

as the female of *Mallophora analis*. I have a male which agrees with his description. The head is black haired; the thorax yellow above; hair on scutellum, in front of the wings and in front of the halteres is black; the legs black haired, except the middle tibiæ are yellow haired on outer side; the abdomen has four basal segments yellow, rest black. The superior male appendages are similar to those of *D. lata* but more swollen below and the outer side only slightly excavate. Length 17 mm.

From Texas.

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## KEY TO THE NEARCTIC SPECIES OF LEPTOYPHA AND LEPTOSTYLA (HETEROPTERA TINGIDÆ).

BY W. L. McATEE.

The genera *Leptoypha* and *Leptostyla*, both of Stål, belong to that section of the Tingidæ in which the rostral sulcus is closed in front and the discoidal and costal areas of the hemelytra, are rarely or never, coëlevated, and to the smaller subdivision in which the rostral sulcus is not interrupted by a ridge between the meso- and metasterni. *Leptoypha* contains species in which the translucent lacy type of structure so characteristic of the family is greatly obscured except on membrane and on costa in the species that have it expanded; there is no pronotal hood. The first two joints of antenna are short and of about equal length, and the pronotum has a single prominent median ridge, the lateral ridges are traceable especially near apex of pronotal extension. The species are very plainly colored, usually being light-brown, more or less dark mottled or pruinose, and with dark callosities. *Leptostyla* species on the other hand are distinctly lacy; a hood is present, the first antennal joint is three times (or more) as long as the second, and there are three high and thin pronotal carinæ. Some of the species of this genus have a distinct color pattern.

### KEY TO THE SPECIES OF LEPTOYPHA.\*

- A. Costal margin explanate, reflexed, distinct for its whole length.
- B. Areoles of costal margin in a single series ..... *minor* n. sp.

\* Stål, C., *Enumeratio Hemipterorum*, 3, 1873, p. 121. The name is frequently misspelled *Leptophya*.



- BB. Areoles in more than one series at some part of the costal margin.  
 C. Two series of areoles extending about as far as apex of pronotal extension ..... *costata* Parshley.  
 CC. Two series of areoles in all but the posterior fourth or less of the costal margin ..... *elliptica* n. sp.  
 AA. Costal margin not explanate, deflexed; subcostal area forming outer anterior margin of hemelytron.  
 D. Length over  $2\frac{1}{2}$  mm.; third joint of antenna nearly four times as long as basal joint, total length of antenna nearly 1 mm.,  
*mutica* Say.  
 DD. Length less than  $2\frac{1}{2}$  mm.; third joint of antenna distinctly less than four times as long as basal joint; total length of antenna .75 mm. or less ..... *brevicornis* Champion.

**Leptoypha minor** n. sp.—Length\* (excluding antennæ) 1.81–1.82 mm.; length of pronotum, 1.05–1.08 mm., width, .72–.79 mm.; greatest width of elytra, .84 mm.; length of antennal joints: 1, .099 mm.; 2, .13 mm.; 3, .39 mm.; 4, .23 mm.

Form elliptical; antennæ rather short and thick, upper surface coarsely punctured; punctures not arranged in definite rows except on uniseriate costal margin. Three short blunt spines on front and two straight ones from back of vertex along inner eye margins close to surface of head. Median carina of pronotum distinct; lateral carinæ obsolete.

General color light reddish brown, more or less infuscated as follows: Apical joints of antennæ; head black, vertex, inner orbits, and two closely applied spines with short silvery hairs; region of pronotal callosities; faintly on disc of pronotum and an indistinct U-shaped mark (base forward) on posterior half of pronotum; an irregular band of irrorations across elytra through the posterior half of discoidal areas and another across membrane before apex. Spines on head, edge of rostral sulcus, collar and membrane distinctly lighter than ground color. Ventral surface deeply infuscated on pleuræ, mesosternum and most of venter. Legs light reddish brown; tarsi dark.

Similar to *L. costata* Parshley but much smaller. These two species have more extensive dark markings than is usual in the other species here treated.

