ventral, apices of valves broad and flat.

Known only from the type pair from Arizona.

Type, male, in Snow Collection, University of Kansas.
**Neotriozella sculptoconus** Crawford

1914 *Neotriozella sculptoconus* Crawford, U. S. N. M. Bull. 35: 99.

1914 *Trioxa frontalis* Crawford, ibid. 100.

1917 *Neotriozella sculptoconus* Van Duzee, Cat. Hemip. N. A. 793.


Length to tip of folded wings 3 mm.

**Color:** Thorax orange to red. Abdomen brownish, lighter beneath. Disc of vertex reddish brown, margin light. Antennae and genal processes black. Pro and mesotibiae and tarsi dark. Wings hyaline.

**Structure:** Head about as wide as thorax. Disc of vertex depressed leaving raised margins except medially in front, pubescent. Genal processes large, acute, contiguous throughout, as long as vertex or a little longer, parallel to plane of vertex. Antennae thick, especially basally, slightly over twice as long as width of head. Thorax slender, very strongly arched. Pronotum depressed, with sparse pubescence. Very short sparse pubescence on remainder of thorax. Forewings long, slender, angulate, 3 times as long as wide; $R_3$ shorter than in *pyriformis*. Hind wings long, greatly exceeding abdomen. Hind tibiae with 3 inner apical spines, 2 basal spurs. Metacoxae somewhat produced anteriorly, not spiniform.
Genitalia: "Male genitalia resemble those of immaculata; anal valve relatively longer and produced more into a posterior lobe; forceps broadest subapically, flattened at apex."

Crawford.

Female genitalia similar to pyrifoliae, almost as long as rest of abdomen, slender; ventral valve narrowed to acute apex; dorsal valve longer than ventral, attenuate, not as sharp, black-tipped.

Known only from 3 specimens, all from California. The above description is from the female allotype.

Type, male, no 13091 U. S. N. M.

Type examined.

Neotriozella laticeps (Crawford)

1914 Neotriozella laticeps Crawford, U. S. N. M. Bull. 35:110.
1917 Neotriozella laticeps Van Duzee, Cat. Hemip. N. A. 798.

Crawford's description of this species is as follows:

"Length of body 1.6 mm.; length of forewing 2.7; width of head 0.62. General color dark brown, thorax lighter; head
and genal cones black.

"Head strongly deflexed, distinctly broader than thorax, slightly punctate; vertex rather sharply defined on margin, scarcely impressed discally, slightly emarginate over front ocellus; genal cones not longer than vertex, acute, more abruptly converging to apex than in _immaculata_, vertical or retrose, slightly pubescent. Antennae very slender.

"Thorax arched, narrow, punctate, slightly pubescent. Wings hyaline, narrower than in _immaculata_, relatively longer usually, subacute at apex.

"Genitalia: Female genital segment almost as long as rest of abdomen, very acute at apex; dorsal valve longer and larger than ventral, very acute.

"Described from one female collected by S. R. Pilate in Louisiana. This is very close in many respects to _immaculata_." 

Type, female, no. 13092 U. S. N. M.

Type examined.

_Neotrichozella virginiana_ Caldwell


This species is known from a single female specimen.
Caldwell's description follows:

"Length to tip of forewing 3.5 mm.; forewing 3 mm.

"Color: Very similar to immaculata. Vertex evenly dark; genal cones light colored.

"Head as broad as thorax, strongly deflexed. Vertex almost two-thirds as long as broad. Genal cones shorter than vertex, slightly divergent, broad at base, subacute apically. Antennae about one and a half times as long as width of head; segment III almost as long as following three.

"Thorax moderately broad; pronotum strongly depressed, vertical. Hind tibiae with basal spurs; apex with three spurs within and one on outside. Forewing twice as long as broad; apical portion rounded, slightly subacute. Veins prominent; cubital cell large.

"Genitalia: Female genital segment shorter than rest of abdomen. Apical half of dorsal valve narrow, styliform; apex rounded. Ventral valve very broad, stout, narrowed evenly to apex in lateral aspect.

"Male unknown."

Type, female, Hocking County, Ohio, Caldwell.

Type in Ohio State University Collection.

