

Family CICADELLIDAE.

Jassina Stål.*Jassoidea* Van Duzee.

By DWIGHT MOORE DELONG, PH.D.*

Meadows and old pastures, especially those of long standing, are ideal places for the development and hibernation of members of this family, and they usually harbor a large number of species, and also are prolific sources of infestation for adjacent agricultural crops. A few of the smallest and most abundant species frequent the orchard and cause serious injury to many important fruits. Their attacks are not confined to the pasture and orchard, but one may find them as pests of nurseries, vegetable gardens, forage crops, vineyards, ornamental plants, shrubs and trees.

Direct injury by leafhoppers is manifested in many ways; most characteristic is the discoloring, drying and shriveling of grasses and foliage, and often the curling or distorting of leaves, as in the case of potato "tip burn." These are results of leafhopper feeding, and are caused by puncturing the leaf with the proboscis in order to obtain the plant juices. By this constant drain the plant is often killed or the vitality greatly reduced.

The blasting of heads of grain is often definitely attributed to certain species of leafhoppers, and the deposition of eggs is a further source of injury, for in many cases these are placed in small incisions made through the outer covering of the leaves, stems or twigs. Indirect injury may also occur, for recently they have been definitely and specifically proven to carry certain fungous and bacterial diseases of plants.

The number of broods a season will vary with the species, and certain of our common forms produce one or two distinct broods during the summer. The great number spend the winter in the egg stage, and develop during spring and early summer. Others hibernate as nymphs or adults according to the species.

Bogs, swamps, sand plains, meadows and various types and stages of forests each have a rather well defined group of plants which live under somewhat restricted conditions. Certain species of "Jassids," or groups of species, are quite closely associated with the plant societies which occur in these areas, and the plant distribution seems to control to a large extent the species distribution. The meadow group is by far the most important. Here are found more species of insects because of the great variety and variation in the type of meadows and the large number of factors which combine to produce diversified habitats.

* The author takes this opportunity to express his appreciation to Prof. J. G. Sanders, who has offered many helpful suggestions and criticisms and through whose kindness it has been possible to prepare this manuscript.

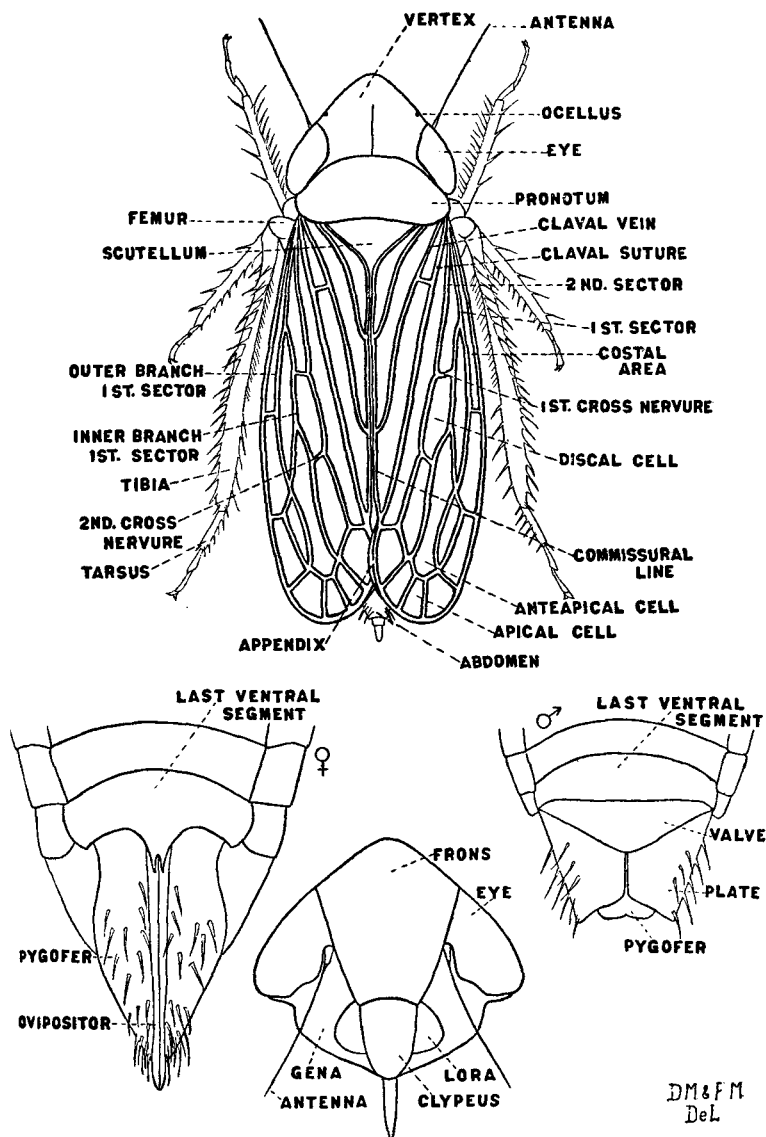


FIG. 4. *Deltocephalus configuratus* Uhler.—(Upper) Dorsal view. (Lower left) Female genitalia. (Lower right) Male genitalia. (Lower center) Face. All greatly enlarged. Drawing by D. M. and F. M. DeLong.

This family as considered at the present time includes the leaf-hoppers closely allied in structure to the Cercopidae, Membracidae and Fulgoridae, and is placed systematically between the two latter families, but is easily distinguished from all of these by the double row of spines on the hind tibiae, the prominent but normal pronotum and the insertion of the antennae on the front between the eyes. A few forms like *Penthimia americana* Fitch, and certain of the *Gyponas* and *Acucephalini* resemble very closely the Cercopidae, but lack the circlet of large heavy spines at the distal end of the hind tibiae of the Cercopidae, and are armed with a double row instead. In the Membracidae the pronotum is greatly produced, often covering a large part of the dorsal portion of the body, and projects in curious structures formed at the sides or in front. The pronotum is normal in the Cicadellidae and forms only a dorsal covering of the thoracic region. As a group the Fulgoridae are most easily confused with this family. In the Fulgoridae the antennae are always beneath the eyes; the ocelli are beneath the eyes or sunken into the cheeks close to the eyes, and are separated from the keeled frons by a distinct and often conspicuous ridge at the sides. The pronotum is very short and usually keeled. Observation of the position and character of these structures should easily separate these two groups.

The Connecticut records of this group at present are of those which have been taken in general collecting, since no special collecting has been undertaken. For this reason the following list of species includes all which have been taken in adjoining states, and which doubtless occur in the state, and may be found by more extensive search.

Key to Subfamilies.

- 1. Ocelli not on front, either on disc or margin of vertex. (Fig. 5, 1a, 2a, 7b.) 2
Ocelli on front below margin of vertex. (Fig. 5, 4b and c.) BYTHOSCOPIINAE, p. 58
- 2. Ocelli on disc of vertex usually distinct from the margin. (Fig. 5, 1a, 2a.) 3
Ocelli on margin of vertex or between vertex and front near margin, sometimes wanting (TYPHLOCYBINI). (Fig. 5, 7b.) JASSINAE, p. 85
- 3. Body usually elongate, cylindrical, head often angulate. (Fig. 5, 1a, b.) CICADELLINAE, p. 73
Body usually dorso-ventrally flattened, broadly oval and with head usually broadly rounded or roundly angulate. (Fig. 5, 2a, b.) GYPONINAE, p. 80

Subfamily BYTHOSCOPIINAE.

The chief characteristic of this subfamily and the one which will readily separate it from the other members of the family, is the position of the ocelli which are located on the front below the

margin of the vertex. The vertex is usually short and very broad, rounding to the front so that no definite margin is between them.

Key to Genera.

- 1. Anterior margin of the pronotum not produced beyond the anterior margin of the eyes, vertex distinctly and broadly rounded anteriorly. (Fig. 5, 6a.) 2
- Anterior margin of pronotum strongly produced beyond anterior margin of eyes, vertex obtusely angulate. (Fig. 5, 4a.) 4
- 2. Head across eyes as wide as, usually wider than pronotum, humeral angles rounded, not prominent 3
- Head, including eyes, narrower than pronotum which is widened by prominent humeral angles [Bythoscopus]
- 3. Elytra with large appendix, vertex very broadly curved before, almost straight. (Fig. 5, 6a.) Idiocerus, p. 61
- Elytra with appendix very small or wanting, vertex more distinctly curved and produced anteriorly. (Fig. 5, 3.) .. Agallia, p. 59
- 4. Vertex strongly angled, striations on pronotum extending obliquely from median longitudinal line toward humeral angles (Fig. 5, 4a.) Macropsis, p. 66
- Vertex more obtusely angled, pronotum with striation transverse or nearly so. (Fig. 5, 5a.) Oncopsis, p. 69

Agallia Curtis.

Comprised of small species varying from brown to dirty white, but usually the former color. Vertex well rounded almost parallel margined, head wider than elytra at base. Face as long as wide, elytra with an appendix.

Contrary to the feeding habits of most of this subfamily, the species of *Agallia* live almost entirely upon herbaceous plants. They are commonly found on grasses and sedges in pasture land, on the undergrowth in woodland, and are very common on clover and truck crops. A few of the most important economic species belong here.

Key to Species.

- 1. Pronotum marked with two round black spots on disc or the posterior half, often very small, length exceeding 3.5 mm. 2
- Spots on anterior half of pronotum usually close to anterior margin, size smaller, 3 mm. in length sanguinolenta
- 2. Vertex marked with six black spots, and a pair of large round spots on the disc of pronotum; female segment roundly produced oculata
- Vertex with few spots, pronotum with spots on posterior portion only 3
- 3. Narrow, elytra narrow in proportion, usually with a dark median longitudinal line on the anterior two thirds of pronotum 4
- Broader, robust, almost 2 mm. wide, dark almost unicolorous, elytra short and broad quadri-punctata

4. Last ventral segment of female broadly roundly produced posteriorly, elytra almost unicolorous, vertex nearly parallel margined, with two black spots*constricta*
 Last ventral segment of female deeply emarginate, sutural margin of clavus light, vertex shorter at middle than next eyes, marked with four black spots*novella*.

A. oculata Van Duzee.

Ent. Amer., vi, p. 38, 1890.

In size and general appearance resembling *novella* but with different markings and genitalia. Vertex with a median line, two large spots on disc and a pair of smaller ones next each eye, black. Pronotum with a pair of large round spots and a median line, black. A dark band across middle of elytra. Female last ventral segment slightly roundly produced. Length 4.5 mm.

This insect hibernates as an adult; the life cycle is not known.

New Haven, 20 March, 1921 (B. H. W.).

A. constricta Van Duzee.

Can. Ent., xxiv, 90, 1894.

Narrow, pale testaceous, a pair of spots on vertex and a pair on posterior margin of pronotum, black, elytra usually dark brown, nervures paler. Length 3.5-4 mm.

There is only one brood a year, and the adults appear in the spring. This species is found very commonly in uncultivated fields in pastures close to rubbish and in woodlands where there are leaves and sheltered places for hibernation. It feeds on numerous grasses.

New Haven, 18 May, 1916, 7 May, 1921 (B. H. W.).

A. novella (Say). *Macropsis nobilis* Forbes.

Jour. Acad. Nat. Sci. Phila., vi, 309, 1831.

A narrow wedge-shaped brownish species with four black spots on anterior margin of vertex and elytral suture light. The vertex is longer next eyes than at middle. Length 3.75 mm.

The species is single brooded passing the winter in the nymphal stage and becoming adult in midsummer. They feed on grasses and herbaceous plants and are abundant in fields and open woods.

New Haven, 14 July, 1920 (B. H. W.); Cornwall, 5 June, North Branford, 12 June, 1921, 16 June, 1922 (B. H. W.).

A. quadri-punctata (Provancher). *Ulopa canadensis* Van Duzee. (Figs. 5, 3.)

Nat. Can., iv, 376, 1872.

A rather short, very robust form, elytra broad, brownish with pale nervures. Two black spots on vertex and two on posterior portion of pronotum. Length 4 mm.

The adults appear in early spring and feed on a great variety of plants. They are commonly taken in fields, among weeds, in gardens, etc. One brood a year is known to occur.

New Haven, 31 Oct., 1903 (H. L. V.); 13 May, 1911, 10, 28 June, 14 July, 1920 (B. H. W.); 16 July, 1920, 9 May, 1921 (M. P. Z.); Branford, 21 July, 1920, Huntington, 9 July, 1920, Killingworth, 31 May, 1920, Orange, 22 June, 1920, North Branford, 30 May, 1920, 12 June, 1921, 16 June, 1922 (B. H. W.); Cornwall, 5 June, 1921 (B. H. W.); Colebrook, 19 June, 1920 (P. G.); Hamden, 28 May, 1920 (P. G.); 28 May, 1922 (B. H. W.).

A. sanguinolenta (Provancher). *Bythoscopus siccifolius* Uhler.
Clover leafhopper.

Nat. Can., iv, 376, 1872.

A broad short *Agallia* with two large dark spots on vertex, pronotum without distinct markings and elytra brown with dark nervures, varying in color, often mottled. Basal angles of scutellum dark. Length 3 mm.

The most common and important species economically of the genus. It hibernates as an adult and can be found feeding very early in the spring. It is a pest of forage crops, especially abundant on clover and alfalfa, and seems able to exist under varied circumstances, whether meadows or dry sandy areas.

New Haven, 4 Nov., 1903 (H. L. V.); 4 Aug., 1909, 26 June, 1910, 8, 27 July, 1920, 20 March, 21 May, 1921 (B. H. W.); Orange, 15 Sept., 1920; Branford, 28 July, 1920, 26 May, 1921 (B. H. W.); Milford, 26 Sept., 1921 (B. H. W.); Hamden, 10 Apr., 1921 (B. H. W.); North Branford, 1 Aug., 1922 (B. H. W.); North Haven, 4 Sept., 1920 (B. H. W.); Waterbury, 15 Oct., 1920 (B. H. W.); Cornwall, 18 July, 1921 (B. H. W.).

Idiocerus Lewis.

This group may be characterized by the broad parallel margined head which exceeds the pronotum in width, and rounds to the front. Male antennae usually with disc-like swellings near the tip. Elytra exceeding the abdomen and with a distinct appendix.

The species that are known at the present time feed upon trees and shrubs both in nymphal and adult stages. Most of the species are confined to specific food plants belonging to *Salix*, *Crataegus* or *Populus*. The various species of willows especially harbor a variety of these forms.

They usually hibernate as adults, and most of the species are two-brooded.

Key to Species.

- 1. Vertex with two round black spots or a black band on the rounded crest between eyes 5
Vertex without distinct round spots or bands 2
- 2. Almost unicolorous, green or yellowish, rarely with dark markings 3
Elytra with a dark band along sutural margin, often interrupted by a light cross stripe **suturalis**
- 3. Length more than 5 mm. 4
Smaller not over 4.75 mm., elytra yellowish or greenish hyaline **nervatus**

4. Triangular anteapical cell formed by outer fork of first sector before it joins costa, elytra greenish *pallidus*
No anteapical cell formed by outer fork of first sector. Elytra yellowish with iridescent tinge *duzcei*
5. Large robust species with a band on vertex between the eyes, sometimes broken into an irregular row of spots or blotches.... 6
Smaller, two spots but no band present on vertex 7
6. Pronotum light with dark markings on anterior half, elytra subhyaline with dark nervures *lachrymalis*
Pronotum darker without definite markings, elytra rather opaque with unicolorous or pale nervures *scurra*
7. Spots on vertex small and about twice their diameter from the eyes 8
Spots on vertex large and slightly more than their diameter from the eyes 11
8. Nervures of elytra usually alternating dark and white, without sutural stripe, pronotum and scutellum with markings 10
Nervures of elytra not alternating in color, greenish with a dark stripe along suture, pronotum unmarked *snowi*
9. Male antennae without discs, color pale, a narrow brownish band across apex of clavus, and apices of elytra smoky *cognatus*
Male antennae with discs, without definite band across apex of clavus 10
10. Dark colored, face with six longitudinal stripes, length 5 mm. *alternatus*
Lighter, face pale without stripes, length 4.5 mm. *verticis*
11. Species pale with a pair of angular black spots on vertex, pronotum and scutellum *crataegi*
Dark, fulvous with light markings 12
12. Clavus at base creamy yellow, elytra without dark coloration at center of costa *provancheri*
Clavus fulvous, usually with a pale stripe, center of costal area black *fitchi*

I. *alternatus* Fitch. *Idiocerus interruptus* Gillette and Baker.

Homop. N. Y. St. Cab., 59, 1851.

Brownish fuscous with two black spots on the vertex, face yellow with longitudinal dark stripes. Elytral nervures alternating white and dark. Length 5 mm.

Very common and abundant throughout New England on willows. The adults hibernate and can be collected from early spring to midsummer, and often in August.

Cornwall, 5 June, 1921, Thompson, 19 July, 1921 (B. H. W.).

I. *cognatus* Fieber. *Idiocerus distinguendus* Kirshbaum.

Cicadinen von Mittel Europa, 162, 1896.

A little larger than *verticis* which it closely resembles. Black spots on vertex very small, sometimes lacking, but always very prominent in nymphal stages. Pronotum smoky often with four black spots on anterior margin. Scutellum with two round black spots on disc. Elytra subhyaline, nervures alternating white and brownish, a narrow band across apex of clavus and tips of elytra brownish, iridescent. Male antennae without discs. Length 5 mm.

An European species recently reported for this country where it occurs in abundance on *Populus alba*. It is easily separated from *verticis*, which it resembles, by the lack of antennal discs.

New Haven, 27 June, 29 July, 3 Oct., 1920 (B. H. W.), Stratford, 1, 15 Sept., 1920 (B. H. W.), Hamden, 11 June, 1921 (B. H. W.); New Canaan, 3 Sept., 1920 (B. H. W.). On poplar.

I. crataegi Van Duzee.

Can. Ent., xxii, 110, 1890.

Very distinctly marked, greenish yellow to brown with a pair of dark spots on vertex, anterior border of pronotum and basal angles of scutellum. Elytra yellowish hyaline with dark veins. Length 4.75-5.25 mm.

As its name would indicate this species occurs on different species of *Crataegus*. It is a typical northern form and is common in New England.

I. duzei Provancher. *Idiocerus perplexus* Gillette and Baker.

Pet. Faune Ent. Can., iii, 292, 1890.

Resembling *pallidus*, a little larger, pale, with golden iridescent elytra, fuscous at apex. Length 6-7 mm.

This is apparently a rather rare species in New England, but should be found in the state. It occurs on poplars and especially cottonwood.

Portland, 25 July, 1920, 24 July, 1921 (B. H. W.).

I. fitchi Van Duzee. *Idiocerus maculipennis* Fitch.

Can. Ent., xli, 383, 1909; Homop. N. Y. St. Cab., 59, 1851.

Chestnut brown, two black spots on vertex. Pronotum with an irregular black blotch on anterior margin behind either eye. Elytra brownish hyaline, nervures dark brown, a broad milky white band along claval vein curved to commissural line at half its length; middle of costal margin and apex black or brown. Length 5-5.5 mm.

Common throughout the state on *Crataegus* and apple.

New Haven, 3 Aug., 1909, 8, 25 July, 1912, 20, 22, 26, 27 June, 1914 (B. H. W.); 28 July, 8 Aug., 1920 (on apple), Wallingford, 8, 28 July, 1912 (D. J. C.); Manchester, 30 Aug., 1912 (H. B. K.); Portland, 25 June, 1922 (M. P. Z.).

I. lachrymalis Fitch. (Fig. 5, 6.)

Homop. N. Y. St. Cab., 58, 1851.

Large, particularly female specimens, varying from yellow to brown or slate color. A transverse band on vertex between eyes, and a spot next either eye dark. Basal angles of scutellum and a median stripe forming a spot on disc, brown. Nervures of elytra dark brown. Length, male 5.5 mm., female 7 mm.