*L. minor* is easily distinguished by its size, and by the possession of distinct and reflexed though narrow costal margins, in all parts of which there is but a single series of areoles.

*Type*.—A male from Siskiyou Co., California, collected in

\* Measurements taken with eyepiece micrometer with combination of eye-pieces No. 1 and objectives A2 in Zeiss Binocular Microscope; magnification 20.



August; allotype female with same data. Both in collection of U. S. National Museum. I am adopting Mr. Heidemann's cabinet name for this species.

**Leptoypha costata** Parshley.—*Leptoypha costata* Parshley, H. M. Psyche, 24, No. 1, February, 1917, pp. 16-17 (Marshall Hall, Md.); *Leptoypha distinguenda* Heidemann, Otto. Proceedings of the Entomological Society of Washington, 18, No. 4, Dec. 1916 (June 1917), Pl. 17, Fig. 1, p. 218 (Washington, D. C., Rock Creek, D. C., Marshall Hall, Md., Mt. Vernon, Va.).

Length of a well-developed male specimen (excluding antennæ), 2.83 mm.; length of pronotum, 1.38 mm.; width, 1.05 mm.; greatest width of elytra, 1.1 mm.; length of antennal joints: 1, .13 mm.; 2, .16 mm.; 3, .57 mm.; 4, .23 mm.

Form oblong elliptic, hemelytra expanded across discoidal areas and rather narrowed toward apex. Body surface coarsely punctured, the areoles not in definite rows except in costa and margin of membrane. Percurrent median and shorter lateral carinæ on pronotum distinct. Three short converging tubercles on front and two rather long curved spines from back of vertex reaching past middle of eyes.

General color reddish brown, eyes black, cephalic spines pale. Region of pronotal callosities, indistinct clouding on remainder of pronotum and irrorations across discoidal, and central membranous areas of the elytra fuscous. Lower surface darker than upper; infuscated on pleuræ, pectus, and sides of abdomen. In pale specimens the collar, lateral margins of pronotum, apex of pronotal extension, and costa are distinctly lighter than the ground color.

This species has a distinct, reflexed costal margin of moderate width in which there are two series of areoles from humerus nearly to point where greatest width of elytron is attained, and a single series for the remainder of the length. The lateral carinæ of pronotum are more conspicuous than usual, being readily traceable from point just back of callosities to posterior margin of pronotum.

The only specimens thus far seen are those cited in connection with Mr. Heidemann's description.

**Leptoypha elliptica** n. sp.—Length of an average male specimen (excluding antennæ), 2.93 mm.; length of pronotum, 1.32 mm.; width, .92 mm.; greatest width of elytra, 1.22 mm.; length of antennal joints: 1, .13 mm.; 2, .099 mm.; 3, .89 mm.; 4, .33 mm.

Form broadly elliptical; hemelytra unusually expanded at middle, broadly rounded at apex. Body coarsely punctured; the areoles in regular rows only on costa and margin of hemelytra; median pronotal carina distinct; lateral ones barely traceable on pronotal extension. Three short but sharp, and convergent, almost fused spines on front of vertex, and two short,



sharp, not wholly decumbent, ones from back of vertex along inner margins of eyes.

General color stramineous to light reddish brown; eyes and callosities black; basal and apical joints or whole antennæ infuscated; veinlets across discoidal region of hemelytra (especially on costa) and on membrane more or less embrowned. Head spines, margins of rostral sulcus, and collar paler than ground color. Spots on pleuræ below callosities and mesosternum darker than remainder of lower surface.

This, the largest of the species here considered, has a very wide costal area in which there are two full series of large areoles from humerus to or nearly to the point where elytron begins to curve to form the apex.

Several specimens, labelled simply Texas, in the National collection, of which a male is selected as type. Mr. Heidemann's cabinet name is *discreta*.

**Leptoypha mutica** Say.—*T(ingis) mutica* Say, Thomas. Descriptions of new species of Heteropterous Hemiptera of North America, New Harmony, Indiana, December, 1831, p. 26; The complete writings of Thomas Say on the entomology of North America, Vol. 1, 1859, p. 349 (Indiana).