Cenus Metatrioza Tuthill

Head large, at least as broad as thorax. Vertex with sharp anterior and posterior margins, strongly concave between eyes, medial suture prominent. Genal processes not contiguous. Clypeus very small. Dorsum of thorax rather broad and flat, pronotum not depressed below head. Forewings with typical trizine venation, except cubital cell which is unusually large. Metatibiae with large basal spur, 1 outer and 2 inner apical spines.

Orthotype: Metatrioza pubescens Tuthill.

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Metatrioza pubescens Tuthill

Figs. 84, 85, 124.


Length to tip of folded wings 4 mm.

Color: General color reddish brown. Genal processes, pronotum and posterior portion of vertex yellow. Venter and antennae dark. Forewings hyaline, hind wings more or less white.

Structure: Body finely punctate, clothed with short, fine pubescence, including veins of forewings, pubescence most prominent on genital segments, legs and antennae. Head very large, as wide as thorax, 3 times as wide as long in dorsal view, strongly deflexed. Vertex as long as wide,
sharply margined both anteriorly and posteriorly, deeply excavate, medial suture prominent. Anterior ocellus large, beneath overhanging margin of vertex. Frons visible as a distinct sclerite, not covered by genal processes, latter not contiguous, short, 1/2 as long as disc of vertex, slightly divergent, rather blunt. Clypeus very small, entirely invisible from front. Antennae slightly over twice as long as width of head. Pronotum not depressed below level of head, episternum strongly produced. Prescutum not very strongly arched, about 1-2/3 times as wide as long. Forewings acute at apex, 3 times as long as wide; veins prominently pubescent, marginal cells large, cubital larger than medial, Rs very long, curved. Venation of hind wings unusually prominent. Hind tibiae with very prominent basal spur, 2 inner and 1 outer apical spines.

Genitalia: Male genitalia of moderate size. Proctiger longer than forceps, almost equilaterally triangular in outline, broadest near base, truncate at apex. Forceps simple; in caudal view somewhat broader at base, slightly bowed, apices blunt, with very small medial black tooth. Female genital segment quite large, about 3/4 as long as rest of abdomen; dorsal valve longer than ventral.

Known only from the type series from the Baboquivari Mountains, Arizona. Host plant unknown.

Type, male, in Snow Collection, University of Kansas.
Genus **Leuronota** Crawford


1911 *Allotrioza* Crawford (pro parte), ibid III: 423, 442.

1914 *Leuronota* Crawford, U. S. N. M. Bull. 35: 67.

1917 *Leuronota* Van Duzee, Cat. Hemip. N. A. 791.


Head narrower than thorax, scarcely or not at all de- flexed. Genae produced as conical processes, porrect. Anten- nae slender, long. Eyes hemispherical. Thorax scarcely arched. Pronotum flat, long, on same plane as vertex and prescutum, produced cephalad medially as blunt epiphysis, very narrow. Proepisternum very large, visible in dorsal view as prominent quadrate lateral processes. Prescutum flat with a small median anterior epiphysis. Mesopleurites also strongly developed. Forewings long, slender, angulate, venation trizine. Legs long. Metatibiae with basal spur, 2 or 3 inner, 1 outer apical spines.

Orthotype: *Leuronota maculata* (Crawford).

A total of 9 species have been referred to this genus only 2 of which occur north of Mexico. Three of the 9 were originally described in *Cerotrioza* by Crawford and subsequently (1920) placed in *Leuronota* by him. From his
descriptions of these latter species it seems unlikely that
they are conseners of *maculata* but as I have seen no speci-
mens of any of the 3 no other disposition can be made at this
time.

The nymphs apparently produce galls or semi-galls on
their host plants.

Key to the genus *Leuronota*

1. Antennae 2-1/2 times as long as width of head; genal
   processes somewhat descending........ *maculata* (Crawford).
   Antennae 3 times as long as width of head; genal
   processes extending forward on same plane as
   vertex....................... *longipennis* Crawford.

*Leuronota maculata* (Crawford)

1910 *Trioza maculata* Crawford, Pom. Coll. Jour. Ent. II:230,
349.

1911 *Allotrioza maculata* Crawford, ibid. III:444, 446.

1913 *Trioza maculata* Aulmann, Psy. Cat. 43.

1914 *Leuronota maculata* Crawford, U. S. N. M. Bull. 95:68.

1917 *Leuronota maculata* Van Duzee, Cat. Hemip. N. A. 791.


1932 *Leuronota maculata* Klyver, Ent. News XLI:34.
Length to tip of folded wings 3.25 to 4 mm.