A common species in New England and the Northern States, feeding upon cottonwood and other poplars.

Portland, 25 July, 1920 (B. H. W.); New Haven, 19 June, 1921 (B. H. W.). On poplar.

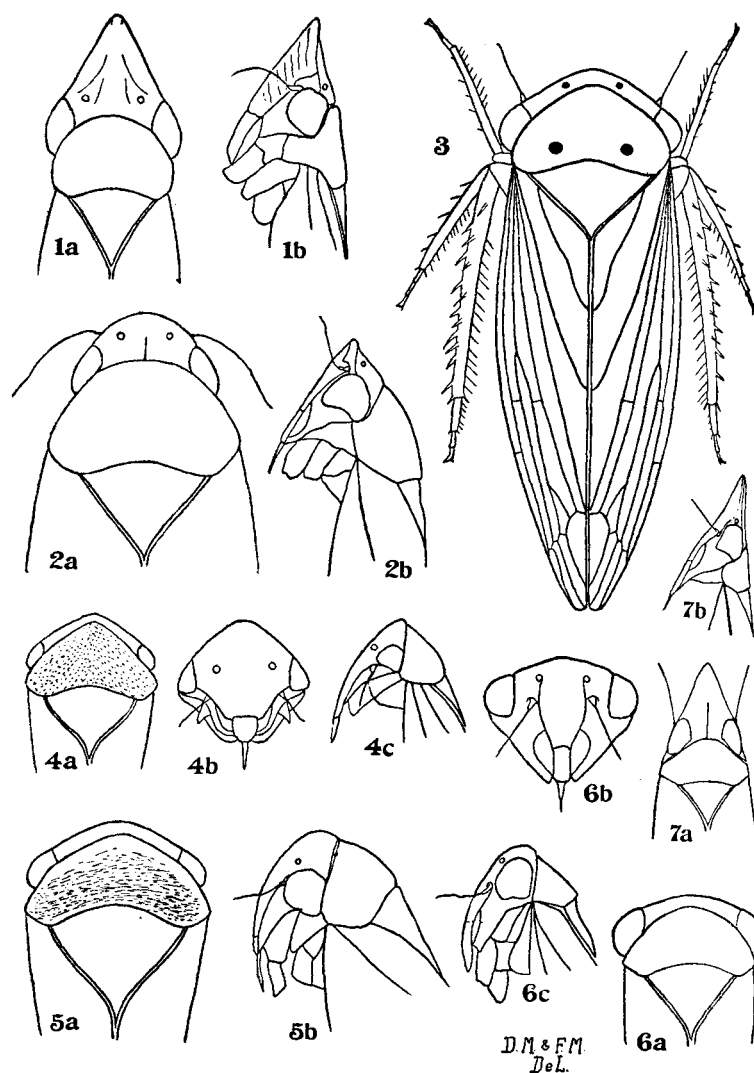


FIG. 5. (1a) *Draeculacephala mollipes* Say,—head, dorsal view; (1b) same, lateral view. (2a) *Gypona pectoralis* Spangberg,—head, dorsal view; (2b) same, lateral view. (3) *Agallia quadripunctata* Provancher,—dorsal view. (4a) *Macropsis viridis* Fitch,—head, dorsal view; (4b) same, face; (4c) same, head, lateral view. (5a) *Oncopsis variabilis* Fitch,—head, dorsal view; (5b) same, lateral view. (6a) *Idiocerus lachrymalis* Fitch,—head, dorsal view; (6b) same, face; (6c) same, head, lateral view. (7a) *Platymetopius cuprescens* Osborn,—head, dorsal view; (7b) same, lateral view. All greatly enlarged. Drawing by D. M. and F. M. DeLong.

I. nervatus Van Duzee.

Bull. Buff. Soc. Nat. Sci., v, 194, 205, 1894.

One of the smallest of the group, pale in color, green or often yellow, without definite dark markings on vertex. Elytra hyaline with dark wing nervures showing through. Length 4.5-4.75 mm.

Common in swampy land on willow shrubs, being limited in its distribution by the species of willows upon which it feeds.

Portland, 24 June, 1921 (B. H. W.). On poplar.

I. pallidus Fitch. *Bythoscopus obsoletus* Walker.

Homop. N. Y. St. Cab., 59, 1851.

Larger than *nervatus* but similar in color, pale green, yellowish, or often white, unmarked. The nervures of the wings usually not distinct through elytra. Length 6 to 6.5 mm.

Abundant on willows and poplars. The adults can be found feeding on shrubs in May, June and July. It is a species distributed through the New England States, and should occur in good numbers.

New Canaan, 3 Sept., 1920 (B. H. W.); Stratford, 1 Sept., 1920 (B. H. W.); New Haven, 22 Aug., 1920, 19 June, 1921 (B. H. W.); Hamden, 18 July, 1920 (B. H. W.); Norwalk, 8 Sept., 1920 (B. H. W.); North Branford, 13 July, 1920 (B. H. W.); Cornwall, 18 July, 1921 (B. H. W.).

I. provancheri Van Duzee. *Bythoscopus clitellarius* Provancher.

Can. Ent., xxii, 111, 1890; Pet. Faune Ent. Can., iii, 288, 1890.

Very strikingly and conspicuously colored. Shining reddish brown with a bright yellow area on basal portion of clavus along claval vein. Two large round black spots on vertex, elytra reddish brown more hyaline on posterior half, smoky at tips. Length 5-5.5 mm.

Common on hawthorn and other species of *Crataegus*. It has also been taken from oak and hickory. Occurs throughout the New England States, and is reported from Connecticut.

New Haven, 17, 27, 31, 22 Aug., 1920, 25 June, 18 Sept., 1921 (B. H. W.). On chokeberry, *Pyrus arbutifolia*.

I. scurra (Germar). *Jassus scurra* Germar. *Jassus crenatus* Germar. *Idiocerus germari* Fieber. *Idiocerus gemmismulon* Leonard and Crosby.

Fauna Ins. Eur., xvii, 11, 1834.

Rather large and robust, dull brown shading to yellow, usually with a well defined band on vertex between the eyes. Elytra with veins often alternating pale and dark. Claval veins usually pale along suture. Rather irregular dark markings on pronotum and scutellum. Length 6-7 mm.

An European form apparently introduced into this country, and now with rather wide distribution. It feeds on species of *Populus*, and has been taken as adult in April, May, September and October, thus it would appear to be two-brooded.

New Haven, 1 Oct., 1909, 4, 5 Aug., 1920; New Canaan, 3 Sept., 1920, 21 Oct., 1909; Bridgeport, 20 Sept., 1920; Norwalk, 8 Sept., 1920; Stratford, 1 Sept., 1920 (B. H. W.); Hamden, 20 May, 1920 (M. P. Z.).

I. snowi Gillette and Baker.

Hemip. Col., 79, 1895.

Another pale green species with two small spots on vertex and elytral suture narrowly black or brown. Elytra greenish hyaline, nervures margined with sparse pubescence. Length 5.5-7.5 mm.

Reported from New York, and perhaps occurs in Connecticut as an adult during July and August.

I. suturalis Fitch.

Hömob. N. Y. St. Cab., 59, 1851.

Pale yellowish, characteristically marked by a broad dark stripe along the elytral suture, tips smoky. Scutellum with basal angles dark. Vertex and pronotum unmarked. Length 5-5.75 mm.

Occurs on poplars and willows and perhaps occasionally is found on birch, as it has been taken from that plant although not definitely known to be feeding upon it.

Hamden, 11 June, 1921 (B. H. W.).

I. suturalis var. **lunaris** Ball.

Can. Ent., xxxiv, 311, 1902.

Similar to preceding with sutural stripe interrupted by a lunate mark on middle of clavus. Tips of elytra smoky, appendices overlapping and appearing as a third elongated dark spot on elytra.

Often found in company with *suturalis* on willows and poplars. A common variety in the eastern states.

New Haven, 19 June, Cornwall, 18 July, 1921 (B. H. W.).

I. verticis (Say). *Jassus verticis* Say.

Jour. Acad. Nat. Sci. Phila., vi, 308, 1831.

Resembling *alternatus*, but smaller and lighter in color. Pale brownish often faded, vertex with two black spots. Basal angles of scutellum black. Elytra subhyaline, nervures alternately brown and white. Length 4.25-4.5 mm.

It is doubtful whether this species occurs in the state, but may be found in small numbers during July, August and September.

Macropsis Lewis.

Pediopsis Burmeister.

Vertex obtusely angularly produced, almost parallel margined, very short and broad. Pronotum broad, produced anteriorly beyond the anterior margin of the eyes (at least in American species), dorsally roughened by oblique striations extending from the median anterior margin to the humeral angles.

The members of this group, as in the preceding, are tree and shrub inhabiting and are apparently limited in their feeding habits

to a few species of trees. A great many occur on willows and poplars, a few on wild plum and honey locust. So far as known they are single-brooded, the adults being found in June and early July.

Key to Species.

1. General color above greenish or yellowish to orange, often with dark markings 2
General color above brownish or fuscous, sometimes marked with green or yellow 9
2. Elytra greenish hyaline, or rather uniform brownish in the male 3
Elytra with dark markings maculate or in the form of bands 5
3. Tip of vertex without black markings 4
A black spot at the pointed tip of vertex, propleurae unmarked
virescens var. **graminea**
4. Male bright green with a black spot on propleura, length 5-6 mm.
viridis
Male without spot on propleura, elytra tinged with fuscous, less than 5 mm. in length **gleditschiae**
5. Elytra without distinct transverse hyaline bands 6
Elytra with transverse hyaline bands crossing clavus 7
6. Entire clavus and margin of suture to apex of corium black **suturalis**
Definite brown band across base of clavus and scutellar region **basalis**
7. Elytra with two transverse hyaline bands 8
Elytra reddish brown with a single hyaline band across nervures at base of anteapical cells **ferrugineoides**
8. Elytra broad, propleurae without black markings, no black spots in basal angles of scutellum **canadensis**
Elytra narrower, propleurae and angles of scutellum with black spots **bifasciata**
9. Elytra brownish with two or three pale spots, scutellum with a black spot in either basal angle **trimaculata**
Elytra deep reddish brown, scutellum rather uniform in color **sordida**

M. gleditschiae (Osborn and Ball). *Pediopsis gleditschiae* Osborn and Ball.

Proc. Dav. Acad. Sci., vii, 67, 122, 1898.
Resembling *viridis* but smaller, stout, elytra of the males washed with fuscous. Propleura unmarked. Length 4-4.75 mm.
Found on honey locust from which plant it derives this name. A rather common species in the south and occasionally found farther north, the range and abundance depending largely upon the distribution of its food plants.

New Haven, 29 July, 1920 (B. H. W.); 8 Aug., 1920 (B. H. W.).
Honey locust.

M. virescens (Gmelin) var. **graminea** (Fabricius). *Cicada graminea* Fabricius.

Ent. Syst., Suppl., 521, 1798.
Typical *virescens* is smaller than *viridis*, very narrow with a black spot at the base of hind tibia. The more common form is the variety *graminea*, which is conspicuously marked by a black spot at the tip of the angled apex. Otherwise the color is uniform greenish or yellowish, often sordid green. Length 5 mm.
An European form occurring in New England.

Noroton, 21 June, 1913 (A. H. Renshaw); Orange, 17 July, 1920; New Haven, 18, 28 July, 1920 (B. H. W.); Portland, 24 July, 1921 (B. H. W.); 25 July, 1922 (M. P. Z.).

M. viridis (Fitch). *Pediopsis viridis* Fitch. (Fig. 5, 4; a, b, c.)
Homop. N. Y. St. Cab., 59, 1851.

The common bright green form, rather large, robust, unmarked above. Propleurae of males usually marked with a small black spot. Abundant on willow. Length 5-5.5 mm.

A very common insect throughout the New England States on willow.

New Haven, 18 July, 1, 3 Aug., 1920, 4 July, 1921; Guilford, 13 July, 1920; Hamden, 18, 24 July, 1920, 11, 19 June, 1921; No. Branford, 13 July, 1920 (B. H. W.); Milford, 17 July, 1920 (B. H. W.); Ellington, 25 Aug., 1920; Cornwall, 18 July, 1921 (B. H. W.).

M. suturalis (Osborn and Ball). *Pediopsis suturalis* Osborn and Ball.

Proc. Dav. Acad. Sci., vii, 67, 119, 1898.

Green with a stripe either side of pronotum and entire clavus black, a narrow stripe extending along suture to apex of elytra. Length 6 mm.

Reported from New England. It should be found on willow in adult stage during June.

M. basalis (Van Duzee). *Pediopsis basalis* Van Duzee.

Ent. Amer., v, 171, 1889.

A rather blunt-headed species, easily recognized by the dark fuscous area on scutellum and base of elytra. The remainder of elytra is usually greenish hyaline. Vertex and pronotum yellowish or brown. Length 5.5 mm.

Abundant on poplars throughout New England. Occurs as adult during June and July.

Hamden, 11 June, 1921 (B. H. W.).

M. canadensis (Van Duzee). *Pediopsis canadensis* Van Duzee.
Pediopsis flavescens Van Duzee.

Can. Ent., xxii, 111, 1890.

Greenish yellow, elytra brownish with a transverse light band near base and another across the apex of the clavus. Vertex, pronotum and scutellum reddish brown or yellowish. Length 4.75 mm.

Reported from Maine and New York, so no doubt occurs in Connecticut. Adults have been collected from poplar during July.

M. bifasciata (Van Duzee). *Pediopsis bifasciata* Van Duzee.

Ent. Amer., v, 173, 1889.

Greenish often with a brownish tint with two quite definite bands, one on basal half of elytra and one at apex. The bands are usually somewhat oblique and often a little broken. Vertex, pronotum and scutellum reddish brown. Markings in male rather indistinct. Length 4.5 to 5.25 mm.

A common species on poplar and previously reported from New England.

M. ferrugineoides (Van Duzee). *Pediopsis ferrugineoides* Van Duzee. *Pediopsis bifasciata* Gillette and Baker.

Ent. Amer., v, 171, 1889.

Rusty brown, usually dark with a light band including the cross nervures of the elytra. Vertex and pronotum yellowish brown, scutellum darker. Length 5.5-6 mm.

Feeds on narrow-leaved willows. Professor Osborn has recorded it for Maine and it perhaps occurs in Connecticut.

M. trimaculata (Fitch). *Pediopsis trimaculata* Fitch. *Pediopsis insignis* Van Duzee.

Homop. N. Y. St. Cab., 60, 1851.

Dull brown, elytra with two or usually three white spots in a row on apical half of costa, nervures paler. Vertex and pronotum more yellowish brown, scutellum with darker basal angles. Length 4-4.25 mm.

This is reported from wild plum by Van Duzee. Three records are at hand.

Westville, 31 July, 1901; Hamden, 23 Aug., 1910 (W. E. B.); New Haven, 18 June, 1921 (B. H. W.); Cromwell, 27 Aug., 1920 (B. H. W.) on *Prunus pissardii*.

M. sordida (Van Duzee). *Pediopsis sordida* Van Duzee.

Can. Ent., xxvi, 89, 1894.

Rusty brown, often shading to yellow, elytra subhyaline in female with brownish areas. Male elytra often darker, chestnut brown. Vertex, pronotum and scutellum paler. Length 4.75-5 mm.

Reported from Maine by Professor Osborn, and its distribution should extend south and west of this locality.

Cornwall, 5 June, 1921, New Haven, 16 June, 1921 (B. H. W.). Both on willow.

Oncopsis Burmeister.

Bythoscopus Amyot and Serville.

Vertex short and broad, almost parallel margined, produced but obtusely angled. Pronotum produced anteriorly beyond the anterior margin of the eyes, the surface covered with transverse wrinkles or striations extending almost transversely across the pronotum. In this respect it is easily distinguished from *Macropsis* to which it is closely related. Elytra with a distinct appendix.

The members of this genus are arboreal and similar in that respect to all the genera of the Bythoscopinae except *Agallia*. Although one or two species are reported as collected from blueberry, feeding observations show them to be closely restricted to trees and shrubs such as birch, walnut, alder, hazel, etc.

The members of the genus are apparently single brooded, judging from numerous collecting records, the adults usually occurring in June and July.

Key to Species.

1. First sector branching so as to form five apical and three ante-apical cells 2
First sector branching but forming only four apical and two ante-apical cells *distinctus*
2. Last ventral segment of female notched or concavely rounded but without projecting teeth either side of notch 3
Last ventral segment notched, with projecting teeth more or less pointed either side of notch 6
3. Last ventral segment one-half longer than preceding, roundly produced from base, deeply notched at apex 4
Last ventral segment proportionately shorter, notch shallow 5
4. Face very strongly convexly inflated, color above black shining, unmarked *tumidifrons* n. sp.
Face moderately inflated, not bulbous, above pale or with pale markings, clavus usually conspicuously marked *variabilis*
5. Face black, notch broad and shallow giving segment a bilobed appearance *nigrinasi*
Face usually bright yellow, female segment rounded, posterior margin with small shallow notch *sobrius*
6. Last ventral segment of female triangular, produced medially, apical teeth usually distinct 7
Last ventral segment of female not medially produced, notch almost obsolete, teeth often missing or very small *cognatus*
7. Elytra dark, clouded, with whitish or hyaline areas 8
Elytra hyaline, nervures brown, apex clouded; vertex dark, a broad yellow band connecting ocelli *pruni*
8. Size large 4.5-5 mm., last ventral segment strongly produced medially forming two large distinct teeth *fitchi*
Size smaller, 4 mm., last ventral segment but slightly produced medially, teeth short, rather distant *minor*

O. variabilis (Fitch). *Athysanus variabilis* Fitch. *Athysanus abietis* Fitch. *Macropsis clitellarius* Provancher. (Fig. 5, 5a, b.)

Homop. N. Y. St. Cab., 60, 1851.

As the specific name indicates, a great variation in color is found in a series of specimens. Often sulphur-yellow with an oblique black line along claval suture. A common form on alder is rusty brown with clavus pale yellow. Length 5 mm.

Abundant on birch and alder.

Branford, 5 July, 1904 (P. L. B.); North Branford, 8 June, 1912; Hamden, 30 June, 1913 (B. H. W.); New Haven, 17 June, 1904 (H. L. V.); 28 May, 1905, 14 July, 1909 (B. H. W.); Suffield, 21 May, 1917 (M. P. Z.); Huntington, 9 July, 1920; Orange, 22 June, 1920, 17 July, 1920 (B. H. W.); Cornwall, 5 June, 1921 (B. H. W.).

***O. tumidifrons** DeLong, n. sp. (Fig. 6, 1-4.)

Size and form of *variabilis* which it resembles, but from which it differs by the greatly inflated face and its distinct coloration. Length 4.5 mm.

Vertex and pronotum similar in form to *variabilis*, very coarsely transversely striate, these striations are deeper and more pronounced than in any allied form. Face very strongly convexly inflated, appearing bulbous as seen from the side.

Color: Vertex, pronotum, scutellum and elytra black shining, unmarked, beneath rather bright pale yellow with ovipositor and a few faint spots on legs fuscous. Front black above from which

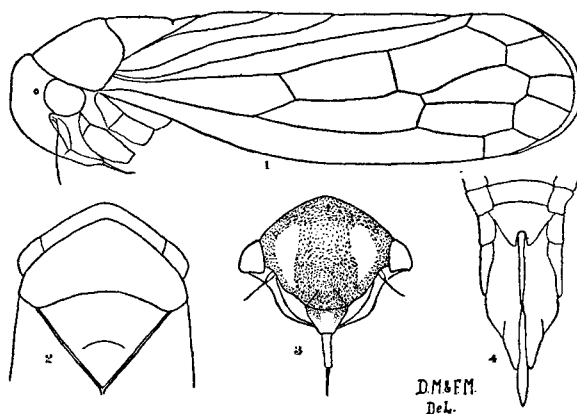


FIG. 6. *Oncopsis tumidifrons* DeLong.—(1) Lateral view. (2) Head, dorsal view. (3) Face. (4) Female genitalia. All greatly enlarged. Drawing by D. M. and F. M. DeLong.

a very broad black stripe extends across face, terminating on base of clypeus. Eyes margined with black and a narrow line extends along outer margin of face to clypeus, so as to form a large oval yellow area near either side.