Length of an average specimen (excluding antennæ), 2.9 mm.; length of pronotum, 1.35 mm.; width, .98 mm.; greatest width of elytra, .99 mm.; length of antennal joints: 1, .13 mm.; 2, .099 mm.; 3, .49 mm.; 4, .23 mm.

Form oblong, a little constricted across bases of elytra and somewhat narrowed behind. Surface coarsely punctured; areoles in subcostal area tending to be arranged in three series; a single series of large areoles on membranous margin, merging into the uniseriate costa which can be seen from above only to a point just short of widest part of hemelytra. Median pronotal carina distinct, lateral ones traceable, if at all, only on posterior extension. Spines on front of vertex convergent, appearing almost fused, short, sometimes nearly obsolete, spines from back of vertex decumbent along inner orbits, of variable length, sometimes reaching front of eyes.

General color usually reddish brown, pruinose at various points, especially on head and anterior part of thorax. Eyes dark, callosities black; veinlets infuscated about discoidal areas and on membrane. Cephalic spines, collar and disc of membrane paler. Some specimens are very pruinose, even the antennæ being covered, while others become very dark, sometimes almost black. The areas which most persistently remain light are collar, apex of pronotal extension, and areas at humeral and cuneal portions of elytra. Lower surface usually of uniform ground color except for pale rim of rostral sulcus, and scattered pruinosity.

In *L. mutica* and *L. brevicornis* the costal area, according to the point of view, is obsolete or deflexed anteriorly. The species are therefore more



slender and more nearly parallel-sided in appearance than others of the genus. Viewed from above the subcostal area forms the lateral margin of the hemelytra from humerus to a point just back of widest part. From the side or beneath, however, the deflexed costa can be seen and inspection of its surface reveals a uniseriate arrangement of the areoles. *L. mutica* has the third antennal joint nearly or quite four times as long as the basal joint.

This species, which varies greatly in color, being sometimes almost entirely black is very common in the vicinity of Washington, D. C., on fringe-tree (*Chionanthus virginica* L.) and on various species of ash (*Fraxinus*). It has been collected on the food plants from May to October, has been found hibernating among old leaves, and the nymphs have been seen from July to September.

Other specimens seen show that the species occurs also in Nebraska, Wisconsin, Ohio, Ontario, New Jersey, Tennessee, and Texas.

**Leptoypha brevicornis** Champion.—*Leptoypha brevicornis* Champion, G. C. Biologia Centrali-Americana. Insecta. Rhynchota. Hemiptera-Heteroptera, Vol. 2, p. 32, December, 1897 (Omiteme in Guerrero, Mexico, 8,000 feet).

Length (excluding antenna), 2.27 mm.; length of pronotum, 1.13 mm.; width, .82 mm.; greatest width of elytra, .89 mm.; length of antennal joints: 1, .099 mm.; 2, .099 mm.; 3, .36 mm.; 4, .19 mm.

Form not so narrowly oblong as in *L. mutica*, the pronotum proportionally broader. Coarsely punctured, subcostal area largely triseriate; inner margin of membrane with a single series of large areoles which becomes two at apex and merges into the single series of costa which can be seen (from above) to a point just behind greatest elytral expansion. Cephalic spines as in *L. mutica*.

Color stramineous to light reddish brown; eyes and callosities black; veinlets infuscated across discoidal areas and on membrane; pruinosity generally distributed. Under surface reddish brown, bucculae paler, pleural spots and mesosternum darker; more or less pruinose.

*L. brevicornis* is smaller than *L. mutica*; the antenna is shorter and the third joint of antenna is distinctly less than four times as long as the first; a proportion which it nearly or quite attains in *L. mutica*. However, the two forms are very closely related and it may well prove that *brevicornis* is a southern and western subspecies of *mutica*.



From their perfect agreement with description and figure (Pl. 2, fig. 28) of *L. brevicornis*, two specimens collected in the Argus Mountains, California, April, 1891, by Albert Koebele are assigned to this species. Specimens collected by Mr. C. A. Hart at Brownsville, Texas, December 8, 1910, and November 21, 1911, also are referred here.