Color: General color dirty white to brown, abdomen darker. Forewings with numerous small brown dots forming maculae as follows: Along anal margin from apex through most of cubital cell, somewhat broken from middle of cubital cell, fading out on clavus and along Cu. Amount of maculation quite variable.

Structure: Entire body more or less pubescent. Head narrower than thorax, not deflexed. Vertex almost plane, discal foveae more or less prominent. Genal processes short, blunt, divergent apically, about 1/2 as long as vertex, somewhat deflexed from plane of vertex. Antennae slender, 2-1/2 times as long as width of head. Clypeus large, visible in cephalic view. Thorax scarcely arched. Pronotum flat, above plane of vertex, acute epiphysis medially on anterior margin fitting into excavate posterior margin of vertex. Prescutum broad, lateral margins long. Forewings slender, 3 times as long as wide or slightly over, roundly angulate; R₃ straight then arched to costal margin, cubital cell larger than medial. Hind tibiae with 3 inner apical spines.

Genitalia: Male proctiger of medium length, rather stout, straight, anal pore opening antero-dorsally. Forceps very short; in lateral view broad, produced dorso-cephalically as long, acute lobes; in dorso-caudal view broad, flattened, arched to black-tipped apices. Female genital segment about
1/2 as long as rest of abdomen, thick dorso-ventrally; dorsal valve somewhat hood-shaped, exceeding ventral, ventral margin of latter straight for about 1/2 its length then sharply upturned to acute apex.

Ferris gives Celtis iguana as a definite host, having taken both nymphs and adults on this plant. Many specimens are at hand from Arizona taken on Celtis pallida Torr.

Type, female, Arizona 2315, in Crawford Collection.

Leuronota longipennis Crawford

1917 Leuronota longipennis Van Duzee, Cat. Hemip. N. A. 791.

Crawford's description of this species is as follows:

"Length of body 2.8 mm.; length of forewing 3.1; width of head 0.66.

"General color brown; genal cones, anterior margin of pronotum, part of sternum, legs, antennae except terminal segment very light brown; antennal segments tipped with brown.

"Head small, flattened, not deflexed, not as broad as thorax; vertex flat, with a broad, shallow depression on each side of median line, smooth; genal cones about 2/3 as long as vertex, extending forward in same plane with vertex, divergent, subacute at apex, slightly pubescent. Clypeus far
back, with a conspicuous cavity in front of it between gense.
Antennae more than 3 times as long as width of head, slender.

"Thorax not arched, flat, narrow; pronotum moderately long,
anteior epiphysis smaller than in 2 preceding species,

[maculate and crawford]. Legs slender. Wings nearly 4 times
as long as broad, very narrow, narrowly rounded at apex,
apical third brown, basal 2/3 transparent, membrane coarsely
punctate; first marginal cell larger than second; radial
sector long.

"Genitalia: Male genital segment small; anal valve
much longer than forceps, fusiform, narrow at apex, with
processes; forceps small, short, slender, acute at tip,
strongly arcuate; pubescence short.

"Described from 1 male from Palm Beach, Florida (H. G.
Dyar), no data.

"Type, Cat. no. 19031, U. S. N. M.

"This species bears some resemblance to members of
the European genus Floria."

Type examined.

Genus Ceropsylla Riley

1911 Ceropsylla Crawford, ibid. III:423.
1911 Triczoidea Crawford (pro parte), ibid. 493.
1913 Ceropsylla Aulmann, Psy. Cat. 59.
1914 Ceropsylla Crawford, U. S. N. M. Bull. 35:100.
1917 Ceropsylla Van Duzee, Cat. Hemip. N. A. 793.

Head narrower than thorax. Vertex smooth, somewhat rounded, portion bearing lateral ocelli very strongly raised, next eyes rounding evenly into genae, medially overhanging median ocellus. Genae produced as short blunt processes extending somewhat forward, a second pair of small rounded processes next eyes, below antennal insertions. Antennae slender, long, arising close together and far down on genae, largely on genal processes. Eyes hemispherical, very large. Thorax strongly arched. Pronotum very short, vertical, depressed below vertex and prescutum. Proepisterna produced laterad, plate-like. Prescutum as long as wide, very strongly arched. Mesopleurites strongly developed, episternum very large, swollen. Forewings large, membranous, angulate spically, basal vein (R + M + Cu) very long, parallel to costa, cubitus arising separately, radius and media with a short petiole, R very short, R₁ long, R₂ very short, no pterostigma. Hind wings much shorter than forewings. Metatibiae with basal spur, 1 outer and 2 inner apical spines.