Genitalia: Female last ventral segment one-third longer than preceding, roundly produced from base with a U-shaped notch extending one-third the way to base.

Described from a single female from North Branford, Conn., collected June 8, 1912, by B. H. Walden, and kindly sent to me by Doctor Britton. As compared with allied forms it seems to deserve specific treatment here in view of the differences cited above.

O. sobrius (Walker). *Bythoscopus sobrius* Walker.

List Homop., iii, 874, 1851.

Vertex, pronotum and scutellum bright yellow, elytra darker, tawny to brown. Commissural margin along clavus and nervures pale. Length 5 mm.

Both nymphs and adults have been taken on birch.

Hamden, 14 June, 1911 (W. E. B.); Branford, 13 June, 1918; Rainbow, 13 June, 1916 (B. H. W.); Cornwall, 5 June, 1921 (B. H. W.).

O. cognatus (Van Duzee). *Bythoscopus cognatus* Van Duzee.

Ent. Amer., vi, 226, 1890.

Ashy brown, suture of elytra alternated light and dark, front dark. Vertex, pronotum and scutellum reddish brown. Female segment slightly concave. Length 5 mm.

Reported as feeding on hazel in Maine.

Portland, 5 June, 1914 (B. H. W.); Lyme, 16 June, 1918 (M. P. Z. and B. H. W.); Cornwall, 5 June, 1921 (B. H. W.).

O. fitchi Van Duzee. *Athysanus fenestratus* Fitch.

Check List Hemip., 65, 1916; Homop. N. Y. St. Cab., 60, 1851.

Pale to reddish brown, elytra infuscated, with whitish hyaline spots, nervures or many of them often broadly brown. Ocelli connected by a yellow band, vertex and front darker, yellow to brown. Length 4.5 mm.

It feeds on birch and perhaps willow, a form very similar to *minor*.

North Branford, 8 June, 1912 (B. H. W.); Guilford, 26 July, 1926 (M. P. Z.).

O. pruni (Provancher). *Bythoscopus pruni* Provancher.

Pet. Faune Ent. Can., iii, 290, 1890.

Ash-colored, usually dark, face yellow, vertex with a black band. Elytra hyaline, veins black, a transverse band on cross nervures and apex of elytra dark. Length 4-4.5 mm.

A common species in early summer on wild plum and birch throughout the New England states.

New Haven, 7 July, 1920; Orange, 22 June, 1920; Portland, 25 July, 1920 (B. H. W.); Guilford, 13 July, 1920 (B. H. W.); Litchfield, 22 July, 1920 (P. G.); Westport, 24 June, 1921 (W. E. B.).

O. minor (Fitch). *Athysanus minor* Fitch. *Macropsis ocellatus* Provancher.

Homop. N. Y. St. Cab., 60, 1851.

Resembling *fitchi* but smaller, with elytra more uniform in color, either hyaline or brownish. Female segment slightly produced medially, with a pair of short teeth including a shallow notch. Length 4 mm.

Reported as feeding on birch. Specimens from Connecticut are labeled "birch."

New Haven, 21 June, 1909 (B. H. W.); 9 June, 1914 (Q. S. L.); Hamden, 30 June, 1913 (B. H. W.) (on birch); Rainbow, 13 June, 1916 (B. H. W.); Orange, 22 June, 1920 (B. H. W.).

O. nigrinasi (Fitch). *Athysanus nigrinasi* Fitch. *Pediopsis flavescens* Provancher.

Homop. N. Y. St. Cab., 61, 1851.

Variable in color, yellowish to brown, elytra marked as in *fenestratus*, subhyaline, with two more or less conspicuous brownish transverse bands. Front usually black, female segment bilobed. Length 4 mm.

Reported from New York on hornbeam, and from Maine on hazel and *Viburnum*. This conspicuously marked form should occur in Connecticut from June to August.

O. distinctus (Van Duzee). *Bythoscopus distinctus* Van Duzee. Ent. Amer., vi, 224, 1890.

Easily separated from the others of the genus by the two ante-apical and four apical cells. Elytra subhyaline with dark markings on basal half and apex. Vertex and pronotum yellowish, punctures coarse and black. Length 3.5-4.5 mm.

Reported by Van Duzee from *Populus* and *Quercus*. Practically all specimens collected by the author were from *Juglans nigra*, where it is commonly found both as nymph and adult.

Subfamily CICADELLINAE.

Tettigoniellidae.

This group as considered at the present time includes those forms which have the ocelli located on the disc of the vertex and the body cylindrical, not dorso-ventrally flattened. We find here a great diversity in head structure, and a considerable difference in wing venation. The species are usually quite large, the antennae are located in a rather deep cavity beneath a prominent ledge formed by the margin of the vertex.

The several species have a great diversity of food plants and feeding habits.

Key to Genera.

- 1. Ocelli on disc of vertex usually closer posterior than anterior margin, elytra long, covering posterior segments of abdomen. (Fig. 5, 1a.) 2
- Ocelli close to margin of vertex equidistant from apex and eyes, elytra short, apices well rounded, not covering posterior segments of abdomen **Evacanthus**, p. 80
- 2. Elytra narrow not covering lateral margins of abdominal segments, antennal sockets deep, overhung by a distinct ledge, head and pronotum usually deflexed, sloping. (Fig. 7, 1.) 3
- Elytra broader, covering lateral margins of segments, antennal sockets small, head and pronotum not deflexed, usually in straight line with scutellum and elytral suture. (Fig. 7, 2.) 4
- 3. Pronotum with posterior margin rounding, with slight median excavation, vertex rather deeply, longitudinally furrowed **Aulacizes**, p. 75
- Pronotum broadly roundly emarginate posteriorly, almost parallel with anterior margin, vertex without indication of longitudinal furrow. (Fig. 7, 1.) **Oncometopia**, p. 74
- 4. Elytra not reticulate veined at apex, head not greatly produced. (Fig. 7, 3.) 5
- Elytra reticulate veined on apical third, head produced, usually longer than pronotum. (Fig. 5, 1; Fig. 7, 4.) **Draculacephala**, p. 78
- 5. Vertex flat, margin of vertex sharp, angled with front **Graphocephala**, p. 77
- Vertex sloping to front, often conical, not sharp and more rounded to front 6

6. Vertex broad and pointed, reflexed portion of front elevated on disc and with conspicuous arcs. Pronotum more than twice as long as scutellum *Helochara*, p. 77
Vertex more narrowed and bluntly angled, often conical, when reflexed portion occurs it is not elevated. Pronotum not more than twice the length of scutellum 7
7. Vertex subconically narrowed, lateral margins in a continuous line with the outer margins of the eyes *Kolla*, p. 76
Vertex bluntly conical, lateral margins somewhat rounded not in a definite line with the outer margins of the eyes .. *Cicadella*, p. 76

Oncometopia Stål.

Proconia Amyot and Serville.

Head broader than pronotum, vertex rounding to front, obtuse, front gibbous. Pronotum broadly rounded in front, anterior and posterior margins almost parallel. Elytra narrow, lateral margins of abdomen exposed.

Key to Species.

1. Vertex black, irrorate with yellow, size small, 8 mm. 2
Vertex orange with black markings, size large, 12 mm. or more *undata*
2. Elytra red with black nervures *lateralis*
Elytra shining black *lateralis* var. *limbata*

O. undata (Fabricius). *Cicada undata* Fabricius. *Cicada orbona* Fabricius. *Proconia nigricans* Walker. (Fig. 7, 1.)

Ent. Syst., iv, 32, 1794.

Very large, robust, vertex and scutellum orange-yellow, each with a rather definite black color pattern. Pronotum orange-yellow anteriorly, marked with black; posterior portion darker, often slaty blue. Elytra long and narrow, reddish to slaty blue, apices yellowish subhyaline. Face bulbous, orange-yellow. Length 13 mm.

It has been reported for Massachusetts and should be found in Connecticut. Common in old pastures on New England aster.

O. lateralis (Fabricius). *Cercopis lateralis* Fabricius. *Cercopis marginella* Fabricius. *Tettigonia striata* Walker.

Ent. Syst., Suppl., 524, 1798.

Shorter and more robust than *undata*. Vertex black, margins of reflexed areas, posterior margin and a few small spots yellow. Pronotum coarsely striate and with numerous large yellow irrorations. Elytra reddish, veins and linear areas, black. Length 7-8 mm.

A very common form in low pastures and waste places on grasses and herbaceous plants.

O. lateralis var. *limbata* (Say). *Tettigonia limbata* Say. *Tettigonia septentrionalis* Walker.

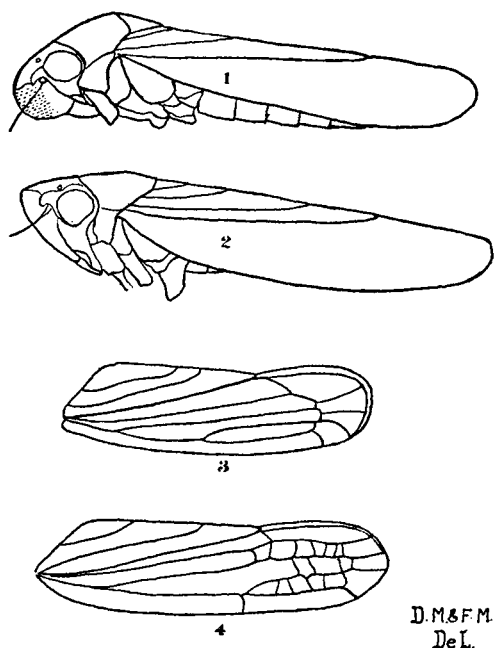
Jour. Acad. Nat. Sci. Phila., iv, 340, 1825.

Similar to preceding in structure, slightly smaller, black, shining, with a few pale irrorations on vertex, pronotum and scutellum,

elytra unmarked. Dorsal surface rather densely and coarsely pitted.

In old pastures and waste places.

Cornwall, 9 Nov., 1919, 25 March, 5 Dec., 1920, 15 Jan., 1921 (K. F. C.).



D. M. & F. M.
DeL.

FIG. 7. (1) *Oncometopia undata* Fabricius,—lateral view. (2) *Cicadella gothica* Signoret,—lateral view. (3) *Kolla bifida* Say,—elytron. (4) *Draeculacephala mollipes* Say,—elytron. All greatly enlarged. Drawing by D. M. and F. M. DeLong.

Aulacizes Amyot and Serville.

Tettigonia (Group II) Signoret.

Vertex moderately produced, obtuse, with a large longitudinal furrow, front gibbous, pronotum roundly 6-angular, elytra not covering lateral segments of abdomen.

A. irrorata (Fabricius). *Cicada irrorata* Fabricius. *Cicada nigripennis* Fabricius. *Aulacizes rufiventris* Walker.

Ent. Syst., iv, 33, 1794.

Very large, pale brown to blackish, vertex, pronotum and elytra finely irrorate with pale yellow. Vertex and pronotum very rugose, a deep median furrow and one next either ocellus on vertex. Length 11-12.5 mm.

Occurs in New York and no doubt will be found in Connecticut.

Cicadella Latreille.**Tettigonia** Reaumur.**Tettigoniella** Jacobi.

Head bluntly conical, ledge over antennal pit not prominent. Vertex rounding to front. Elytra covering lateral segments of abdomen, venation not reticulate. No doubt only one species occurs in New England.

C. gothica (Signoret). *Tettigonia gothica* Signoret. *Tettigonia similis* Woodworth. (Fig. 7, 2.)

Ann. Soc. Ent. Fr., Ser. 3, 345, 1854.

Vertex produced but very blunt, pale marked with black or dark brown. Margins of reflexed portions, spot at apex, two longitudinal lines close median line on posterior portion and a somewhat curved one toward each eye, black. Pronotum and elytra variable in color, reddish to grayish green, the latter faintly obliquely striped. Length 5.5-6 mm.

Common on shrubs and undergrowth, in pastures, swampy meadows, and in woodland.

Westville, 19 Sept., 1904 (W. E. B.); New Haven, 26 Feb., 1911 (A. B. C.); 22 Sept., 1918 (F. H. L. and D. M. D.); 20 Aug., 1920; 3 Oct., 1920 (B. H. W.); Hamden, 14 June, 1911 (W. E. B.); 20 June, 1920 (B. H. W.); East Hartford, 16 Sept., 1920, Killingworth, 31 May, 1920 (B. H. W.); Cornwall, 20 June, 1920 (K. F. C.).

Kolla Distant.

Vertex subconically narrowed anteriorly, with lateral margins in a line with outer margins of the eye, vertex foveate near inner margins of eyes. Lateral areas of face strongly, transversely striate.

Key to Species.

1. Vertex short, almost twice as wide as long, elytra green with black stripes *bifida*
- Vertex longer, almost as long as basal width, elytra white with dark stripes *tripunctata*

K. bifida (Say). *Tettigonia bifida* Say. *Tettigonia tenella* Walker. (Pl. ii, 2.) (Fig. 7, 3.)

Jour. Acad. Sci. Phila., vi, 313, 1831.

Vertex with two black and two white transverse bands, alternating. Pronotum green with a black band bordered by a white one on anterior and posterior margins, disc green. Elytra green, veins broadly black, tips smoky. Face black. Length 5.5-6 mm.

Common on grasses and low plants throughout the summer, an abundant species in swampy woods, pastures, meadows and along streams. It has also been taken on vines in wooded areas.

Branford, 28 July, 1905 (H. L. V.); Stafford, 23 Aug., 1905 (W. E. B.); New Haven, 3 Oct., 1920, Portland, 25 July, 1920 (B. H. W.); Guilford,

24 July, 1921 (B. H. W.); North Haven, 6 Aug., 1922 (B. H. W.); New Canaan, 26 Aug., 1920 (B. H. W.); Cornwall, 18 July, 1921 (B. H. W.); Salisbury, 20 Aug., 1921 (P. G.).

K. tripunctata (Fitch). *Tettigonia tripunctata* Fitch. *Pagaronia tripunctata* Van Duzee. (Pl. ii, 1.)

Homop. N. Y. St. Cab., 55, 1851.

Vertex rather long, conically pointed, white with three black spots, one at apex and one around either ocellus; reflexed arcs brownish. Two transverse lines on disc and posterior margin of pronotum, and elytral nervures brown. Length 5 mm.

Occurs on *Muhlenbergia* and allied grasses, especially in wooded areas during July, August and September. Mr. Van Duzee has placed this species under *Pagaronia* but it seems more closely allied with members of this genus.

Lyme, 20 Aug., 1910 (B. H. W.); New Haven, 22 Sept., 1918 (D. M. D. and F. H. L.); 16 July, 1920 (B. H. W.); Bridgeport, 20 Sept., 1920; Cornwall, 22 Oct., 1920; East Haven, 21 July, 1920; Hamden, 24 July, 1920; Huntington, 9 July, 1920; North Branford, 13 July, 1920 (B. H. W.); Madison, 24 Sept., 1922 (B. H. W.); North Haven, 24 Sept., 1921 (B. H. W.).

Helochara Fitch.

Head wider than thorax, broader than long, obtusely angled, reflexed portion of front elevated. Scutellum very short, elytra coriaceous, veins distinct. Apical third of male antennae forming a flat plate.

One species occurs in the United States.

H. communis Fitch.

Homop. N. Y. St. Cab., 56, 1851.

Deep green, vertex and pronotum yellowish; robust, upper surface deeply and closely pitted, reflexed portions of front elevated on vertex. Posterior portion of pronotum convex, scutellum very small. Elytra greenish, heavily pitted, claval suture broadly dark green. Length 4-4.5 mm.

A very common species occurring in swamps and moist places, feeding on grasses and sedges along lakes, streams and lagoons.

Rockville, 24 Aug., 1905 (H. L. V.); Meriden, May, 1913 (H. L. J.); Guilford, 13 July, 1920; Wilton, 19 Oct., 1920; New Haven, 8, 13, 18, 27, 28 July, 1920, 25 March, 1921 (B. H. W.); Cornwall, 28 Nov., 1918 (K. F. C.); 18 July, 1921 (B. H. W.); East Haven, 29 July, 1921 (B. H. W.).

Graphocephala Van Duzee.

Diedrocephala Woodworth.

Head narrower than pronotum, vertex flat, roundly angulate. Pronotum strongly curved in front. Elytra long, coriaceous, venation obscured.

G. coccinea (Foerster). *Cicada coccinea* Foerster. *Tettigonia quadrivittata* Say. *Tettigonia picta* Walker.

Nov. Spec. Ins., 69, 1771.

Vertex yellow to orange, black margined, pronotum reddish, posterior margin with a central tooth and one next either side greenish. Elytra red, costal and sutural margins, a broad stripe along claval suture, and another on disc almost to apex, green or bluish green. Length 8-9 mm.

An abundant and widely distributed form occurring on a number of plants. Especially found on undergrowth in wooded areas. Blackberry apparently is a choice food plant.

New Haven, 18, 27, 28 June, 1902 (E. J. S. M.); 6 Oct., 1902, 23 Oct., 1903, 4 July, 1905, 29 June, 1910 (B. H. W. and H. L. V.); 6 Aug., 1904 (P. L. B.); 3 July, 1913 (L. B. R.); 22 Sept., 3 Oct., 1920 (B. H. W.); Yalesville, 19 Oct., 1903 (H. L. V.); West Haven, 29 June, 1905 (W. E. B.); Portland, 10 July, 1913 (A. E. Moss); Stonington, 2 July, 1914 (I. W. D.); Stratford, 1 Sept., 1920 (B. H. W.); Danbury, 29 Aug., 1920 (B. H. W.); North Branford, 6 July, 1921 (B. H. W.); North Haven, 6 Aug., 1922 (B. H. W.); Greenwich, 24 June, 1921 (W. E. B.); Westport, 24 June, 1921 (W. E. B.); Hamden, 12 July, 1922 (W. E. B.); Stratford, 1 Sept., 1920 (B. H. W.).

G. coccinea var. **teliformis** (Walker). *Tettigonia coccinea* var. *teliformis* Walker.

List. Homop., iii, 764, 1851.

Differs from preceding only slightly in coloration.

Danbury, 29 Aug., 1920 (B. H. W.); Branford, 3, 24 Aug., 1904 (H. W. W.); Durham, 10 Aug., 1922 (M. P. Z.); Easton, 6 July, 1922 (M. P. Z.); Hamden, 12 July, 1922 (W. E. B.); 16 Aug., 1922 (B. H. W.); Kent, 10 Aug., 1918 (B. H. W.); Cornwall, 19 July, 1920 (K. F. C.); North Branford, 5 July, North Haven, 4 Sept., 1921 (B. H. W.).

Draeculacephala Ball.

Vertex usually long and angled, face as seen from side usually straight, front angled with the vertex. Elytra long, greenish, venation distinct, apical and anteapical cells reticulate veined.

The members of this genus are found especially abundant in low swampy land, and feed upon coarse grasses and sedges.

Key to Species.