KEY TO THE SPECIES OF LEPTOSTYLA.\*

- A. Pronotum widest at about middle; paranota angulate....*velifer* n. sp.
- AA. Pronotum widest behind; paranota not angulate.
  - B. Third joint of antenna shorter than pronotum; anterior third of costal margin with two series of about equal-sized areoles; elytra widest near base.....*clitoriae* Heidemann.
  - BB. Third joint of antenna about as long as pronotum; anterior third of costal margin not with two series of equal-sized areoles; elytra widest near apex.
    - C. Form narrower; elytra widest near apex; anterior third of costal margin with a single series of large rectangular areoles; costal cross-veinlets hyaline.....*oblonga* Say.
    - CC. Form broader; elytra about as wide across discoidal areas as at apex; anterior third of costal margin with an outer series of large areoles and an interdigitating inner series of small areoles; costal cross-veinlets dark,
      - heidemanni* Osborn & Drake.

*Leptostyla velifer* n. sp.—Length of an average specimen (excluding antennæ and cephalic spines), 2.93 mm.; length of pronotum, 1.28 mm.; width, 1.22 mm.; greatest width of elytra, 1.32 mm.; length of antennal joints: 1, .36 mm.; 2, .099 mm.; 3, 1.36 mm.; 4, .33 mm.

Antennæ long and slender; three long, diverging, sharp-pointed spines on head, underneath the median one of which are two shorter laterally converging spines. Paranota flaring, roundly angulate at middle, strongly reflexed, so that rounded posterior angle is almost vertical to surface of pronotum; four rows of areoles at widest point. Hood oblong, wider and higher behind; carinæ thin, high and distinct, the lateral ones, uniseriate and simply arched, the median one with a single series of large squarish areoles, the upper edge, higher in front, rounded at the ends and sinuate in middle. Costal area with large areoles in from two to three series; subcostal with the same number of series of smaller areoles; discoidal area with conspicuously raised margin.

Color stramineous; basal and terminal joints of antennæ, eyes, non-membranous parts of thorax, spots near apices of outer margins of discoidal areas, and under surface, except edges of rostral sulcus and legs, fuscous to black. Legs, intermediate antennal joints, edges of carinæ, etc., a few cross veinlets in costa and some in membrane testaceous.

\* Stål, Enum. Hemip., 3, 1873, p. 120.



The angulate expansions of the pronotum and the comparatively large size of this species give it the aspect of a *Gargaphia*. However, it has the generic characters of *Leptostyla*. In this genus it needs to be compared particularly with *L. elata* Champion (Biol. Centr.-Amer. Heteroptera, 2, p. 16, 1897). It differs from that species in the greater development of the hood, the front declivity of which also is much steeper; in having 3 as the maximum and 2 as the minimum number of series of areoles in the costal margin, instead of 4 and 3 respectively, and in having less dark marking.

From *L. dilaticollis* Champion (pp. 18-19), to which it is not so closely related, it differs in having 3 long, diverging, instead of 2 short, converging spines on vertex; in the first antennal joint being more than  $2\frac{1}{2}$  times as long as second; and in having the maximum number of series of areoles in the costal margin 3 instead of 4.

First and last joints of antenna, base and spot near apex of discoidal area, a few veins in costal area and apical third of elytra fuscous to black; membranous parts of body hyaline, most of the veins testaceous; legs and intermediate antennal joints of same color.

Numerous specimens obtained in Arizona in 1882 by H. K. Morrison, all in National Collection. A female type and male allotype have been selected. Both Uhler and Heidemann used the cabinet name *velifica* for this species. Uhler also at one time called it *Gargaphia reticulata*.

***Leptostyla clitoriae* Heidemann.**—*Leptostyla clitoriae* Heidemann, Otto. Proc. Ent. Soc. Wash., 13, No. 3, July-Sept., 1911 (September 30, 1911), pp. 180-181, fig. 4 (Rock Creek, D. C., Washington, D. C., Plummers Island, Md., Columbus, Texas); *Leptostyla costofasciata* Drake, Carl J., Ohio Jour. of Sci., 16, No. 7, May, 1916, pp. 326-328 (Clarksville, Tenn.).