Epilotype: Ceropsylla sideroxyll Riley.

This genus is most peculiar in the characters of the head and venation of the wings. The position of the antennal insertion is unique, in the North American Psyllidæ at least.
The extremely long basal vein of the forewings is very distinctive as is the very short base of R and short Rs.
Cubitus arises separately from the basal vein leaving radius and media with a short common base as described by Riley, not cubitus and media on a common petiole as Crawford states.
This character I do not consider to be of the importance that Crawford attached to it.

Crawford synonymized his Triozoida with Ceropsylla, from his descriptions and figures of johnsonii it would seem to be congeneric with sideroxyli except for the disparity in wing venation. As no specimens of johnsonii have been seen it is left in this genus for the present. The other species placed here by Crawford, californica, is referred back to Triozoa.

Ceropsylla sideroxyli Riley

1911 Ceropsylla sideroxyli Crawford, ibid. III:423.
1913 Ceropsylla sideroxyli Aulmann, Psy. Cat. 59.
1917 Ceropsylla sideroxyli Van Duzee, Cat. Hemip. N. A. 793.
1924 Ceropsylla sideroxyli Ferris, Can. Ent. IV:254 [nymph].
1929 Ceropsylla sideroxyli Ferris, ibid. LX:245.
Length to tip of folded wings 4 mm.

Color: General color green to yellow. Front of head, between antennae, including genal processes, anterior 2/3 of prescutum and 2 broad stripes on scutum, dark brown. Antennae dark apically. Wings hyaline.

Structure: Dorsum with short sparse pubescence. Head small, narrower than thorax. Vertex very small, rounded downward both posteriorly and anteriorly, except over median ocellus. Eyes very large. Lateral ocelli on raised prominences, far forward, almost midway of eyes. Sense separated medially to above bases of antennae, below antennae sense produced into short bluntly rounded processes. Antennae 1-4/5 times as long as width of head, arising far down on sense, and close together. Thorax strongly arched. Pronotum depressed below plane of vertex. Prescutum large, rounded anteriorly, as long as wide. Mesopleurites very large, swollen. Forewings long, slender, acutely angled, 3 times as long as wide; basal vein (R + M + Cu) very long; R and M with a short common stem; Rs very short, straight; cubital cell larger than medial. Hind tibiae with small basal spur, 1 outer and 2 inner apical spines. Metacoxae with posterior spurs of moderate size, anteriorly somewhat produced but not spiniform.

Genitalia: Male proctiger produced caudad as a broad rounded lobe. Forceps shorter than proctiger; in lateral
view slender, slightly curved cephalad, a short, slender, curved process near base on anterior margin; in caudal view slender to spatulate apices. Female genital segment longer than preceding sternite; ventral valve very broad, slightly sinuate to a medial, broad, truncate tooth; dorsal valve exceeding ventral, narrower, blunt.

Described from specimens from Lake Worth, Florida (E. A. Schwarz) in the U. S. National Museum. According to Riley this species forms galls on the leaves of "Sideroxylon masticodendron", evidently the mastic, the name of which as given by Sergeant is Sideroxylon foetidissimum Jacq.

Ferris describes and figures the nymph which is apparently even more strikingly distinct than the adult. He also records it from Mexico, the only record of its occurrence outside of Florida.

Type, no. 695 U. S. N. M. (6 cotypes).

Types examined.

Genus Hemitrioza Crawford

1914 Hemitrioza Crawford, U. S. N. M. Bull. 35:104.
1917 Hemitrioza Van Duzee, Cat. Hemip. N. A. 793.

Head much narrower than thorax, deflexed. Vertex without abrupt margins. Genal processes short, strongly divergent. Clypeus small. Antennae moderately long. Eyes very small,

Orthotype: Hemitrioza sonchi Crawford.

As Crawford notes, this genus while distinctly psylline in general, shows some psylline characteristics.

Klyver's species washingtonia appears from his figures to be congeneric with sonchi although it differs from the latter markedly in some respects, notably the very short antennae, the longer and less angular wings and the venation.