1. Vertex long, acute, in female decidedly acutely angled 2
Vertex shorter, obtuse, slightly more than right angled 4
2. Vertex one-half longer than pronotum, males usually light beneath, length 7 mm. or more 3
Vertex as long as pronotum, male black beneath; length 6 mm. **minor**
3. Vertex distinctly marked, pronotum with three distinct pale longitudinal lines, length 7 mm. (Fig. 5, 1.) **mollipes**
Vertex poorly marked, pale longitudinal lines on pronotum wanting, length 9-10 mm. **angulifera**
4. Anterior margin of pronotum with vermiculate dark markings, length 7 mm. **inscripta**
Anterior margin of pronotum without vermiculate dark markings, vertex with dark markings, length 8 mm. **noveboracensis**

D. angulifera (Walker). *Tettigonia angulifera* Walker.

List. Homop., iii, 771, 1851.

Vertex slightly shorter than pronotum, broad, yellow with heavy black lines. Spots at apex, median line, lines next eye and reflexed arcs dark in color. Front quite strongly inflated. Length 9-10 mm.

A common form on grasses, river bulrush, in the New England States. It usually is found feeding in low meadows or swamps in moist habitats.

Stafford, 24 Aug., 1905 (W. E. B.).

D. mollipes (Say). *Tettigonia mollipes* Say. *Tettigonia antica* Walker. *Acopsis viridis* Provancher. (Fig. 5, 1; Fig. 7, 4.)
Jour. Acad. Nat. Sci. Phila., vi, 312, 1831.

Vertex longer than pronotum, acutely angled, yellow with fine black lines, often almost uniform yellowish, spots at apex usually distinct. Elytra dark green, nervures conspicuous. Length 6.5-7.5 mm.

The common species of the genus found on numerous grasses and sedges in swamps and uplands.

New Haven, 3 Oct., 1902; 16, 21 Oct., 1903; 20 Aug., 1909 (B. H. W.); 9 Nov., 1903 (H. L. V.); 22 Sept., 1918 (F. H. L. and D. M. D.); 24 May, 3 Oct., 1920 (B. H. W.); Yalesville, 19 Oct., 1903 (H. L. V.); Salisbury, 30 Aug., 1904 (W. E. B.); East River, 10 July, 1909 (C. R. E.); Stamford, 16 Aug., 1912 (W. E. B.); Bridgeport, 20 Sept., 1920; Cornwall, 22 Oct., 1920; Guilford, 13 July, 1920; Orange, 15 Sept., 1920; Portland, 25 July, 1920 (B. H. W.); Cheshire, 10 Aug., 1921 (B. H. W.); East Haven, 29 July, 1921 (B. H. W.); Hamden, 25 Sept., 1921, 28 May, 1922 (B. H. W.); Killingworth, 31 May, 1920 (B. H. W.); Madison, 24 Sept., 1922 (B. H. W.); Marlborough, 15 July, 1922 (B. H. W.); Milford, 2 May, 1921 (B. H. W.); North Branford, 1 Aug., 1922 (B. H. W.); North Haven, 6 Aug., 1922 (B. H. W.); Waterbury, 15 Oct., 1920 (B. H. W.); Wilton, 19 Oct., 1920 (B. H. W.).

D. inscripta Van Duzee.

Ent. News, xxvi, 178, 180, 1915.

Dull green, vertex heavily lined with broad black lines, pronotum a fourth longer than vertex with heavy vermiculate black markings on anterior third. Scutellum with two round black spots and a transverse black dash on disc. Female segment produced, slightly notched at apex. Length 7 mm.

Found on *Muhlenbergia* sp. in swamps and occurs in great numbers as adults during August and September. Has now been found in Tennessee, Ohio, Pennsylvania and New York in addition to Georgia, its type locality.

D. minor (Walker). *Tettigonia minor* Walker. *Diedrocephala producta* Van Duzee.

List. Homop., iii, 772, 1851.

Shorter than *mollipes*, vertex more obtuse, as long as pronotum, with fine black lines. Male black beneath. Length 6 mm.

Resembles *mollipes* very closely, and is often confused with it, being found in similar habitats.

New Haven, 22 Sept., 1918 (F. H. L.); 3 Oct., 1920 (B. H. W.); Wilton, 19 Oct., 1920 (B. H. W.); Cornwall, 18 July, 1921 (B. H. W.); Hamden, 25 Sept., 1921 (B. H. W.); North Haven, 4 Sept., 1921 (B. H. W.); East Haven, 29 July, 1921 (B. H. W.).

D. noveboracensis (Fitch). *Aulacizes noveboracensis* Fitch.
Tettigonia prasina Walker.

Homop. N. Y. St. Cab., 56, 1851.

Vertex shorter than basal width, obtuse, a very heavy black spot either side of apex, and somewhat smaller one on margin just before either eye; lines and other markings rather faint. Length 8 mm.

Common in New England in marshy meadows.

Salisbury, 30 Aug., 1904 (W. E. B.); Cheshire, 8 July, 1904 (H. L. V.); Colebrook, 21 July, 1905 (H. L. V.); Hamden, 17 July, 1920; New Haven, 17, 18, 27 July, 1920; North Branford, 13 July, 1920 (B. H. W.); Cornwall, 18 July, 1920 (B. H. W.); Guilford, 13 July, 1920 (B. H. W.); North Haven, 6 Aug., 1922 (B. H. W.); Thompson, 19 July, 1921 (B. H. W.).

Evacanthus LePeletier and Serville.

Eucanthus Burmeister.

Vertex very blunt, with a central longitudinal keel, and a branch of this each side from apex to eye. Ocelli just above this keel, close margin and distant from eyes. Front inflated, longitudinally carinate. Elytra short, pubescent above.

E. acuminatus (Fabricius). *Cicada acuminatus* Fabricius.
Cicada interstincta Fallen; *Amblycephalus germari* Curtis;
Amblycephalus orbitalis Fitch.

Ent. Syst., iv, 36, 1794.

A robust species with very blunt head and rather short elytra, not covering abdomen in female. Vertex with median carina and one from apex to either eye. Pronotum short, pubescent. Elytra blackish or dark brown with white stripes. Sparse pubescence along nervures. Length 5.5-6.5 mm.

Occurs sparingly in woodland on low plants. Often found resting on old logs in thick woods.

Subfamily GYPONINAE.

Scarides Amyot and Serville.

To this subfamily belong those forms with the ocelli on the disc of vertex and in which the body is decidedly dorso-ventrally flattened. Usually broad and flat.

Key to Genera.

1. Head more or less flattened but not thin or foliaceous, margin of vertex very narrowly sharp, elytra not perpendicular at tips. (Fig. 5, 2.) 2
- Head flat, foliaceous, margin broadly thin and sharp, elytra angularly pointed, perpendicular at tips **Xerophloea**, p. 84

2. Very short and broad (almost as broad as long), clavus broadly truncate at apex**Penthimia**, p. 81
Broad elongate, clavus not truncate at apex**Gypona**, p. 81

Penthimia Germar.

Vertex very short and broad, including eyes, narrower than pronotum. Elytra broad, very short, exceeding abdomen in length, appendix broad. Only one species is known in the United States.

P. americana Fitch. *Penthimia vicaria* Walker. *Penthimia picta* Provancher.

Homop. N. Y. St. Cab., 57, 1851.

Resembling a "Cercopid" of the genus *Clastopera*. Black to reddish brown, vertex broadly rounded, transversely striate; pronotum transversely striate. Elytra short, very broad, rather narrowly rounded at apex. Appendix broad. Length 5-6 mm.

Occurs on oak, hickory and other shrubs during early summer.

New Haven, 27 June, 1902 (E. J. S. M.); 21 May, 1910 (A. B. C.); 11 June, 1914 (B. H. W.); 9 June, 1914 (Q. S. L.); Westville, 19 June, 1904 (W. E. B.); Scotland, 27 July, 1904 (B. H. W.); Portland, 5 June, 1914 (M. P. Z.); Stonington, May, 1914 (I. W. D); Ansonia, 26 May, 1918 (M. P. Z.); Branford, 8, 13 June, 1918 (B. H. W.); Hamden, 18 June, 1919 (M. P. Z.); Middlebury, 20 June, 1916 (M. P. Z.); Milford, 22 June, 1917 (M. P. Z.).

Gypona Germar.

Usually large, body broad and oval. Head broad, rather short, flattened, usually well rounded anteriorly and often margin with a thin edge. Elytra broad, moderately long.

Members of this group commonly feed on grasses, and often are taken from shrubs on which they feed.

The genus has recently been revised by Dr. Ball and although the subgenus names are not used, the synonymy and arrangement has been followed in this treatment.

Key to Species.

- | | |
|--|--------------------|
| 1. Vertex acutely angled with front, margin rather thin and foliaceous | 2 |
| Vertex rounding to front, or with margin thick and not foliaceous | 6 |
| 2. Elytra usually reticulate, some shade of green with few markings | 3 |
| Elytra not reticulate usually brownish or with black markings | 5 |
| 3. Elytra rather smooth, female segment concavely rounding | 4 |
| Elytra strongly rugose, female segment rectangularly emarginate | |
| 4. Clavus of elytra usually reticulate, and more or less scarlet coloration upon reticulations. Vertex and pronotum with scarlet stripes | octolineata |
| Clavus of elytra usually not reticulate, no scarlet color on elytra, vertex and pronotum with six orange or yellow stripes ...var. | striata |
| 5. Form broad and rather short, above black shining, or greenish with a black spot on pronotum behind either eye | melanota |
| More elongate, vertex very long, cinereous in color, female segment bisinuate | cinerea |

6. Vertex, pronotum and elytra usually with bright red irrorations,
 general color brownish *scarladina*
 Without red markings, elytra yellowish or greenish marked with
 smoky bands and two round black spots on disc of each
var. *pectoralis*

G. octolineata (Say). *Tettigonia octolineata* Say.

Jour. Acad. Nat. Sci. Phila., iv, 340, 1824.

Large, oval, green, vertex and pronotum usually with six to eight longitudinal stripes varying from pale yellow to deep red, often broadened to make these appear almost uniform reddish. Vertex broadly rounded, varying somewhat in length. Elytra greenish with a variable venation, many or few cross veins, and variable in color from greenish or pale yellow to deep red. Length 8-10 mm.

This species has been cited under numerous names, but all of these no doubt belong under *octolineata*. Although the structural characters vary greatly, in a long series, no sharp lines of limitation can be given to so-called species under names given below.

It occurs on coarse grasses in meadows, pastures, swamps and practically all moist grassy areas. A very common species which causes great drain to the various grass crops by its constant feeding throughout the summer. It is also found feeding on shrubs and trees, and the egg punctures are frequently found on apple and other twigs. Two rather distinct broods have been noted, an early and late summer brood.

From records it seems to be well distributed in the state.

New Haven, 20 July, 1897 (W. C. Sturgis); 18 June, 1902 (E. J. S. M.); 21 July, 7 Sept., 1910, 28 June, 1911 (W. E. B.); 12 Aug., 1912, "at light"; 27 Aug., 1912 (H. B. K.); Branford, 21 July, 1905 (H. W. W.); Westville, 9 Sept., 1907 (W. E. B.); Wallingford, 3 Aug., 1910 (D. J. C.); Portland, 20 July, 8, 9, 15 Aug., 1913 (B. H. W.); East River, 6 Aug., 1910 (C. R. E.).

G. octolineata var. *octolineata* Say.

This variety is usually distinguished by heavier reticulation of the elytra. Also with scarlet stripes on vertex and pronotum and reticulations of elytra often washed with scarlet.

New Haven, 6 Oct., 1902, 22 Sept., 3 Oct., 1920 (B. H. W.); South Glastonbury, 12 Oct., 1905 (B. H. W.); Ellington, 25 Sept., 1920 (B. H. W.).

G. octolineata var. *striata* Burmeister. *G. cana* Burmeister. *G. flavilineata* Fitch. *G. quebecensis* Provancher. *G. scrupulosus* Spangberg. *G. olivacea* Spangberg. *G. geminata* Osborn.

A rather bright greenish yellow form with six yellowish stripes on vertex and pronotum. The venation is somewhat variable but usually the reticulations are confined to the apical part of the wings. Female segment rounded. Length 10 mm.

New Haven, 14 July 1909 (B. H. W.).

G. rugosa Spangberg. *G. ramosa* Kirkaldy. *G. delicata* Fowler.
Spec. Gyponae, 6, 1878.

Large green species with vertex, pronotum and elytra rugose, venation very conspicuous. Some specimens have black spots on pronotum. Female segment deeply rectangularly notched. Length 10-11 mm.

Superficially it resembles *octolineata* but is coriaceous on upper surface and is known to feed on burr and white oak.

Hartford, 27 July, 1914 (W. A. Muirhead).

G. melanota Spangberg. *G. bipunctulata* Woodworth. *G. nigra* Woodworth. *G. bimaculata* Gibson. *G. unicolor* Gibson.

Spec. Gyponae, 19, 1878.

Broad and short. Color of sexes differing. Female pale green, often with a pair of round black spots on pronotum back of the eyes, and a second pair on the hinges. Male varying from green to black. Vertex, pronotum and scutellum usually shining black, elytra smoky, the black markings of abdomen showing through. Female segment nearly truncate, male plates broad and short. Length 8 mm.

According to Ball there are five color varieties of the male which have been described as distinct species. The species is grass-feeding and found in meadow, pasture and prairie situations.

New Haven, 9 Aug., 1906 (P. L. B.); 14 Aug., 1906 (W. E. B.); 31 July, 22 Aug., 1920 (B. H. W.); Hamden, 20 Aug., 1922 (B. H. W.); North Haven, 6 Aug., 1922 (B. H. W.); Guilford, 24 July, 1921 (B. H. W.); Cornwall, 17 July, 1921 (B. H. W.).

G. cinerea Uhler.

Bull. U. S. Geol. Geog. Surv. Terr., iii, 460, 1877.

Gray to brown, vertex produced but not acutely angled. Entire dorsal surface often finely and rather sparsely irrorate with brown. In pale specimens nervures of elytra margined with irrorations. Elytra grayish opaque. Length 9 mm.

Although Dr. Ball states that probably all eastern references should be *miliaris*, after examining Connecticut material and comparing it with Iowa and Dakota material it seems advisable to place it under this name. Also since *negotiosa* Gibson is placed as a synonym of *miliaris* and the specimens at hand do not agree with Gibson's paratypes. This is apparently a grass-feeding species.

Recorded from Connecticut (Van Duzee Catalogue), also specimens examined from Hamden, 5 July, 1920 (P. G.).

G. scarlatina Fitch var. *scarlatina* Fitch. *G. modesta* Spangberg. Homop. N. Y. St. Cab., 57, 1851.

Pale yellow to brown with vertex, pronotum and elytra usually flecked with red. Elytra frequently with reddish nervures and sparsely spotted, a number of irregular darker spots on disc. Length 9-10 mm.

This species has been taken from undergrowth in wooded areas.

G. scarlatina var. **pectoralis** Spangberg. *G. hullensis* Provancher.
G. bimaculata Woodworth. *G. woodworthi* Van Duzee.
 (Fig. 5, 2, a, b.)

Spec. Gyponae, 46, 1878.

Dull greenish shading to brown. An indefinite smoky band arising on posterior margin of pronotum and extending to apex of elytra, costal margins yellowish. Usually four black spots, often very small on elytra. Vertex and pronotum pale, often a pair of pale spots behind eyes on vertex. Length 8-9 mm.

Common in the eastern part of United States on trees and shrubs. According to Ball it occurs on water sprouts and lower limbs of Basswood.

New Haven, 18 June, 1902 (E. J. S. M.); 8 Aug., 1920 (B. H. W.); North Branford, 16 June, 1922 (B. H. W.).

Xerophloea Germar.

Mesodicus Fieber.

Parapholis Uhler.

Wedge-shaped in appearance. Vertex broad, flat, anterior margin thin. Elytra long, angularly pointed and perpendicular at tips. Dorsal surface coarsely and rather densely pitted.

These species live in dry habitats and are more abundant in arid regions. They are common on the prairie grasses of the west, and are found in dry, restricted areas in the south and eastern United States.

Key to Species.

1. Vertex with margin broadly rounded, length less than 7 mm. . . *viridis*
 Vertex with margin more angulate, size large, more than 7 mm. **major**

X. viridis (Fabricius). *Cercopis viridis* Fabricius. *X. grisea* Germar. *X. virescens* Stål. *Parapholis peltata* Uhler.

Ent. Syst., iv, 50, 1794.

Vertex broadly rounded and flattened, often with shallow longitudinal depressions. Greenish to dirty yellow, often a median stripe on vertex and posterior portion of pronotum dark brown. Vertex, pronotum and scutellum deeply and heavily pitted. Elytra perpendicular at apices, clavus and costal areas pitted, otherwise hyaline, nervures distinct. Length 6-7 mm.

Often found in dry upland grassy areas, and occurs on *Aristida gracilis* society. A widely distributed form.

X. major Baker.

Psyche, viii, 285, 1898.

General appearance of *viridis*, but larger with vertex more angulate and more strongly produced. Dorsal surface pitted as in preceding. Bright green to dull yellow often marked with brown. Elytra hyaline on central and apical portion. Length 7-8 mm.

Found in same habitat as preceding.

New Haven, 5 July, 1920 (B. H. W.).

Subfamily JASSINAE.

Jassides.

The great number of leafhoppers with the ocelli located on the margin of the vertex where such is definite or on that portion of the head between the vertex and front when there is no perceptible limit to either, are included in this family.

Key to Tribes.

- 1. Elytral nervures branching on the disc, ocelli on or near margin of vertex. (Fig. 8, 6.) 2
Elytral nervures not branching on the disc, branched at base, ocelli often wanting. (Fig. 8, 5.) **Typhlocybini**, p. 147
- 2. Ocelli on vertex near margin, or between vertex and front, and remote from the eyes. (Fig. 8, 3.) **Acucephalini**, p. 85
Ocelli on margin between vertex and front, usually very close to eyes. (Fig. 8, 2.) **Jassini**, p. 89

Tribe ACUCEPHALINI.

Vertex and face distinctly separated, generally by a well-defined margin, the ocelli on or adjoining margin, or margin being absent, on rounded portion between front and vertex. Appendix very narrow or wanting.

Key to Genera.

- 1. Vertex rather flat with acute edge forming definite limitations of vertex and front. (Fig. 8, 4.) 2
Vertex sloping and rounding to front, without definite margin. (Fig. 8, 3.) 3
- 2. Vertex transversely striate in front, elytra narrowly rounded at apex **Stroggylocephalus**, p. 85
Vertex not transversely striate in front, more broadly rounded at apex. (Fig. 8, 4.) **Acucephalus**, p. 86
- 3. Pronotum gently rounded, not produced to anterior margin of eyes, vertex moderately long, well rounded. (Fig. 8, 3a, b.) .. **Xestocephalus**, p. 87
Pronotum strongly rounded, produced almost half its length beyond anterior margin of eyes. Head very short, acutely conical. (Fig. 8, 1.) **Nionia**, p. 89

Stroggylocephalus Flor.

Vertex produced, obtusely angled, transversely striate in front. Margin thin, foliaceous, ocelli close to front margin. Elytra coriaceous, narrowly rounded at apex, appendix wanting.

S. agrestis (Fallen). *Cicada agrestis* Fallen. *Tettigonia mixta* Say.

Acta Holm, xxvii, 23, 1806.

Grayish yellow to brown, frons black finely irrorate with pale brown. Vertex striate in front, smooth at base. Pronotum transversely striate, brownish. Elytra with inner margins, bars and

spots along nervures, and costa with twelve or more spots, brown or black. Female paler with few markings. Last ventral segment concave, notched at middle. Length 6-7 mm.

Occurs in moist grassy areas.

New Haven, 13 May, 1911, 25 March, 1921 (B. H. W.).

Acucephalus Germar.

Aphrodes Curtis.

Pholetaera Zetterstedt.

Anoscopus Kirschbaum.