Length of an average specimen (excluding antennæ), 2.24 mm.; length of pronotum, .957 mm.; width, .72 mm.; greatest width of elytra, .957 mm.; length of antennal joints: 1, .099 mm.; 2, .099 mm.; 3, .757 mm.; 4, .18 mm.

Form broadly oblong, constricted at humeri and again beyond discoidal areas; hemelytra widening again behind. Superior median spine of head long, ascending, then somewhat decurved, inferior median spines shorter, in and up curved so that they and the superior spine to a certain extent converge; lateral spines short, projecting straight forward along inner orbits. Pronotum (disregarding posterior extension) heart-shaped, the apex cut off by a line farthest advanced at anterior angles and middle, sinuate between. Hood not conspicuous, paranota well reflexed, biseriate; carinæ moderately high, uniseriate, the lateral ones arched, the median bisinuate. Costal area mostly biseriate; subcostal and discoidal areas mostly triseriate.

Among the species included in the above key, *L. clitoriae* is easily recog-



nized by its small size, shortness of antennæ, and very dark color. The underside of body and all median parts of upper surface, except hood, apex of pronotum and three large areoles in sutural area vary from fuscous to black (the discs of areoles may be hyaline or whitish) and lateral extensions of this pattern are found on posterior part of pronotal margin, on costal area at widest part of elytra and near apex of elytra. The lateral margin otherwise is clear; the veinlets stramineous. The first, second, and fourth antennal joints vary from fuscous to black, the third joint and the legs from stramineous to testaceous.

The species is abundant about Washington, D. C., and occurs not only upon the plant (*Clitoria mariana* L.) for which Mr. Heidemann named it, but also on various species of *Lespedeza* and *Meibomia*. Specimens have been collected from late June to September. Examples of the species from Tennessee and South Carolina also have been seen. Mr. Heidemann compares the species to *L. constricta* Champion, to which indeed it is very similar. If the respective illustrations can be trusted, however, the species are sufficiently distinct. The pronotum of *L. constricta* is longer and narrower than the same part in *clitoria* and the hemelytra are much more constricted beyond the discoidal area and do not widen again as they do in the present species. *L. constricta* is recorded from the Nearctic region by Van Duzee, but no specimens have been seen by the writer.

**Leptostyla oblonga** Say.—*Tingis oblonga* Say, Thomas. Descriptions of new Hemipterous Insects collected in the expedition to the Rocky Mountains . . . under command of Major Long. Journal of the Academy of Natural Sciences of Philadelphia, Vol. 4, 1825, pp. 326-327; Compl. Writings, Vol. 2, 1859, p. 248 (Missouri).

Length of an average specimen (excluding antennæ and spines), 2.83 mm.; length of pronotum, 1.08 mm.; width, .79 mm.; greatest width of elytra across discoidal areas, .92 mm.; near apex, .99 mm.; length of antennal joints: 1, .26 mm.; 2, .08 mm.; 3, 1.32 mm.; 4, .39 mm.

Form narrowly oblong constructed at humeri and just before tip of elytra. Head with three long, sharp spines from back of vertex, under the median one of which are two shorter laterally converging ones arising from front of vertex. Hood well developed, oblong, broadest and highest in front. Paranota well reflexed, with a single series of large squarish areoles. Carinæ moderately high, uniseriate; the lateral ones viewed from above, a little wavy behind. Costal area with a single series of large squarish areoles from humeri to or near end of discoidal area, biseriate near constriction, then again uniseriate.



Underside of body (except edges of rostral sulcus), eyes, nonmembranous parts of pronotum and spots near apices of discoidal areas black. Basal and apical joints of antennæ fuscous to black; intermediate joints and legs stramineous to testaceous, tips of tarsi black; membranous parts of upper surface mostly whitish hyaline; crest of hood, veins on sutural area, and membrane brown; the subcostal and discoidal areas sometimes have a brownish ground color.