Key to the genus Hemitrioza

1. Costal margin of forewings strongly arched, Rs arched to costa, short, not reaching furcation of media; general color red, antennae, tibiae and tarsi white, forewings maculate........................................ sonchi Crawford. Costal margin of forewings not strongly arched, Rs long, straight, extending beyond furcation of media; general color brown, forewings immaculate ........................................ washingtonia Klyver.
Hemitrioza sonchi Crawford


1913 Triozesonchi Aulmann, Psy. Cat. 55 nomen nudum.

1914 Hemitrioza sonchi Crawford, U. S. N. M. Bull. 35:104.

1917 Hemitrioza sonchi Van Duzee, Cat. Hemip. N. A. 799.

Length to tip of folded wings 2.5 to 3 mm.

Color: General color red. Tibiae, tarsi and antennae white, latter black-tipped. Wings hyaline except a broad band across middle and 3 or 4 spots on posterior margin, brown.

Structure: Head small. Vertex with deep discal foveae, rounding down in front, deeply emarginate. Eyes very small. Genal processes stout, strongly divergent, acute, about 1/2 as long as vertex. Antennae rather short, stout, slightly over twice as long as width of head, segment III thicker than distal segments. Thorax proportionately very broad, weakly arched. Pronotum almost as wide as head, above plane of vertex. Forewings short, slightly over twice as long as wide, narrowly rounded apically, membrane thickly set with minute setae. Costal margin strongly arched; media and cubitus with a short common petiole, length somewhat variable; R₈ short, arched to costa. Hind wings very small, thickly set with minute setae. Hind tibiae with 3 inner apical spines.
Genitalia: Male genitalia described by Crawford as follows: "Forceps about 1/2 as long as anal valve, [proctiger] thick at base and converging to apex to a sharp tooth-like point, arcuate somewhat; anal valve rather large, elliptical (from side view), broadest at middle; forceps and anal valve quite densely pubescent." Female genital segment longer than preceding sternite, ventral valve rounded apically, dorsal valve longer, blunt.

This species is represented in the material at hand by 2 females from the District of Columbia. It was described from Virginia, District of Columbia and Atlanta, Georgia. It is recorded from Sonchus arvensis (Riley's specimens). Crawford mentions the nymph but gives no host plant data.

Type, female, no. 18094 U. S. N. M.

Type examined.

Hemitrioza washingtonia Klyver


"Length of body on slide, 2.0 mm.; length of forewing, 1.3 mm.; width of head, .6 mm. General color of entire body uniform medium brown. Eyes dark brown. Genae lighter than the general color. Tip of antenna black. Wings uniform brown (including veins), semi-opaque, shiny; hind wings iridescent. Agreeing fairly well with the characters of the
genus as defined by Crawford except that the head is not much narrower than the thorax, the eyes are not proportionately very small, and the hind tibia has 4 instead of 3, apical spines or teeth on the inner aspect.

"Head strongly deflexed. Antenna ten-segmented with the third segment nearly as long as segments 4, 5, 6 and 7 combined; antennal sensoria obscure; antenna scarcely as long as width of head.

"Thorax moderately arched; without pubescence. Posterior tibia with 1 large black tooth and a comb of setae on the outer aspect and with 4 black teeth, 2 of them large and 2 distinctly smaller, on the inner aspect. Forewing semi-opaque and punctate throughout with a suggestion of alar radulae in the 2 marginal cells and between Cu₁ and M₃ + 4; .......... with irregular venation, in the same individual.......... Posterior wing distinctly brown, with the venation .........., developed for the most part as little more than streaks of brown along which the punctations that beset the entire wing membrane are arranged in more or less definite but irregular rows.

"Abdomen with the tergites and sternites uniformly and equally chitinized; with small pleurites at the lateral extremities of tergites 4, 5, 6, and 7. Male genitalia relatively small; the proctiger oval in lateral view, with sparse pubescence; the clasper simple in structure, with the distal end directed anteriorly." Klyver.
This species was described from 1 male from Toppenish, Washington.

Type in Klyver's Collection.

Genus **Levidea** Tuthill

1939 **Levidea** Tuthill, Ent. News XLIX:245.