Vertex obtusely angular, produced, in female generally tricarinate. Ocelli on front margin a little nearer the eyes than the apex.

Key to Species.

1. Larger, 6.5 mm. in length, vertex thin at edge, disc rather concave, pronotum exceeding vertex in length **nervosus**
2. Smaller, not exceeding 6 mm. in length, vertex with edge thickened, disc scarcely depressed, vertex as long as pronotum **albifrons**

A. nervosus (Schrank). *Cicada nervosus* Schrank. *Cercopis rustica* Fabricius. *Cercopis striata* Fabricius. (Fig. 8, 4.)

Enum. Ins. Aust., 252, 1781.

A rather broad flat-headed species varying in color from greenish to brown. A yellow transverse band is conspicuous on pronotum of male. Females usually light, speckled with brown. Length 5-6 mm.

Common on grasses in New England, and often collected with the *Cercopidae* which it resembles in general appearance.

New Haven, 11 July, 1920 (B. H. W.).

A. albifrons (Linnaeus). *Cicada albifrons* Linnaeus. *Acucephalus circumflexus* Provancher.

Syst. Nat., Edn. 10, i, 437, 1758.

A smaller form than *nervosus*, variable in color, yellowish to brown, males with white spots on elytra often in the form of large blotches or transverse bands. Elytra shortened in males usually exposing tip of abdomen. Front pale. Length 3-4 mm.

A common species on low grasses. This species is now known to live partially under the ground or in little depressions around the roots of grasses. It is single brooded, the adults being found in late July, August and September.

Hamden, 24 July, 1910; New Haven, 30 July, 1909, 23 July, 1910 (B. H. W.); 16 July, 31 July, 1920 (B. H. W.); Branford, 21 July, 1920, East Haven, 21 July, 1920 (B. H. W.); Guilford, 26 July, 1920 (M. P. Z.); Cornwall, 18 July, 1921 (B. H. W.); North Branford, 5 July, 1921 (P. G.).

Xestocephalus Van Duzee.

Small ovate, head subconical, narrower than pronotum, vertex sloping. Ocelli just above anterior edge and distant from the eyes. Elytra somewhat rugose, without appendix, and with five apical areoles.

The species of the genus feed on grasses and sedges and are usually found only in swampy or very moist places.

Key to Species.

- 1. Color brown, elytra brownish, usually with dark markings 2
Color black, vertex often a uniform dark brown, face distinctly black, elytra with pale spots at the apex, length 3 to 3.5 mm. ... **nigrifrons**
- 2. Vertex uniformly brown, unmarked or with faint brownish markings 3
Vertex brown with inscribed yellow markings, pronotum and elytra dark with conspicuous pale spots **pulicarius**
- 3. Species large, 3.5 mm., vertex and pronotum rather uniform brownish, elytra mottled **superbus**
Species smaller, 2 mm. in length, entire insect a pale brown color, seldom marked with spots **brunneus**

X. pulicarius Van Duzee. (Fig. 8, 3.)

Bull. Buff. Soc. Nat. Sci., v, 197, 215, 1894.
Small, yellowish to brown, vertex with heavy brown vermiculate markings. Pronotum brown with numerous pale blotches. Scutellum brown. Elytra yellowish hyaline with nervures and mottling brown, leaving round pale areas. Length 2.5-3 mm.
Occurs in New England on *Carex*, and is abundant in swampy or moist and sometimes dry meadows, July to September.

New Haven, 27 July, 3 Aug., 1920 (B. H. W.).
X. superbus (Provancher). *Deltocephalus superbus* Provancher.
X. fulvocapitatus Van Duzee.

Pet. Faune Ent. Can., iii, 339, 1890.
Rather large, vertex uniform pale brown, pronotum often darker, slightly mottled with pale. Elytra yellowish hyaline, marked with rather large brownish areas, apices broadly brown, veins pale, indistinct. Length 3 mm.
Feeds on *Carex* and should occur in swamp habitats in Connecticut.

New Haven, 27 July, 1920 (B. H. W.).

X. nigrifrons Osborn.

Me. Agr. Expt. Sta., Bull. 238, 109, 1915.
Size of *superbus*, vertex, pronotum, scutellum and face black shining or often very dark brown, unmarked. Elytra black shining, opaque, with very few pale areas, when present occurring only on apical portion. Length 3 mm.
Described from Maine and known to occur in Tennessee and Pennsylvania. Taken in low marshy places and undoubtedly has a food plant similar to allied species.

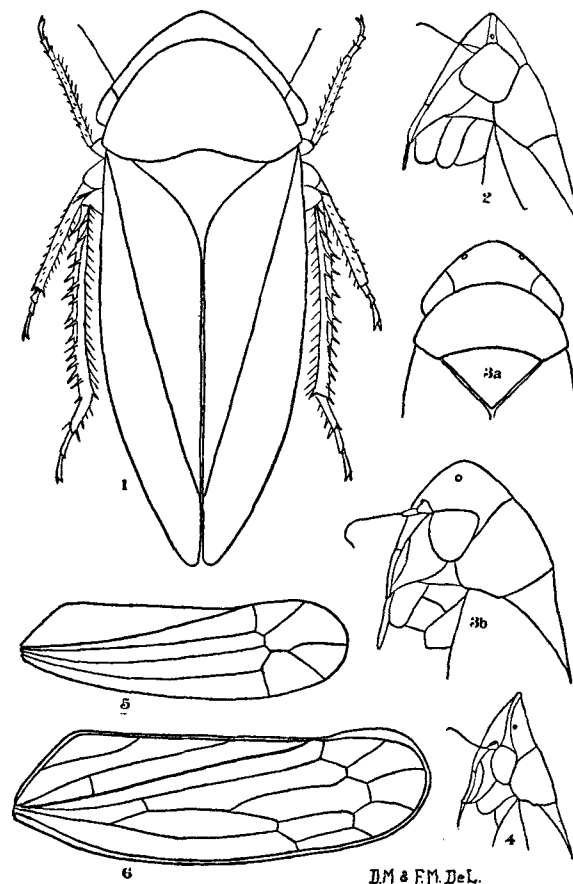


FIG. 8. (1) *Nionia palmeri* Van Duzee,—dorsal view. (2) *Scaphoideus auronitens* Provancher,—head, lateral view. (3a) *Xestocephalus pulicarius* Van Duzee,—head, dorsal view; (3b) same, lateral view. (4) *Acucephalus nervosus* Schrank,—head, lateral view. (5) *Empoa querci* Fitch,—elytron. (6) *Euscelis parallelus* Van Duzee,—elytron. All greatly enlarged. Drawing by D. M. and F. M. DeLong.

X. brunneus Van Duzee.

Bull. Buff. Soc. Nat. Sci., viii, 62, 1907.

A very minute brown species with few pale markings. Face, vertex, pronotum and scutellum uniform pale brown unmarked, elytra brownish hyaline, appearing darker over abdomen, marked with two rather faint paler bands just back of clavus. Length 2 mm.

Reported from Massachusetts and Rhode Island, and perhaps is widely distributed throughout New England on *Carex* and small sedges.

Nionia Ball.

Goniagnathus Van Duzee.

Vertex short, apex obtusely angled. Ocelli on anterior margin distant from eyes. Anterior margin of pronotum produced beyond anterior margin of eyes.

N. palmeri (Van Duzee). Goniagnathus palmeri Van Duzee. (Fig. 8, 1.)

Can. Ent., xxiii, 171, 1891.

Short, robust, head conically pointed, anterior margin of pronotum extending beyond anterior margin of eyes. Black shining, resembling a Macropsis in general appearance. Length 4 mm.

Perhaps occurs on grasses in Connecticut, usually quite common in old pastures and waste places on herbaceous plants.

North Branford, 2 June, 1921, 23 May, 2-5 June, 1 Aug., 1922 (B. H. W.); 5 July, 1921 (P. G.).

Tribe JASSINI.

Jassidae.

Ocelli on margin of vertex usually very close to eyes.

Key to Genera.

- | | |
|---|-----------------------|
| 1. Vertex produced, anterior edge sharp, often flattened, thin and foliaceous. (Fig. 9, 3.) | 2 |
| Vertex often produced, acutely angled or rounded but margin not thin or foliaceous. (Fig. 9, 11b, and 13a.) | 5 |
| 2. Elytra narrowed posteriorly to pointed tips, general color brownish | Dorydiella, p. 91 |
| Elytra not narrowed posteriorly, apices well rounded, general color greenish | 3 |
| 3. Elytra with two claval veins. (Fig. 9, 7.) | 4 |
| Elytra with one claval vein. (Fig. 9, 2.) | Spangbergiella, p. 93 |
| 4. Vertex greatly longer than basal width between eyes, thin and foliaceous, usually with color markings, elytra very short, greatly exceeded in female by abdomen and ovipositor. (Fig. 9, 3.) | Hecalus, p. 91 |
| Vertex broader between eyes than length at middle, without color markings, elytra longer, covering or only slightly exceeded by abdomen. (Fig. 4.) | Parabolocratus, p. 93 |
| 5. Inner sector of elytra twice forked, three anteapical cells formed. (Fig. 9, 5 and 7.) | 6 |
| Inner sector of elytra not forked, only two anteapical cells. (Fig. 9, 8, 9 and 10.) | 22 |
| 6. Vertex as long as or almost as long as width between the eyes, disc flat or furrowed, and a rather distinct margin between vertex and front. (Fig. 9, 11.) | 7 |
| Vertex usually greatly wider than long, in most cases with disc sloping and margin rounding to front. (Fig. 9, 12 and Fig. 10, 14.) | 12 |
| 7. Elytra with two cross nervures between first and second sectors or with supernumerary veinlets to costa or both. (Fig. 9, 7.) | 8 |
| Elytra with one cross nervure between first and second sectors (occasionally with two in Thamnotettix). (Fig. 9, 5, and Fig. 10, 5.) | 10 |

8. Vertex not strongly produced, often angled, face broader proportionately. (Fig. 11, 1, 2, 3.) 9
Vertex strongly produced and acutely angled, front very long and narrow. (Fig. 9, 13a, b.) **Platymetopius**, p. 100
9. Elytra usually with many supernumerary veinlets along costal margin **Mesamia**, p. 94
Elytra with reflexed veinlets at apex of costal area but without supernumerary veinlets along costal margin. (Fig. 11, 5.) **Deltocephalus**, p. 104
10. Elytra without costal recurved veins. (Fig. 10, 4 and 5.) 11
Elytra with recurved veins on costal margin. (Fig. 9, 5.) **Scaphoideus**, p. 95
11. Elytra marked with fine brown ramose pigment lines **Phlepsius**, p. 125
Elytra usually subhyaline, without ramose pigment lines or areas, often with bright color markings **Thamnotettix**, p. 133
12. Inner branch of first sector forking on disc of corium. (Fig. 10, 9 and 2.) 13
Inner branch of first sector not forking on disc of corium. (Fig. 10, 8.) 20
13. Elytra greatly narrowed and acutely pointed at apex. (Fig. 9, 6.) **Acinopterus**, p. 133
Elytra scarcely narrowed, broad and rounded at apex. (Fig. 9, 7 and 10.) 14
14. Elytra short, not exceeding abdomen, often very short, covering only basal portion, head short and broad. (Fig. 10, 1.) 15
Elytra longer exceeding abdomen in length 17
15. Head broad, ovipositor short, elytra usually extending to ovipositor. (Fig. 10, 6.) **Euscelis**, p. 117
Head narrower, ovipositor long, elytra usually extending only to second abdominal segment 16
16. Vertex bluntly rounded, almost parallel margined, female abdomen abruptly narrowed posteriorly, ovipositor only a little longer than abdomen **Driotura**, p. 117
Vertex more conical, bluntly but decidedly produced at middle, female abdomen gradually narrowed, last visible dorsal segment very long, ovipositor extremely long **Aconura**, p. 116
17. Elytra with one cross nervure between first and second sectors (Fig. 10, 3.) 18
Elytra with two cross nervures between first and second sectors .. **[Aligia]**
18. Elytra marked with ramose pigment lines 19
Elytra without markings in the form of ramose pigment lines 20
19. Ramose lines on elytra in the form of bands or saddle areas, pigmentation of various colors **Eutettix**, p. 122
Ramoses lines on elytra not restricted to bands, often quite uniformly inscribed, some shade of brown **Phlepsius**, p. 125
20. Pronotum with sides short, usually with dark or bright markings **Thamnotettix**, p. 133
Pronotum with sides longer, usually a uniform green or greenish yellow, vertex broadly rounded or roundingly angulate **Chlorotettix**, p. 138
21. Vertex angularly, conically produced, eyes small, quite remote. (Fig. 10, 14.) 22
Vertex broadly curved, parallel margined, eyes large, close together, almost as long as pronotum. (Fig. 10, 15.) .. **Jassus**, p. 141
22. Clypeus not tuberculate, elytra rather short and broad. (Fig. 10, 14.) **Neocoelidia**, p. 142
Clypeus strongly and conspicuously tuberculate, elytra longer and narrower **Paracoelidea**, p. 142

23. Head narrower than pronotum which is somewhat angularly produced between the eyes. (Fig. 10, 11.)*Balclutha*, p. 145
Head as wide as or wider than pronotum, anterior margin of which is well rounded and but slightly produced. (Fig. 10, 12 and 13.) 24
24. Head slightly produced, usually with definite color markings. (Fig. 10, 13.)*Cicadula*, p. 142
Head very blunt, not produced, parallel margined, without definite color markings. (Fig. 10, 12.)*Eugnathodus*, p. 146

Dorydiella Baker.

Head broader and longer than pronotum, anterior margin roundingly angulate, foliaceous and upturned, ocelli on margin close to eyes. Elytra long, with apices acutely angled. Four apical cells and two anteapical. Clavus with two longitudinal veins. Only one species is known to belong to this genus.

D. floridana Baker.

Can. Ent., xxix, 159, 1897.

Large, yellowish with brown markings. Vertex long, broad and flat with margin foliaceous, upturned in front. Elytra long, apices acutely angled. Face somewhat irrorate, vertex with five dark spots on anterior edge. Pronotum longitudinally striate. Elytra with ramose pigment lines mostly longitudinal, apex with brown spot. Length 8 mm.

Although rather difficult to collect, it occurs in abundance during late August and early September at the margins of lagoons on the young *Scleria-Eleocharis* growth which follows the receding water-line as evaporation takes place.

In general appearance and color markings this species resembles quite closely species of *Phlepsius* and the pointed elytra would suggest a relationship to *Acinopterus*. The head character, however, is more closely allied to the *Dorycephalus* type and this is more pronounced in the nymphs than in the adults. It is, therefore, given this relative position, since the nymphal characters are most important.

Hecalus Stål.

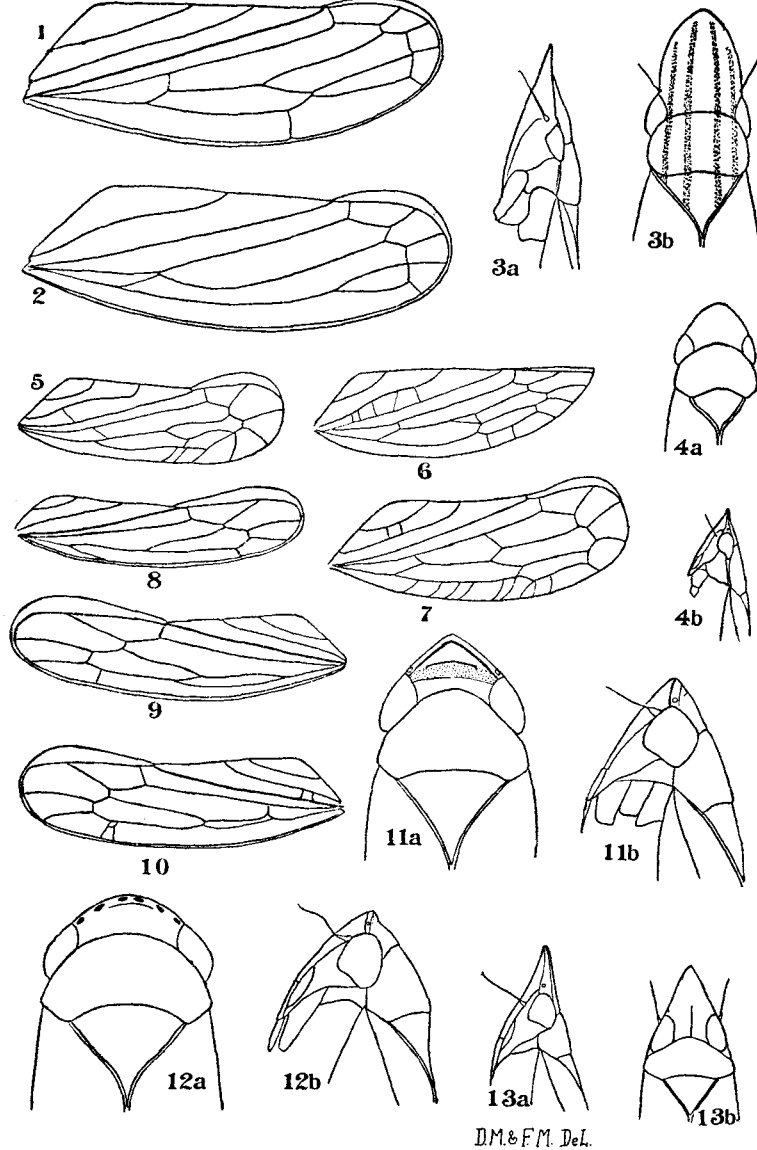
Glossocratus Fieber.

Vertex longer than basal width and flattened, sharp and foliaceous at margin. Pronotum very short and broad. Clavus of elytra with at least two veins. Elytra shorter than abdomen.

H. lineatus (Uhler). *Glossocratus lineatus* Uhler. *Glossocratus fenestratus* (male) Uhler. (Fig. 9, 3a, b.)

Bull. U. S. Geol. Geog. Surv. Terr., iii, 463, 1877.

Greenish with very long thin flat vertex. Four longitudinal red stripes extending across vertex and pronotum and central two across scutellum. Elytra short in female, greatly exceeded by abdomen, nervures broadly reddish or yellowish, in male exceeded by black abdomen, and crossed by two broad black bands, one



DM. & FM. DeL.

FIG. 9. (1) *Parabolocratius flavidus* Signoret,—elytron. (2) *Spangbergiella mexicana* Baker,—elytron. (3a) *Hecalus lineatus* Uhler,—head, lateral view; (3b) same, dorsal view. (4a) *Parabolocratius viridis* Uhler,—head, dorsal view; (4b) same, lateral view. (5) *Scaphoideus immistus* Say,—elytron. (6) *Acinopterus acuminatus* Van Duzee,—elytron. (7) *Platymetopius frontalis* Van Duzee,—elytron. (8) *Eugnathodus abdominalis* Van Duzee,—elytron. (9) *Balclutha impicta* Van Duzee,—elytron. (10) *Cicadula sexnotata* Fallen,—elytron. (11a) *Scaphoideus auronitens* Provancher,—head, dorsal view; (11b) same, lateral view. (12a) *Eutettix johnsoni* Van Duzee,—head, dorsal view; (12b) same, lateral view. (13a) *Platymetopius cuprescens* Osborn,—head, dorsal view; (13b) same, lateral view. All greatly enlarged. Drawing by D. M. and F. M. DeLong.

across middle and another covering apical and a part of anteapical cells. Length, male 7 mm., female 9 mm.

A rather rare form, occurring on sedges, around swamps and lagoons. Has been found in New York and Massachusetts.

Spangbergiella Signoret.

Head strongly produced before the eyes, flat, ocelli on sharp margin near eyes. Pronotum twice wider than long, elytra with four apical cells. Clavus with one vein.