This is the only American *Leptostyla* known that has a single series of large, rectangular areoles in the costal area, of which they occupy the anterior third. This character together with the entirely hyaline lateral margins of the elytra, clearly distinguish the species.

Specimens examined are from West Point, Nebr.; Ames, Iowa; Cahokia, Ill.; Polk County, Wis.; Amery, Wis.; Glen Echo, Md.; and Maryland near Plummers Id. The last specimen listed was taken by the writer, July 26, 1914, on a thin-leaved, climbing, leguminous plant (*Falcata comosa* L.). The Ames, Iowa, specimens were collected July 9, 1894, by Dr. E. D. Ball on *Petalostemon*. Dr. Ball tells me that almost every plant of this genus found on dry gravelly knolls bears specimens of this tingid. The Amery, Wis., examples were found on a basswood leaf by Mr. D. M. De Long.

*Leptostyla heidemanni* Osborn & Drake.—*Leptostyla heidemanni* Osborn, Herbert and Drake, Carl J. The Tingitoidea of Ohio, Ohio State University Bulletin 20, No. 35, June, 1916, pp. 238-239 (Arkansas, Washington, D. C., Newton, Mass.).

Length of an average specimen (excluding antennæ and spines), 3.1 mm.; length of pronotum, 1.18 mm.; width, .86 mm.; width of elytra across discoidal areas, 1.02 mm.; near apex, 1.05 mm.; length of antennal joints: 1, .26 mm.; 2, .08 mm.; 3, 1.25 mm.; 4, .36 mm.

Very similar to *L. oblonga*. The hood is more rounded triangular in outline viewed from above, but as in *oblonga* is highest and widest in front. *L. heidemanni* is further distinguished structurally from *oblonga* by the elytra being practically as wide across discoidal areas as near apex; and by the possession of two series of areoles in anterior part of costal area, of which the inner are smaller and alternated with the larger ones of the outer series.

In color this species is similar to *oblonga*, with the chief exception that the cross-veinlets of the costal area are dark. A few cells at apex of elytra and just within the posterior convexity of the elytron also are infuscated.



Of the numerous species of *Leptostyla* mentioned in the *Biologia Centrali-Americana*, *L. heidemanni* need be contrasted only with *gracilentia* and *angustata*. Both of these species have the subcostal area biseriate, while *heidemanni* has from three to four series of areoles in this division of the hemelytron; furthermore, those species have two series of full-sized areoles in the costal area instead of one series of large and one of small cells.

*Leptostyla heidemanni* is extremely common about Washington, D. C., on its food plant *Baptisia tinctoria* L., which is not only often, but usually, severely injured by the feeding operations of these little Tingids. Other localities represented by the material examined are: Forest Hills and Springfield, Mass., New Jersey, and Shreveport, La. Mr. Heidemann's cabinet name for this species was *L. affinis*; I have also seen the name *similis* on some specimens.

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## STUDIES IN THE OLD TESTAMENT.

By R. P. Dow, Brooklyn, N. Y.

Before considering each insect in the order of its mention in the Old Testament, it might give a better understanding if the order of creation as given in Genesis is compared with the order assumed by modern science to be the correct one. Our evolutionary theories are less than a century old. The writers of the Pentateuch may have been ignorant of the nature of the world as a component of the universe, and may have been filled with the wisdom of ages since forgotten. But that does not figure in the Book, the allegory, and the imagery of which is always graphic. The progress of creation is given day by day, the verbal order not agreeing with the correct sequence of time. Genesis I: 11 narrates that on the third day came grass, the herb yielding seed, the fruit tree reproducing itself. On a day following the moon and the stars were placed in the heavens. Well, what of it? None of the greatest philosophers of Greece or Rome had progressed sufficiently to have an improved order in his mind. During the present century the head of the great Arab University in Cairo was asked whether the earth revolved around the sun or





McAtee, W. L. 1917. "Key to the Nearctic Species of Leptoypha and Lepiosiyla (Heteroptera, Tingidae)." *Bulletin of the Brooklyn Entomological Society* 12, 55-64.

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