Head small, much narrower than thorax, deflexed. Vertex perpendicular, rounded, smooth, median suture lacking or at least apparent only above front ocellus, no discal impressions. Genae somewhat swollen below antennae, almost touching. Clypeus large and globose, visible from front. Antennae slender, of moderate length, longer than width of head. Eyes small, hemispherical. Thorax moderately arched. Pronotum nearly vertical, broad. Proepisternum produced laterad, plate-like around posterior of eyes. Forewings long, pointed apically, somewhat coriaceous, radius, media and cubitus arising from basal vein (R + M + Cu) at same point, no pterostigma. Metatibiae with basal spur, 1 outer and 2 inner apical spines. Metatarsai without claws.

**Orthotype**: **Levidea lineata** Tuthill.

This genus is included in the **Triozinae** chiefly on the venation of the forewings. The head is quite unlike any other members of this subfamily. It perhaps is more closely related to some other genera with which I am unfamiliar.
Levidea lineata Tuthill

Figs. 86, 87, 125.


Length to tip of folded wings, 3 to 3.5 mm.

**Color:** General body color, including legs, stramineous. Vertex and genae light, antennae darker. Eyes dark. Two brown lines extending across prescutum, sometimes incomplete, continuing on scutum as a diverging pair of lines. Membrane of forewings with small brown spots, very thick at anal margin to sparse on costal margin, the veins unspotted except at marginal cells, thus giving general appearance of stripes.

**Structure:** Head very small, strongly deflexed. Vertex slightly swollen in appearance, perfectly smooth except for 2 very small foveae near occipital margin and remnant of medial suture above front ocellus. Genae slightly swollen. Clypeus very large, visible from front or side. Antennae twice as long as width of head. Thorax moderately arched. Pronotum developed out and around the occiput. Forewings slightly more than twice as long as wide, without pterostigma or cubital pediole, marginal cells about equal. Metatibiae with stout basal spur, 1 outer, 2 inner apical spines.

**Genitalia:** Male genitalia large, proctiger triangular in outline, broad at base, slightly longer than forceps which are simple, tapering from base to acute spines, quite strongly
arched, apices touching, pubescent on posterior margins.

Female genital segment large with rather dense, silky pubescence; dorsal valve very large, hood-shaped; ventral valve smaller, sharply pointed.

Known only from the type series from Arizona. The probable host is Parthenium incanum, "wild rubber".