S. vulnerata (Uhler). *Glossocratus vulnerata* Uhler.

Bull. U. S. Geol. Geog. Surv. Terr., iii, 464, 1877.

Long and slender, green with two oblique red lines on vertex and two on pronotum, and a median one on posterior portion of pronotum. Elytra with veins yellowish. Length, female 8 mm., male 5.5 mm.

This southern form has worked northward along the coast and has been taken in New Jersey and New York, so may occur in Connecticut on low vegetation.

Parabolocratus Fieber.

Closely allied to two preceding genera, vertex roundly produced, flat and thin. Clavus with two veins, elytra with four short apical cells.

These species are closely allied in structural characters and general appearance and are found in similar habitats usually in moist or swampy areas on rank grasses.

Key to Species.

1. Rather small, 6 mm., head flattened and well rounded, usually with ovipositor conspicuous, extending just beyond elytra as viewed from above **viridis**
Larger, females 7.5-8 mm. males 6 mm., vertex more broadly rounded and margin drawn out into a thin edge, elytra shorter **major**

P. viridis (Uhler). *Glossocratus viridis* Uhler. (Fig. 9, 4a, b.)

Bull. U. S. Geol. Geog. Surv. Terr., iii, 462, 1877.

Green or yellow unmarked, head broad, flat, well rounded before, elytra short not covering ovipositor, often brownish at apices. Length 6 mm.

A very common form in damp rank grassy places in early summer. Professor Osborn reports this species as feeding on *Stipa spartea*. It is a very abundant form often in moist pastures, in swamps and swamp meadows, on the coarse grasses and sedges.

New Haven, 11 Aug., 1908 (B. H. W.); 22 Aug., 1920, 15 May, 1921 (B. H. W.); Cornwall, 5 June, 1921 (B. H. W.); North Haven, 6 Aug., 1922 (B. H. W.).

P. major Osborn.

Me. Agr. Expt. Sta., Bull. 238, 110, 1915.

Similar to *viridis* in form and color, but larger with vertex well rounded, margin drawn out to thin edge and elytra proportionately shorter. Length, male 6 mm., female 8 mm.

A northern form which should occur in same habitats and in company with *viridis*. Described from specimens taken from *Calamagrostis canadensis* both in adult and nymphal stages.

New Haven, 11 Aug., 1908 (B. H. W.); 22 Aug., 1920, 12 May, 1921 (B. H. W.); East Haven, 27 June, 1921 (M. P. Z.).

Mesamia Ball.*Paramesus* Van Duzee.

Vertex with anterior margin usually elevated and acutely angled with front, disc depressed. Elytra with second cross nervure present and central anteapical cell slightly constricted. Super-numerary veinlets along clavus and costa.

Key to Species.

1. Elytra whitish marked with a dark saddle between the cross nervures *nigridorsum*
Elytra fulvous with milky white areas *vitellina*

M. nigridorsum Ball. *Paramesus twiningi* Van Duzee. *Paramesus jucundus* Gillette and Baker. (Pl. iii, 8.)

Proc. Dav. Acad. Sci., xii, 60, 1907.

Ivory white, vertex with disc brown, a black spot either side of median line anteriorly. Pronotum brown, an irregular row of spots behind anterior margin, face black, elytra milky white. Saddle on posterior two-thirds of clavus black, a band on basal and apical portions and nervures, brown. Length 4.5 mm.

Reported as feeding on *Helianthus*, a common and widely distributed species perhaps extending as far north as Connecticut.

M. vitellina (Fitch). *Acocephalus vitellina* Fitch. *Jassus twiningi* Uhler. *Paramesus furcatus* Osborn.

Homop. N. Y. St. Cab., 57, 1851.

Vertex and face yellow, often a black line below margin. Anterior margin of pronotum yellowish, darker posteriorly, elytra orange-yellow with numerous white spots, an oblique testaceous band extending from middle of costa to apex of clavus. Length 5.5-6.5 mm.

Common throughout New England feeding on wild rose, and often found on tall grasses in wooded areas.

East River, 2 Aug., 1910 (C. R. E.); North Branford, 13 July, 1920 (B. H. W.); Portland, 8 Aug., 1913, 25 July, 1920 (B. H. W.); New Haven, 4 July, 1921 (B. H. W.); Cornwall, 18 July, 1921 (B. H. W.); Ellington, 8 Aug., 1922 (B. H. W.).

Scaphoideus Uhler.

Vertex flat, angularly produced, almost as long as basal width. Elytra rather long, covering abdomen. Costa often with recurved veins.

Key to Species.

1. Elytra usually mottled with irregular patterns, not with cruciate brown mark, nervures dark 2

Milky white in color, elytra with a brown cruciate mark, darker margined, crossing elytracruciatus

2. Vertex unicolorous or marked with brownish, but not with broad transverse fuscous band between eyes 3

Vertex marked with a distinct transverse rather broad red or fuscous band between eyes. (Fig 9, 11.) 8

3. Vertex with faint or definite brown markings, or blotched with fuscous next eyes 4

Vertex uniform brown, without dark lines or stripesunicolor

4. Vertex not blotched with fuscous next eyes, pale or with dark markings 5

Vertex orange or blotched with fuscous next either eye, but without a band, elytra orange with white spotsjucundus

5. Vertex with brown lines forming a V-shaped mark back of apex and a pale band across base 6

Vertex whitish without markings, or with faint indication of a transverse brown line between eyes 7

6. Size larger, 6 mm., vertex brownish, V-shaped mark at apex not touching a heavy brown mark at its base, and not enclosing a white spot. Elytra with commissural lobate areas rather obscureconsors

Size smaller, 5.5 mm., vertex much paler, V-shaped mark contingent at base with a heavy transverse bar, enclosing a white triangular spot. Elytra with nervures dark and commissural lobate areas conspicuousscalaris

7. Vertex, pronotum and scutellum whitish, vertex often with a faint transverse band, pronotum and scutellum usually with very few and faint markingsintricatus

Vertex yellowish with wavy transverse lines, pronotum distinctly marked with brown blotches, elytra very dark but with scutellar margin and two distinct spots along claval suture milky white lobatus

8. Band between eyes without large toothed portion extending forward 9

Transverse band between eyes with a rather large central toothed portion extending forward 11

9. Transverse band duller in color not margined with black 10

Transverse band bright orange-red, margined before with a black line at central portion. (Fig. 9, 11a.)auronitens

10. Elytra uniform dark brown on posterior two-thirds, veins obscure, pale areas wanting, female segment distinctly and rather deeply, broadly notchedluteolus

Elytra grayish, pale with brown nervures and with dark brown and milky white areas. Female segment produced, not notched at centeropalinus

11. Darker, usually brownish or grayish, band on vertex darker, brownish, transverse behind, with a toothed projection added on anterior side 12

Light ochraceous, band on vertex rather broad, orange, waved by median anterior projecting tooth, not transverse behind ...ochraceus

12. Female segment often produced, but not toothed at center, vertex with transverse band dull reddish 13

- Female segment usually produced with a definite tooth at center, band on vertex broad, very dark brown or blackish, rather robust, about 6-6.5 mm. 14
13. Vertex pointedly angled, usually about as long as width between eyes, face rather pale with black arcs, elytra brownish *immistus*
Vertex more bluntly and obtusely angled, usually about two-thirds as long on middle as width between eyes, face black with pale arcs, elytra very dark brown appearing blackish *melanotus*
14. Length 6 mm., female segment with a small median tooth on posterior margin *productus*
Slightly larger 6.5 mm., female segment bearing a distinct median carina and tooth *carinatus*

S. cruciatus Osborn.

Ohio Nat., xi, 253, 1910.

Ivory white or yellowish, vertex with two transverse brown spots before middle. Front with two arcs at base, a bar below antennae, and a broader one across clypeus and lower portion of lorae. Elytra with a cruciate brown mark bordered with darker brown. Anteapical cells and first and second apicals dark. Length 4.5 mm.

Described from Long Island, and no doubt occurs in Connecticut. A rather rare species occurring throughout the summer.

S. auronitens Provancher. *Jassus areatus* Harris (MS). (Fig. 9, 11a, b.)

Pet. Faune Ent. Can., iii, 277, 1889.

Pale brown, iridescent, vertex with a rather broad transverse orange-red band, anteriorly margined with black between the eyes. A black band on margin and another just above margin. Pronotum marked with reddish. Elytra with three recurved costal veins, and three pairs of black spots along claval suture. Length 6 mm.

A common form on undergrowth in wooded areas, especially in open woods where it was swept from *Solidago*.

East River, 5 Aug., 1908 (C. R. E.); New Haven, 20 Aug., 1909 (B. H. W.); 22 Sept., 1918 (F. H. L.); 22 Aug., 13 Sept., 3 Oct., 1920 (B. H. W.); Portland, 12 Aug., 1913 (B. H. W.); New Canaan, 3 Sept., 1920 (B. H. W.); Bridgeport, 20 Sept., 1920 (B. H. W.); Cromwell, 30 Aug., 1920 (B. H. W.); Hamden, 6 Aug., 1922, 25 Sept., 1921 (B. H. W.); Cornwall, 18 July, 1921 (B. H. W.).

S. jucundus Uhler.

Trans. Md. Acad. Sci., i, 34, 1889.

Bright orange fulvous, vertex, pronotum and elytra with milky white spots. Disc of vertex reddish, a dark line above margin. Elytra with veins and costal reflexed nervures broadly fuscous. Length 5-6 mm.

Often found on oak shrubs during July, August and September.

Plainville, 2 Sept., 1921 (B. H. W.); Hamden, 25 Sept., 1921 (B. H. W.).

S. unicolor Osborn.

Jour. Conn. Soc. Nat. Hist., xix, 196, 1900.

Rather broad, robust, almost uniform dark brown in color, with few markings. Vertex and elytra uniform brown. Elytra brown-

ish subhyaline, nervures dark, reflexed costal veins and apex broadly fuscous. Length 5 mm.

Occurs in small numbers on herbaceous plants during June, July and August.

Branford, 28 July, 1905 (H. L. V.); New Haven, 1 Aug., 1920, 4 July, 1921 (B. H. W.); Hamden, 11 Aug., 1921 (B. H. W.).

S. consors Uhler.

Trans. Md. Acad. Sci., i, 36, 1889.

Vertex brownish with similar markings to *scalaris*, but they are not so distinct and blended more nearly with the color of the vertex. Pronotum with a paler spot behind either eye and a median longitudinal line. Ocelli large, pale. Elytra brownish, subhyaline, with only a suggestion of the pale spots on claval suture, nervures brown, apical margin and costal veinlets broadly black. Length 5.5-6 mm.

In wooded areas and waste places during July and August on herbaceous plants.

East River, 12 Aug., 1910 (C. R. E.); New Haven, 8 Aug., 1920 (B. H. W.); Plainville, 2 Sept., 1921 (B. H. W.); Portland, 24 July, 1921 (B. H. W.).

S. scalaris Van Duzee.

Ent. Amer., vi, 51, 1890.

Resembling *consors* but easily distinguished from it by smaller size and a light mark on elytral suture, formed by three white spots along margin. Vertex with a fulvous spot next each eye, a marginal line, two behind margin not quite meeting on median line, a short strongly curved one just behind and joining these two, and a median longitudinal line on posterior half, black. Length 5 mm.

In some places this is an abundant pasture and meadow species and occurs also on herbaceous plants in woodland from June to September. It is perhaps rather rare in Connecticut, and occurs in August and September.

S. lobatus Van Duzee. (Pl. ii, 7.)

Bull. Buff. Soc. Nat. Sci., v, 199, 211, 1894.

Vertex yellowish or whitish with a line above and parallel to margin, and a transverse line between eyes enlarged to a spot on disc, brown. Pronotum mottled with brown. Elytra milky white, nervures broadly brown or black and numerous heavy and large blackish blotches or inscribed lines. The portions of elytra along scutellum and claval suture white with three rather definite white lobes along commissural line. Length 6 mm.

In open woods this species is quite common on *Solidago caesia*, and perhaps other herbaceous plants, but great numbers have been collected the past season from this plant during August and September.

New Haven, 22 Sept., 1918 (F. H. L.); Norwalk, 8 Sept., 1920 (B. H. W.); Cornwall, 18 July, 1921 (B. H. W.); Hamden, 18 July, 6 Aug., 1922 (B. H. W.).

S. ochraceus Osborn.

Proc. Ia. Acad. Sci., v, 242, 1898.

Vertex whitish or yellowish, well produced, a brown band just above margin, a transverse ochraceous band before eyes with a tooth extending forward at center. Pronotum ochraceous, scutellum paler. Elytra tawny ochraceous, subhyaline, nervures and spots along claval suture brown. Face pale with two lines and faint arcs on basal portion. Length 5-6 mm.

Taken in open woods on dry sandy areas from tall grasses, the predominating species of which was *Andropogon furcatus*. It may not feed on this grass but occurs in this association during July and August.

Portland, 24 July, 1921 (B. H. W.).

S. productus Osborn.

Jour. Cinn. Soc. Nat. Hist., xix, 200, 1900.

Closely resembling *immistus* in coloration, longer and with heavier markings. Vertex rather blunt, a brown line above margin interrupted at middle and a broad fuscous transverse band between eyes, with a large central median toothed spot extending forward. Pronotum dark reddish brown. Elytra brownish hyaline with costal nervures broadly brown, a dark brown spot along claval suture slightly back of scutellum and a brown blotch behind cross nervure of first and second sectors. Female segment produced and black at middle. Length 5.5-6 mm.

A common woodland species which seems to prefer moist habitats.

East River, 14, 23 July, 1908 (C. R. E.); New Haven, 8 July, 1912, "at light," 1 Aug., 1920 (B. H. W.); East Haven, 21 July, 1920 (B. H. W.); (Willow) New Haven, 9 July, 1921 (B. H. W.); 28 July, 1920 (B. H. W.).

S. carinatus Osborn.

Jour. Cinn. Soc. Nat. Hist., xix, 201, 1900.

Larger than *productus* but very similar in coloration. Gray with dark cross band on vertex, elytral markings dark brown, more intensified than in preceding. Female segment strongly carinate and with projecting tooth at center. Length 6.5 mm.

A species occurring in open woodland on a mixed growth of herbaceous plants during July and August.

New Haven, 14 July, 1920 (B. H. W.); Portland, 20 July, 1913, 25 July, 1920 (B. H. W.); 10 July, 1913 (A. E. Moss).

S. intricatus Uhler.

Trans. Md. Acad. Sci., i, 34, 1889.

Vertex, pronotum and scutellum ivory white with a few faint markings, a marginal line and transverse band on vertex, spots on pronotum and base of scutellum, fuscous. Elytra pale, nervures brown, irregular yellowish to testaceous spots, a very large one near base, and three conspicuous milky white lobate spots along claval suture. Length 5.5-6.5 mm.

Occurs on weeds and herbaceous plants in low, sheltered, usually wooded areas. It often is taken in goodly numbers in a *Solidago* association, and may feed upon this plant.

Darien, 5 Aug., 1909 (C. W. J.).

S. luteolus Van Duzee.

Bull. Buff. Soc. Nat. Sci., v, 210, 1894.

Vertex whitish, a distinct black line a little back of margin and a very broad transverse fuscous band between eyes. Pronotum dark, a paler transverse area on disc. Elytra rather uniform brownish without pale areas, nervures on posterior half, a few spots, and apex, broadly dark brown. Female segment long, roundly produced with a broad, deep V-shaped notch. Length 5 mm.

A rather rare species feeding apparently on herbaceous plants in shaded areas.

New Haven, 7 Sept., 1910 (A. B. C.); 16, 29, 31 July, 1920 (B. H. W.); Cornwall, 18 July, 1921 (B. H. W.); Hamden, 20 Aug., 1922 (B. H. W.).

S. immistus (Say). *Jassus immistus* Say. (Fig. 9, 5.)

Jour. Acad. Nat. Sci. Phila., vi, 306, 1831.

Whitish to grayish yellow, vertex with marginal line and transverse band with tooth at center. Pronotum dark with a transverse and longitudinal white area. Elytra grayish yellow, veins broadly brown, apices dark, two spots along claval suture and a few others milky white. Length 4.5-6 mm.

The most common of the group apparently, and feeding on a variety of plants. Taken in pasture land and on shrubs. Certain of the smaller ones known as varieties have been found on willows, and others occur abundantly on grasses.

East River, 14 July, 8 Aug., 1908, 3 Aug., 1910 (C. R. E.); Lyme, 20 Aug., 1910 (B. H. W.); Portland, 10 July, 1913 (A. E. Moss); 20 July, 1910, 1913 (B. H. W.); New Haven, 31 July, 3 Aug., 1920 (B. H. W.), on willow; Hamden, 24 July, 1920 (B. H. W.), on poplar; New Canaan, 3 Sept., 1920; Cornwall, 18 July, 1921 (B. H. W.); Kent, 10 Aug., 1918 (B. H. W.).

S. melanotus Osborn.

Jour. Cinn. Soc. Nat. Hist., xix, 206, 1900.

Vertex obtusely angled, pale buff, a faint marginal brown line just above apex. Band between eyes dull reddish and rather narrow. Pronotum black at side, the entire central portion from vertex to scutellum pale, often whitish. Scutellum pale buff, basal angles black. Elytra dark brownish, nervures and spotted areas black with few and rather vague light markings. Face, lorae, genae and pectus black, white arcs on base of face. Legs pale. Female last ventral segment produced and notched at middle. Length 5 mm.

Usually found in meadows and waste places; the food plant is unknown at the present time.

Woodbury, 16 July, 1913 (W. E. B.); Hamden, 25 Sept., 1921 (B. H. W.).

S. opalinus Osborn.

Rept. N. Y. St. Ent., xx, 525, 1905.

Gray, paler than *immistus*, vertex pale with faint markings. Pronotum pale brown, apex of scutellum yellowish. Elytra grayish to pale brown, nervures brown, some broadly darker, claval veins ending in dark spots along suture, between which are formed two large sutural spots and three just outside of claval vein, white, opalescent.

Found under field conditions often in similar habitats with *immistus*.

Platymetopius Burmeister.

Proceps Mulsant and Rey.

Vertex long, pointed, front very narrow, elytra with two cross veins between the sectors and several small costal veinlets. The elytron contains five apical and three anteapical cells.

Both in structure and food habits these resemble the species of *Deltoccephalus*, but are not found to occur on grasses in such abundance. Most of the species feed on herbaceous or low vegetation, and are often found only in boggy or moist habitats.

Key to Species.

- 1. Elytra usually with inscribed pigmentation, costal veinlets present 2
Elytra whitish hyaline, crossed by three distinct transverse fuscous
vittae, costal veinlets absent**hyalinus**
- 2. Face light or yellowish, often dark margined 3
Face dark or brownish, 5 mm. in length, with a broken pale, trans-
verse band before the eyes**magdalensis**
- 3. Markings on vertex in the form of lineations usually with a pale
median line on vertex. Color brownish or fulvous 4
Markings on the vertex in the form of transverse vittae, color
black, face yellow, dark margined**frontalis**
- 4. Face yellowish, dark margined, distinctly angled above and with
angular white line on base distinct 5
Face without dark margin, bluntly angled at base, angular white
line very faintly showing 6
- 5. Vertex not quite twice as long as width between the eyes, general
color cinereous**acutus**
Vertex more pointed, about two and one-half times as long as
width between the eyes, color bright cuprescent**cuprescens**
- 6. Length 3-4 mm.; light in color with greenish tint, valve of male
almost rounded at apex**angustatus**
Length 4.5-5 mm., darker, fulvous, valve of male distinctly angled
fulvus

P. hyalinus Osborn.

Ent. News, xi, 501, 1900.

Whitish or yellowish hyaline, elytra crossed by three narrow, transverse brown bands, one each across middle and apex of clavus, and another just before apical cells. Vertex well angled a half longer than width between eyes, rather uniform yellowish. Length 4.5 mm.