Holotype, female, no. 55185 U. S. N. M.
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<td>1.</td>
<td>.......................... <em>Psylla phoradendrace</em>, female cauda.</td>
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<td>2.</td>
<td>.......................... &quot; &quot; &quot; , male &quot; .</td>
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<td>.......................... <em>Psylla maculata</em>, male cauda.</td>
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<td>3a.</td>
<td>.......................... <em>Psylla maculata</em>, caudal view of forceps.</td>
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<tr>
<td>4.</td>
<td>.......................... <em>Psylla nana</em>, female cauda.</td>
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<td>.......................... &quot; &quot; &quot; , male &quot; .</td>
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<td>6.</td>
<td>.......................... <em>Psylla arita</em>, &quot; &quot; .</td>
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<td>7.</td>
<td>.......................... &quot; &quot; &quot; , female cauda.</td>
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<td>8.</td>
<td>.......................... <em>Psylla magna</em>, &quot; &quot; .</td>
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<td>.......................... &quot; &quot; &quot; , male &quot; .</td>
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<td>.......................... <em>Psylla omani</em>, female cauda.</td>
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<td>11.</td>
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<td>12.</td>
<td>.......................... <em>Psylla hirsuta</em>, female &quot; .</td>
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<td>.......................... <em>Psylla bulba</em>, female &quot; .</td>
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<td>19.</td>
<td>.......................... &quot; &quot; &quot; , male &quot; .</td>
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<td>20</td>
<td>Psylla manisi, male cauda.</td>
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<tr>
<td>21</td>
<td>Psylla manisi, female</td>
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<td>22</td>
<td>Psylla quadrilineata,</td>
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<tr>
<td>23</td>
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<td>male</td>
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<tr>
<td>24</td>
<td>Psylla confusa,</td>
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<td>26</td>
<td>Psylla parallela,</td>
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<tr>
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<td>Psylla minor,</td>
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<tr>
<td>28</td>
<td>Psylla minor,</td>
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<tr>
<td>29</td>
<td>Psylla pulla,</td>
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<tr>
<td>30</td>
<td>&quot;</td>
<td>male</td>
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<tr>
<td>30a</td>
<td>Psylla pulla, dorsal view of forceps.</td>
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<td>31</td>
<td>Psylla lina, female cauda.</td>
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<tr>
<td>32</td>
<td>&quot;</td>
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<td>33</td>
<td>Psylla cola,</td>
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<td>&quot;</td>
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<td>35</td>
<td>Psylla eva,</td>
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<td>Arytsena singularis, female</td>
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<td>38</td>
<td>Arytsena amorphae,</td>
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<td>39</td>
<td>&quot;</td>
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<td>40</td>
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<td><strong>Arytaena tana</strong>, male cauda</td>
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<td><strong>Arytaena tana</strong>, female</td>
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<td><strong>Euphelerus jugovenosus</strong>, male</td>
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<td><strong>Euphelerus jugovenosus</strong>, male</td>
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<td>46</td>
<td><strong>Euphelerus adustus</strong>, female</td>
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<td><strong>Euphelerus adustus</strong>, male</td>
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<td><strong>Euphelerus tantillus</strong>, female cauda</td>
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<td><strong>Euphelerus tantillus</strong>, male</td>
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<td><strong>Euphyllura leva</strong>, male</td>
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<td><strong>Tetragonoecephala flava</strong>, male</td>
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<td><strong>Tetragonoecephala flava</strong>, female</td>
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<td>54</td>
<td><strong>Trioza pulla</strong>, female</td>
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<td><strong>Trioza pulla</strong>, male</td>
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<td>56</td>
<td><strong>Trioza singularis</strong>, male</td>
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<td><strong>Trioza singularis</strong>, caudal view of forceps</td>
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<td><strong>Trioza sturma</strong>, male cauda</td>
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<td><strong>Trioza sturma</strong>, female</td>
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<td>59</td>
<td><strong>Trioza shepherdiae</strong>, male</td>
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<td>61</td>
<td><strong>Trioza occidentalis</strong>, female</td>
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<td><strong>Trioza incerta</strong>, male</td>
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<td>63</td>
<td><strong>Trioza incerta</strong>, male</td>
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64. Tricioza rubra, female cauda.
65. " " , male " .
65a. Tricioza rubra, caudal view of forceps.
66. Tricioza phoradendrace, female cauda.
67. " " , male " .
68. Tricioza beameri, " " .
69. " " , female " .
70. Tricioza chlora, " " .
71. " " , male " .
72. Tricioza semple, " " .
73. Tricioza sulcata, female " .
74. " " , male " .
75. Tricioza tola, female " .
76. " " , male " .
77. Tricioza inverse, " " .
78. " " , female " .
79. Paratriozza dorsalis, " " .
80. " " , male " .
81. Paratriozza dubia, female " .
82. " " , male " .
83. Neotriozzella hirsuta, " " .
84. Paratriozza pubescens, female " .
85. " " , male " .
86. Levidae lineata, female " .
87. " " , male " .
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<th>Plate</th>
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<td>38</td>
<td>Psylla phoradendrace, forewing</td>
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<td>39</td>
<td>Psylla nana</td>
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<td>40</td>
<td>Psylla arita (and magna)</td>
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<td>41</td>
<td>Psylla omani</td>
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<td>Psylla hirsuta</td>
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<td>Psylla lina</td>
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<td>Psylla cola (and eva)</td>
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<td>51</td>
<td>Arytsea robusta sinusta</td>
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102. -------------- **Arytaena singularis**, forewing.
103. -------------- **Arytaena pallida**, " "
104. -------------- **Arytaena tena**, " "
105. -------------- **Euphalerus jugovenosus**, " "
106. -------------- **Euphalerus adustus**, " "
107. -------------- **Euphalerus tantillus**, " "
108. -------------- **Euphalerus leya**, " "
109. -------------- **Trioza pulla**, " "
110. -------------- **Trioza singularis**, " "
111. -------------- **Trioza stigma**, " "
112. -------------- **Trioza shepherdiae**, " "
113. -------------- **Trioza occidentalis**, " "
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<td><em>Trioza beameri</em>, &quot;</td>
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<td>118.</td>
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<td><em>Trioza sulcata</em>, &quot;</td>
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<td><em>Trioza inversa</em> (and trola), &quot;</td>
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<td>121.</td>
<td><em>Paratrioza dorsalis</em>, &quot;</td>
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<td>123.</td>
<td><em>Neotrioza hirsuta</em>, &quot;</td>
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<td>124.</td>
<td><em>Metatrioza pubescens</em>, &quot;</td>
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