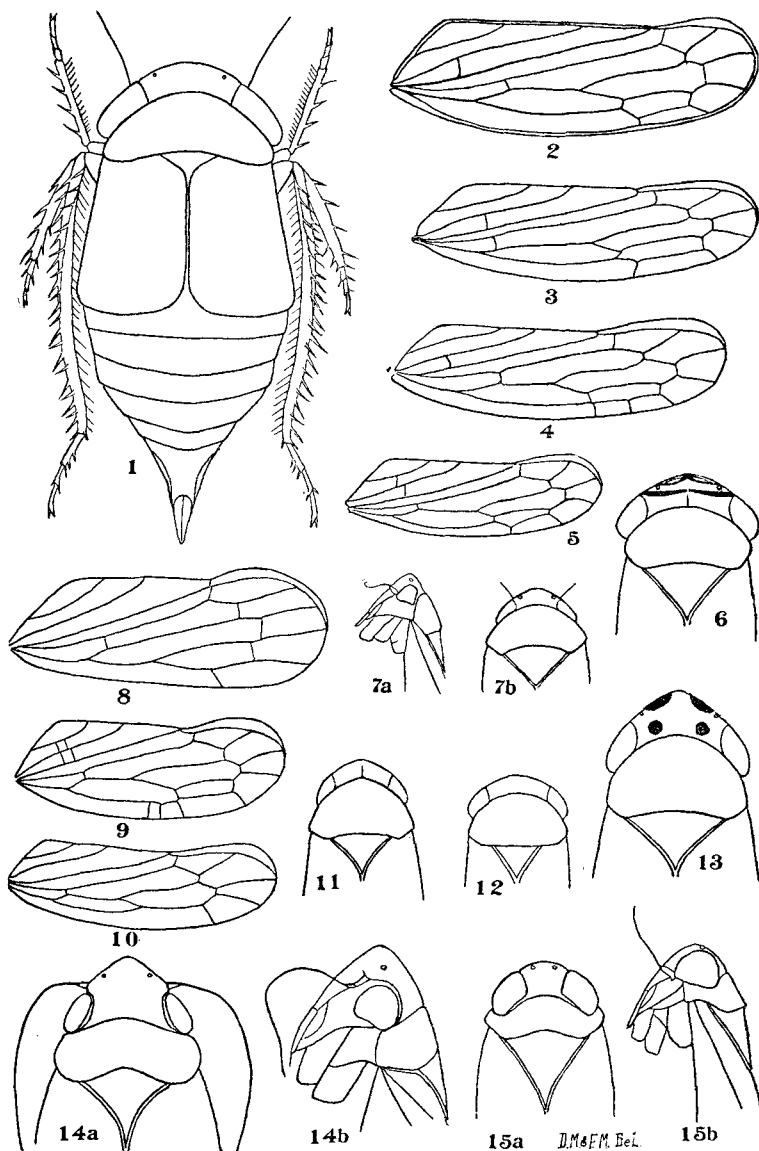


FIG. 10. (1) *Driotura gammaroides* Van Duzee,—dorsal view. (2) *Euscelis parallelus* Van Duzee,—elytron. (3) *Chlorotettix unicolor* Fitch,—elytron. (4) *Thamnotettix fitchii* Van Duzee,—elytron. (5) *Phlepsius irroratus* Say,—elytron. (6) *Euscelis striolus* Fallen,—head, dorsal view. (7a) *Acinopterus acuminatus* Van Duzee,—head, lateral view; (7b) same, dorsal view. (8) *Jassus olitorius* Say,—elytron. (9) *Eutettix seminudus* Say,—elytron. (10) *Cicadula variata* Fallen,—elytron. (11) *Balclutha impicta* Van Duzee,—head, dorsal view. (12) *Eugnathodus abdominalis* Van Duzee,—head, dorsal view. (13) *Cicadula variata* Fallen,—head, dorsal view. (14a) *Neocoelidia tumidifrons* Gillette and Baker,—head, dorsal view; (14b) same, lateral view. (15a) *Jassus olitorius* Say,—head, dorsal view; (15b) same, lateral view. All greatly enlarged. Drawing by D. M. and F. M. DeLong.

Apparently an imported species occurring on Japanese and sugar maples, and perhaps other species of the same group. Quite abundant both as nymphs and adults in June and July. They seem to be more abundant on the higher branches and only a few occur on the lower foliage of the same tree.

New Haven, 21 Sept., 1910 (W. E. B.); 4, 5, Aug., 1920 (B. H. W.); Cromwell, 27 Aug., 1920 (B. H. W.).

P. acutus (Say). *Jassus acutus* Say. (Pl. ii, 3.)

Jour. Acad. Nat. Sci., Phila., vi, 306, 1831.

Brown, vertex acutely angled, almost twice as long as width between eyes, marked with longitudinal pale areas. Pronotum with longitudinal vittae, elytra with numerous dark costal veinlets and apical areoles. Face yellow, fuscous margined. Length 5 mm.

A very common species throughout the summer on grasses in meadows and pastures, and frequently abundant on blueberry in boggy areas. It is of economic importance because of its numbers and variety of food plants.

Yalesville, 19 Oct., 1903, New Haven, 21 Oct., 1903 (H. L. V.); Sept., 1918 (D. M. D., F. H. L.); 14, 20 June, 20 July, 1920 (B. H. W.); Branford, 31 July, 1920 (B. H. W.); Bridgeport, 20 Sept., 1920 (B. H. W.); East Hartford, 16 Sept., 1920 (B. H. W.); Hamden, 20 June, 1920 (B. H. W.); Orange, 15 Sept., 1920 (B. H. W.); Cornwall, 18 July, 1921 (B. H. W.); North Branford, 12 June, 1921 (B. H. W.); North Haven, 24 Sept., 1921 (B. H. W.); Plainville, 2 Sept., 1921 (B. H. W.).

P. cuprescens Osborn. (Fig. 9, 13a, b.)

Rept. N. Y. St. Ent., xx, 517, 1905.

Vertex long, sharp, more than twice longer than wide between eyes, side margins often paler in color, cuprescent, elytra heavily infuscated, with few areolar spots, most of which are on apical and anteapical cells. Face pale, very slightly and gradually darkened at margin. Length 4.5-5 mm.

A common form in shaded and wooded areas, occurring on ferns and undergrowth in a moist habitat. June to September.

P. angustatus Osborn.

Rept. N. Y. St. Ent., xx, 518, 1905.

Vertex almost one-half longer than width between eyes, greenish with longitudinal dark markings. Elytra greenish with yellowish tinge; costa hyaline with dark veinlets, areolar spots confined to apical and anteapical cells. Veins on apical portion heavily infuscated. Length 4 mm.

Described from Long Island, N. Y., and no doubt its distribution extends northward and into Connecticut. It often occurs in the brake-fern habitat in open fields or cut-over areas during August, and is a distinctly northern species.

P. fulvus Osborn.

Rept. N. Y. St. Ent., xx, 519, 1905.

Vertex rather short and blunt, a little longer than width between

eyes, yellowish with three pale areas at apex, and often brownish vermiculate markings. Bright fulvous, elytra opaque, with few pale areolar spots, all located at apex, costal nervures dark brown. Face yellowish not darkened at sides. Length 4.5-5 mm.

Occurs on shrubs and blueberry. Described from Oyster Bay, N. Y., and its range of distribution is quite large, including a part of New England.

New Haven, 22 Sept., 1918 (F. H. L.); 31 July, 5 Aug., 1920 (B. H. W.); Cornwall, 18 July, 1921 (B. H. W.); Hamden, 20 Aug., 1922 (B. H. W.); Portland, 24 July, 1921 (B. H. W.).

P. frontalis Van Duzee. (Fig. 9, 7.)

Can. Ent., xxii, 112, 1890.

Vertex short and blunt, almost one-half longer than basal width. a rather indefinite light transverse vitta before eyes. Pronotum with distinct longitudinal white vittae, elytra heavily inscribed with black and with numerous large white oval spots. Face yellow heavily infuscated at sides. Length 3.5-4 mm.

A common species in damp meadows and a pest of grasses and herbaceous plants. It often occurs with other species of the genus in boggy areas. Abundant throughout the summer.

New Haven, 6 July, 1904 (P. L. B.); 4, 8, 11, 20, 31 July, 3 Oct., 1920 (B. H. W.); West Haven, 27 June, 1905; Rockville, 23 Aug., 1905 (H. L. V.); Hamden, 30 June, 1913 (B. H. W.); 20 June, 1920 (B. H. W.); Branford, 21 July, 1920 (B. H. W.); East Hartford, 16 Sept., 1920 (B. H. W.); Orange, 15 Sept., 1920 (B. H. W.); Westbrook, 21 Sept., 1920 (B. H. W.); Killingworth, 27 June, 1920 (W. E. B.).

***P. frontalis** var. **nigrifrons** DeLong, n. var.

Resembles *frontalis* but with vertex a little more bluntly angled.

Color: Uniform black with few pale markings. Face, clypeus and lorae shining black, margin of vertex and the V-shaped line just beneath, white. Vertex with a spot either side of apex and another just back of this, white. Elytra uniform black marked only by two small areolar spots along claval suture, four on base of apical and three on apex of anteapical cells, white.

Genitalia: Male valve and plates as in *frontalis*.

A single male specimen collected at West Rock, New Haven, September 22, 1918, by the author and specimens collected at New Haven, 9 July, 1921 (B. H. W.) are at hand, and seem after careful study to be a varietal form because of the unique coloration and shining black face.

P. magdalensis Provancher. *P. obscurus* Osborn.

Pet. Faune Ent. Can., iii, 275, 1889.

Resembling *acutus* in size and form, vertex rather blunt, less than twice as long as width between eyes, marked with irregular pale transverse vittae. Pronotum with longitudinal vittae, elytra brownish, inscribed and irrorate with dark brown, and with numerous white areolar spots. Face brown, irrorate with white. Length 5 mm.

A common form in New England, often occurring in boggy places on blueberry during August and September.

New Haven, 22 Sept., 1918 (F. H. L.); 16, 20 June, 20 July, 22 Sept., 1920 (B. H. W.); East Hartford, 16 Sept., 1920 (B. H. W.); Hamden, 23 Oct., 1921 (B. H. W.); North Haven, 4 Sept., 1921 (B. H. W.).

Deltocephalus Burmeister.

Vertex more or less obtusely triangular, often strongly produced, head, including eyes, wider than pronotum. As a rule there are two distinct cross veins between the first and second sectors.

At the present time this genus contains a great number of American species which vary greatly in structural characters, and are consequently very hard to characterize as a group.

A large number of the most injurious forms of the entire family belong to this genus and feed usually upon grasses, cereal and forage crops. Especially abundant in meadows, old pastures and fields of grain.

Though commonly double-brooded, some species have only one generation each season. Field observations and collecting records seem to indicate that in a few species a partial second generation may occur.

Key to Species.

- 1. Elytra with two outer apical veinlets reflexed to costa, these together with the previous one pale, dark margined. Appendix wanting. (Fig. 11, 5.) 2
Elytra without reflexed apical veinlets, appendix present although often very small 5
- 2. Vertex produced, decidedly longer than width between eyes, definitely marked with black or dark fuscous. (Fig. 11, 1.) 3
Vertex as wide as long, yellowish hyaline with few dark markings *inflatus*
- 3. Elytra with pale nervures, rather broadly and heavily margined with dark fuscous 4
Color bright yellow, nervures somewhat indistinct, a large round black spot on disc of each elytron, almost filling discal cell, and reflexed veins broadly margined with fuscous *areolatus*
- 4. Head very strongly produced but rounded at tip, female segment with rounded median lobe, male plates long and with pointed divergent tips *sandersi*
Form appearing more robust, vertex broader and shorter, female segment with a central produced, somewhat keeled portion, male plates shorter than combined width, tips bluntly rounded *pictus*
- 5. Elytra with outer clavus often with one, but seldom with two, reticulate veins; vertex usually rather long, disc flat. (Fig. 11, 3d.) 6
Elytra with outer clavus strongly reticulate, with two, and usually several, reticulate veins; vertex short, disc convex, apex blunt. (Fig. 11, 4b.) 9
- 6. Elytra with only a suggestion of an appendix, pronotum short with posterior angles broadly rounded 7
Elytra with distinct appendix, usually large, pronotum proportionately longer, posterior angles more prominent 15

7. Small, not exceeding 3.5 mm., elytra marked with dark brown, vertex longer than broad 8
 Broader, robust, length exceeding 4 mm., vertex as broad as long, without many dark markings. (Fig. 4, 1.) **configuratus**
8. A dark brown band across elytra and apical cells brown, female segment concavely rounded **sayi**
 Elytra paler without dark bands, female segment convexly produced **misellus**
9. Size small, not exceeding 3.5 mm., elytra short, spots on vertex small, usually four or none 10
 Size larger, 4 mm., a pair of large black spots on vertex, pronotum and scutellum **inimicus**
10. Some shade of gray or brown with elytra dark or with dark markings 11
 Pale yellow to olive, a pair of triangular spots at apex formed by areas on the face and a broken band between the eyes, black **vinnulus**
11. Grayish or brownish with pale and dark areas 12
 Reddish brown, vertex and anterior portion of pronotum yellowish, apices of elytra whitish hyaline **apicatus**
12. Long, 3 mm. or more, elytra usually decidedly longer than abdomen 13
 Very short, compact, not exceeding 2.75 mm. in length, elytra short, usually not longer than abdomen **compactus**
13. Vertex as long as or longer than width between eyes, rather strongly angled 14
 Vertex wider between eyes than length at middle, more obtusely angled. (Fig. 11, 2.) **obtectus**
14. Female segment concaved posteriorly, male plates broad, bluntly pointed. (Fig. 11, 3a.) **weedi**
 Slightly longer and more robust, female segment produced with visible side plates, male plates long with acutely pointed tips .. **interruptus**
15. Vertex usually bluntly angled or almost rounded anteriorly, width between eyes greater than length at middle 16
 Vertex as long as or longer at middle than width between eyes, usually rather sharply angled. (Fig. 11, 4a.) 17
16. Color greenish or yellowish with fuscous or black markings 23
 Color black or dark brown; spots at apex of vertex, and costal margin broadly yellow **flavicosta**
17. Size small, less than 3 mm., yellowish green without definite markings 18
 Larger, more than 3 mm. in length, usually 3.5 mm., or more 19
18. Vertex distinctly longer than width between eyes, angularly pointed; female segment with shallow, broad but abrupt excavation, male plates almost truncated **melsheimerii**
 Vertex less pointed, almost as wide between eyes as length at middle, female segment narrowly incised at middle; male plate convexly rounded, tips bluntly pointed but not truncated **minimus**
19. Vertex sharply angled, sides extending in a straight line from eye to apex, margin without definite markings. (Fig. 11, 4a.) 20
 Vertex broadly roundly angled, sides of vertex convexly rounded to apex, a heavy black line between eyes on margin, often forming two black points on vertex at apex. (Fig. 11, 6a.) ... **pascuellus**
20. Slender, female segment not incised, male plates with apices more pointed 21
 More robust, female segment produced, rather deeply incised at middle, male plates rather broad and blunt at tips **debilis**
21. Female segment distinctly produced at middle 22
 Female segment sinuated, with three small lobes at middle; male plates tapered to narrow attenuated tips **nominatus**

22. Female segment with median third abruptly produced and truncated; male plates with tips quite broad, bluntly pointed and divergent *sylvestris*
 Female segment with median half gradually produced to a pointed brownish tooth; male plates tapered to narrowly rounded tips .. *acus*
23. Form narrow, vertex scarcely one-third wider than long, pronotum not twice wider than long, central anteapical cell seldom divided by cross vein 24
 Form broader vertex one-third wider than long, pronotum more than twice as wide as long. As a rule the middle anteapical cell is constricted and divided by a cross vein 27
24. Vertex not marked with black spots above margin 25
 Vertex with a row of four to six black spots above margin, face with dark arcs *balli*
25. Color yellowish green, wings visible through subhyaline elytra ... 26
 Color greenish often marked with black areas, face sometimes entirely black, elytra opaque, never subhyaline *abdominalis*
26. Female segment concavely rounded posteriorly, male plates slightly exceeding valve, blunt at tips *striatus*
 Female segment triangularly produced from base, with median tooth at apex, male valve transverse, plates short but acutely pointed *littoralis*
27. Vertex rather strongly angled, four black triangular spots above margin, elytra greenish, unmarked *simplex*
 Vertex more obtusely angled with two or four black spots above margin; yellowish, elytra with veins margined with fuscous .. *osborni*

D. areolatus Ball. (Fig. 11, 1.) (Pl. iii, 1.)

Can. Ent., xxxi, 188, 1899.

Vertex one-third longer than width between eyes, acutely angled, bright yellow with a curved black spot either side at apex. Face usually entirely black. Elytra yellow, opaque, a large black spot on disc and reflexed veins at apex broadly black. Venation rather obscured except at apex where they are narrowly margined with brown. Female segment strongly excavated with a rounded median tooth. Length 3-3.5 mm.

Occurs as a rule in dry, hot, often sandy areas on *Panicum*, as adults during early summer and late fall. It has been found in the sandy and coastal areas of New Jersey and undoubtedly is distributed farther northward along the coast.

D. inflatus Osborn and Ball.

Proc. Ia. Acad. Sci., iv, 202, 1897.

One of the broad-headed members of the *reflexus* group. Vertex as wide between eyes as length at middle, rather broadly angled. Yellowish with a few fuscous markings. Basal half of face fuscous. Elytra usually flaring at tips, third apical cell black and reflexed, nervures usually dark margined. Female segment emarginate with a rather broad produced central tooth notched at middle, a black spot either side. Length 4.25-4.75 mm.

A common pasture and meadow form feeding on grasses in low areas and along swamp margins. Specimens are at hand from Long Island, N. Y., and it occurs no doubt in Connecticut.

D. sandersi Osborn.

Proc. Dav. Acad. Sci., x, 164, 1907.

Vertex strongly produced, tip rounded, one-fourth longer than basal width between eyes, more than one-half longer than pronotum. A pair of heavy black paranthesis spots enclosing tip and an interrupted band before eyes, brownish. Pronotum with longitudinal bands. Elytra buff, nervures whitish, heavily bordered with fuscous. Face variable in color from entirely black to pale on lower portion. Female segment with a central rounded lobe, black margined. Male valve triangular, rather short and broad, plates twice longer, tips pointed and divergent. Length 3-3.5 mm.

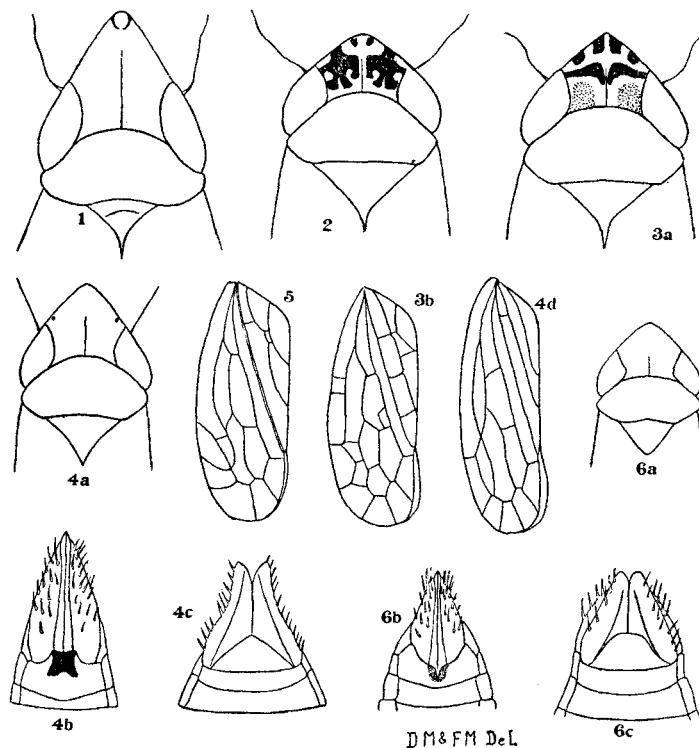


FIG. 11. (1) *Deltoccephalus areolatus* Ball,—head, dorsal view. (2) *Deltoccephalus oblectus* Osborn and Ball,—head, dorsal view. (3a) *Deltoccephalus weedi* Van Duzee,—head, dorsal view; (3b) same, elytron. (4a) *Deltoccephalus sylvestris* Osborn and Ball,—head, dorsal view; (4b) same, female genitalia; (4c) same, male genitalia; (4d) same, elytron. (5) *Deltoccephalus pictus* Osborn,—elytron. (6a) *Deltoccephalus pascuellus* Fallen,—head, dorsal view; (6b) same, female genitalia; (6c) same, male genitalia. All greatly enlarged. Drawing by D. M. and F. M. DeLong.

A grass-feeding species common in the eastern and southern states.

New Haven, 7, 8, 11, 20 July, 1920 (B. H. W.).

D. pictus Osborn. (Fig. 11, 5.)

Proc. Dav. Acad. Sci., x, 165, 1907.

Allied to *D. reflexus*, vertex produced, acutely angled, a little longer on middle than width between eyes. Pronotum with four broad longitudinal dark stripes. Basal half of face black. Elytra whitish, veins pale, broadly dark margined. Female segment slightly concave, a rounded short median tooth with a black line either side. Male plates rather long and narrowed to rounded tips. Length 3.5 mm.

Common throughout the summer on grasses of the *Aristida* type in New York and Pennsylvania. It is perhaps more widely distributed.

New Haven, 30 Oct., 1920 (B. H. W.).

D. configuratus Uhler. (Fig. 4, 1, 2, 3, 4.) (Pl. iii, 4.)

Bull. U. S. Geol. Geog. Surv. Terr., iv, 511, 1879.

Vertex broader between eyes than median length, bluntly angled, a distinct white cross on the disc in well-marked specimens. Pronotum pale with longitudinal dark stripes. Elytra with veins white, often dark margined and spotted with fuscous. Female segment medially produced in a long attenuated bifid black process, male plates long, obliquely truncate. Length 4.5-5 mm.

A very common species on grasses in pastures, meadows and swampy areas throughout New England during July, August and September.

New Haven, 1 June, 1911 (B. H. W.); 10 June, 1920 (B. H. W.); 4 July, 1920, 21 May, 16 July, 1921 (B. H. W.); Hamden, 20 June, 1920 (B. H. W.); Portland, 25 July, 1920 (B. H. W.); Madison, 24 Sept., 1922 (B. H. W.); Cornwall, 5 June, 1921 (B. H. W.).

D. sayi (Fitch). *Amblycephalus sayi* Fitch. (Pl. iii, 2.)

Homop. N. Y. St. Cab., 61, 1851.

Rather short, vertex rather strongly angled, tip, two concentric bands and a median longitudinal stripe pale, forming dark reddish brown spots between them. Pronotum brownish with pale longitudinal stripes. Elytra short and broad at apex, often not exceeding abdomen, brownish, veins white, a dark band across middle and another across apex of elytra. Female segment broadly concavely rounded. Male plates rather long and tapered to blunt tips. Length 3.5 mm.

A very abundant meadow species of economic importance throughout the northern states from May to October. It often feeds on the tall grasses and is able to live under a variety of conditions.

New Haven, 31 Oct., 1903 (H. L. V.); 20 Aug., 1909, 26 June, 1910, 30 May, 1911 (B. H. W.); 22 Sept., 1918 (F. H. L.); 28 June, 11, 18 July,

1920 (B. H. W.); West Haven, 27 June, 1905 (H. L. V.); Bridgeport, 20 Sept., 1920 (B. H. W.); Waterbury, 15 Oct., 1920 (B. H. W.); Cornwall, 5 June, 1921 (B. H. W.); East Haven, 10 May, 1921 (B. H. W.); Hamden, 5 July, 1920 (P. G.); Orange, 22 June, 1920 (B. H. W.); North Branford, 5 July, 1921 (P. G.); Killingworth, 27 June, 1920 (W. E. B.).

D. misellus Ball.

Can. Ent., xxxi, 191, 1899.

Resembling *sayi* in general appearance but smaller and paler without the dark bands, and the female segment roundly produced. White markings on vertex not conspicuous, elytra short with veins white, often discal, claval and apical cells more or less black. Male plates shorter and broader than *sayi*. Length 3.2 mm.

A typical and apparently restricted northern form, found in sufficient abundance usually in New England to place it with those of economic value. Common on grasses during June, July and August.

D. weedi Van Duzee. (Fig. 11, 3a, b.)

Trans. Am. Ent. Soc., xix, 306, 1892.

Pale brown with white and fuscous markings. Vertex produced, as long as wide between eyes, well angled, a dark interrupted band just before eyes and four black triangular spots behind margin. Elytra with nervures broadly white, margined with fuscous. Clavus strongly reticulate. Female segment concavely rounded. Male valve broadly rounded, plates angularly produced. Length 3 mm.

Feeds on low pasture grasses and frequents waste places. It is a rather common form over a large area, including the New England States, June to September.

Huntington, 9 July, 1920 (B. H. W.).

D. interruptus DeLong.

Tenn. St. Bd. Ent., Bull. 17, 51, 1916.

Resembling *weedi* in coloration but more robust. Vertex distinctly angled, a little longer on middle than width between eyes, as long as pronotum, elytra broad but slightly exceeding abdomen. Quite variable in coloration. In dark specimens an interrupted band on vertex between eyes and four round black spots above margin often fused with band. Elytra with nervures pale, dark margined. Female last ventral segment very short at sides, convexly produced on middle to three times length of preceding segment, a membranous plate conspicuous at either side. Male valve almost transverse, slightly produced at middle and placed in concavity of last ventral segment. Plates one-half longer than valve concavely narrowed to acutely pointed tips. Length 2.9-3.2 mm.

Originally described from Tennessee, but has been collected in many states throughout the eastern United States, and the record

for Connecticut is perhaps the most northern. It occurs on grasses in moist places, often along stream margins.

New Haven, 11 July, 1920, 2 July, 1922 (B. H. W.); Hamden, 20 Aug., 1922 (B. H. W.).

D. compactus Osborn and Ball.

Proc. Ia. Acad. Sci., iv, 217, 1897.

Very short and broad, vertex broader than long, elytra scarcely exceeding abdomen, in the female surpassed by the ovipositor. Vertex marked with a transverse interrupted band between eyes and four black points, often pale, just above margin. Elytral cells margined with fuscous. Clavus reticulate veined. Female segment deeply concavely excavated, concealed except at lateral angles by a convexly rounding membrane. Male plates broad at base narrowed to pointed attenuated tips. Length 2.25 mm.

Found in company with *obtectus* on short grasses in high, well-drained pastures from June to September.

D. obtectus Osborn and Ball. (Fig. 11, 2.) (Pl. iii, 3.)

Proc. Dav. Acad. Sci., vii, 78, 1898.

Resembling *compactus* but longer, elytra considerably surpassing abdomen. Vertex broader than long with interrupted dark band before eyes and four small black spots behind margin. Spots behind eyes on pronotum and basal angles of scutellum black. Elytra pale, conspicuous dark margins and spots on cells black or dark brown. Female segment concavely excavated, almost concealed by median membrane roundly produced with a shallow notch either side of small median tooth. Length 3 mm.

Reported from Massachusetts and feeds in rather high pastures on short grasses. It seems to prefer this dry habitat where the land is well drained, and is common in a *Danthonia* association from June throughout the summer.

New Haven, 11, 31 July, 22 Sept., 1920 (B. H. W.); Guilford, 31 July, 1920 (B. H. W.).

D. vinnulus Crumb.

Ann. Ent. Soc. Amer., viii, 192, 1915.

In form resembling *weedi*, vertex bluntly angled, about as long on middle as basal width between the eyes. Elytra rather broad, outer clavus with very few reticulate veins. Vertex pale yellow, black markings from front extending on to vertex and forming a triangular spot on either side of apex, and a broken black band extending transversely across between anterior margins of eyes forms a white cross on anterior portion. Elytra olive, subhyaline, veins whitish, sometimes narrowly fuscous margined. Face black above with pale arcs. Female last ventral segment with lateral margins strongly emarginate from the base, lateral angles rounded to posterior margin which is bisinuate forming three lobes, the central one the smallest. Lateral membranes are present. Male valve triangular plates twice longer than valve.

concavely narrowed and produced to gradually tapering acutely angled apices.

This species has a rather wide distribution in the eastern United States. It occurs in abundance on *Andropogon virginicus* in upland and prairie areas. The record for Connecticut is a good one.

Madison, 24 Sept., 1922 (B. H. W.).

D. apicatus Osborn.

Can. Ent., xxxii, 285, 1900.

Small, robust, vertex almost as long as width between eyes, yellowish, unmarked. Pronotum yellowish anteriorly, shading to brown posteriorly. Scutellum brown. Elytra exceeding abdomen, chestnut brown, tips whitish hyaline, venation pale. Female segment concavely excavated, covered at the middle with a membrane which is convexly produced and has a brown spot either side of central tip so as to appear as having three points. Length 3 mm.

Occurs on *Panicum* during July and August. A common form in wet pastures and on margins of lagoons or other bodies of water. It has also been taken in rather dry habitats in large numbers.

New Haven, 4, 5, 16 July, 1920, 16 July, 1921, 2 July, 1922 (B. H. W.); Stratford, 9 July, 1920 (B. H. W.); Madison, 24 Sept., 1922 (B. H. W.).

D. inimicus (Say). *Jassus inimicus* Say. *Jassus sex-punctata* Provancher.

Jour. Acad. Nat. Sci. Phila., vi, 305, 1831.

Vertex considerably broader than median length, bluntly angled. Varying greatly in intensity of coloration but always with six black spots in two longitudinal rows. Two spots on margin of vertex, two on anterior margin of pronotum and two in basal angles of scutellum. Elytra long, the cells usually heavily marked with fuscous. Outer clavus heavily reticulated. Female segment excavated either side of a rather broad median tooth. Length 4.5 mm.

One of the few species of greatest economic importance, and having a great variety of food plants. It is a common grass feeder, but is also important in its relation to garden, cereal and forage crops as well as a pest of pasture and meadow.

New Haven, 3 Oct., 1902 (B. H. W.); 16 Oct., 4 Nov., 1903 (H. L. V.); 27 June, 1907 (W. E. B.); 26 June, 1912, 8 July, 1912 (at light); 4, 5, 11, 17, 18, 23, 27, 31 July, 8, Aug., 22 Sept., 1920 (B. H. W.); Kent, 31 Aug., 1904 (W. E. B.); Wethersfield, 24 June, 1913 (L. B. R.); Hamden, 20 June, 1920 (B. H. W.); Stratford, 9 July, 1920 (B. H. W.); Waterbury, 15 Oct., 1920 (B. H. W.); Meriden, 28 July, 1909 (A. I. B.); North Haven, 24 Sept., 1921 (B. H. W.); Marlborough, 15 July, 1922 (B. H. W.).

D. flavicosta Stål. *D. flavocostatus* Van Duzee. *D. retrorsus* Uhler.

Rio. Jan. Hemip., ii, 53, 1862.

Vertex broader than long, very bluntly angled, almost rounded

at tip. Dark testaceous to black, vertex with ocelli, spots along margin, one on disc and one inside either eye, whitish. Elytra with basal half of costal margin broadly yellow margined, cross veins from costa and apical margin, white. Veins pale on apical half. Female segment slightly rounded or truncated posteriorly. Length 3-3.5 mm.

The records from New Haven are apparently quite northern for this typical and common southern form where it is abundant in meadows throughout the summer.

New Haven, 3 Oct., 1902 (B. H. W.); 11, 16, 18, 27 July, 1920 (B. H. W.); 8 July, 1912 (at light); North Haven, Sept., 1921 (B. H. W.).

D. debilis Uhler. *D. melsheimeri* Osborn and Ball.

Bull. U. S. Geol. Geog. Surv. Terr., i, 360, 1876.

Large green species with vertex distinctly angled, as long at middle as width between eyes, yellowish green in color, unmarked. Face slightly infuscated, usually pale. Elytra a uniform green with venation conspicuous. Female segment slightly produced and notched at middle, either side of which is a black mark. Male plates convexly rounded and very blunt at apex. Length 4-4.5 mm.

This species is rather widely distributed throughout the northern states usually occurring on grasses in low wooded areas.

D. abdominalis (Fabricius). *Cercopis abdominalis* Fabricius.

Cicada bicolor Fabricius. *Cicada balteata* Zetterstedt.

Aphrodis juvenca Hardy.

Syst. Rhyng., 98, 1803.

Resembling *debilis* but with vertex distinctly broader than long, more bluntly angled and pronotum with very short lateral margins. Greenish, vertex and anterior portion of pronotum yellowish. Face dark or black at base. Elytra greenish, opaque, often black or with black areas, usually subhyaline at apex. Venation as a rule obscured. Female segment slightly excavated, black margined and often incised at middle. Male plates longer than *debilis*, well rounded at apices. Length 4.5 mm.

Inhabits low grassy, often swampy areas, and feeds on coarse vegetation in these habitats. It is a common form in the northern states and Canada as well as Europe.

D. pascuellus (Fallen). *Cicada pascuellus* Fallen. *Cicada punctipes* Zetterstedt. *D. minkii* Provancher. (Fig. 11, 6a, b, c.)

Hemip. Suec., Cicad., 32, 1826.

Vertex obtusely angled, almost rounded, wider between eyes than median length; yellow, a point either side of apex black. Face infuscated, with numerous pale arcs and a black line at base. Elytra greenish, subhyaline, nervures conspicuous. Female segment gradually, rather deeply excavated, deeply incised at center, lateral angles prominent. Male plates broad at base narrowed to blunt tips. Length 3.5 mm.

An European form now recognized as a pest of economic impor-

tance in meadows of New England and some of the middle Atlantic states, feeding on grasses in low areas during July, August and September.

Branford, Cheshire and New Haven, 22 Sept., 1918 (F. H. L. and D. M. D.); 14 June, 7, 11, 18 July, 8 Aug., 1920 (B. H. W.); Cornwall, 22 Oct., 1920 (B. H. W.); Hamden, 20 June, 1920 (B. H. W.); North Branford, 13 July, 1920 (B. H. W.); Killingworth, 27 June, 1920 (B. H. W.); New Haven, 25 June, 1921 (B. H. W.).

D. minimus Osborn and Ball. *Deltocephalus melsheimerii* Van Duzee.

Proc. Ia. Acad. Sci., iv, 211, 1897.

Very small, vertex produced, longer than width between eyes, bluntly angled at tip. Pronotum very strongly convex anteriorly, lateral margin almost obsolete. Vertex yellowish green, ocelli black, margin slightly infuscated. Elytra greenish, subhyaline, venation somewhat obscured. Female segment slightly produced, medially notched, with a black spot either side. Male plates long, gradually narrowed to acute tips. A black spot near middle of either plate. Length 2.75-3 mm.

This species resembles closely *melsheimerii* (Fitch), and they are frequently confused in collections. Common on grasses in pastures and uncultivated areas. Old pastures are ideal feeding places in July and August.

New Haven, 3 Oct., 1902 (B. H. W.).

D. striatus (Linnaeus). *Cicada striata* Linnaeus. *Jassus striata* Herrich-Schaeffer. *Deltocephalus striatus* Flor. *Deltocephalus sabulicola* Curtis. *Deltocephalus affinis* Gillette and Baker. *Deltocephalus affinis* Van Duzee. (Pl. iii, 5.)

Hemip. Col., 84, 1895.

Robust, vertex wider than long, obtusely angled, yellow or fuscous, often with darker markings. Pronotum with very short lateral margins and marked with darker longitudinal bands. Elytra dull green, venation paler and conspicuous. Face infuscated, with numerous pale arcs. Female segment concavely rounded. Male plates very short and rounded, scarcely exceeding convex valve. Length 3.5-4 mm.

Quite variable in coloration, often pale or heavily marked.

A very common and widely distributed form throughout the summer feeding in pastures and meadows on field and swamp grasses. Common in New England.

There has been some confusion regarding the synonymy of this species but a careful study of European material and material from Prof. Gillette show them to be the same species which has been described at least twice in Europe and once in this country.

New Haven, 14, 20 June, 1920, 29 May, 1921 (B. H. W.).

D. nominatus Sanders and DeLong. *Deltocephalus oculatus* Osborn and Ball.

Penn. Bur. Pl. Ind., Tech. Bull. No. 1, 9, 1920; Proc. Ia. Acad. Sci., iv, 212, 1897.

Vertex produced and acutely angled but a little blunt at tip. Pronotum very strongly convex anteriorly. Straw yellow, ocelli and median impressed line of vertex black. Elytra subhyaline, nervures pale. Female segment with a slightly produced portion at middle, black and trilobate. Male plates rather broad at base, tips narrow, acutely angled and attenuated. Length 3.2 mm.

A rather common form on *Andropogon* grasses in high fields or rather dry places. It is more commonly found in western and southern localities, and although not definitely reported from New England it may occur rather sparsely.

New Haven, 14 June, 7, 20 July, 1920 (B. H. W.); North Haven, 4 Sept., 1921; Madison, 24 Sept., 1922 (B. H. W.).

D. littoralis Ball.

Proc. Biol. Soc. Wash., xviii, 120, 1905.

Vertex produced, obtusely angled, wider than median length. Dull yellow, ocelli black and a suggestion of brownish reflexed arcs. Elytra dull greenish, subhyaline, venation pale and conspicuous; rather short, in female exceeded by abdomen. Female segment triangularly produced from base, a notch either side just before apex, forming three rather distinct teeth. The processes of an underlying segment visible at each side. Male plates short concavely narrowed to pointed tips. Length 3.5-4 mm.

It has been found only on *Distichlis spicata* on sandy areas of the Atlantic Coast, but seems to have a rather wide distribution over such areas during June, July and August.

Rowayton, 5 Aug., 1909 (C. W. J.).

D. melsheimerii (Fitch). *Amblycephalus melsheimerii* Fitch.
D. vicilinus Crumb.

Homop. N. Y. St. Cab., 61, 1851.

A small species with pointed head. Vertex strongly produced and sharply angled, distinctly longer than width between eyes and longer than pronotum. Female usually rather uniform yellowish, elytra subhyaline, nervures milky white, face with faint arcs. Male brighter yellow, a faint brown arc either side from apex to black ocelli, white nervures of elytra faintly bordered with fuscous throughout. Six or seven pairs of arcs on face. Female last ventral segment about equaling preceding, median half of posterior margin with simple, very shallow, black bordered excavation. Male valve almost semi-circular, considerably longer than preceding segment; plates broad at base, only slightly narrowed to broadly rounded upturned tips, appearing from below as almost truncate. Length 2.5-2.75 mm.

A very common meadow species which is distributed over a large area in the eastern United States. Since its description in 1851 this species has been confused with *minimus* Osborn and Ball, and

striatus Linnaeus (*affinis* Gillette and Baker). An examination of the type has proven that this species is distinct, and is the same as *vicilinus* described by Crumb in 1915.

New Haven, 8 Oct., 1902 (B. H. W.); 7, 11 July, 1920 (B. H. W.); Hamden, 5 July, 1920 (P. Garman); North Branford, 12 June, 1921 (B. H. W.).

D. sylvestris Osborn and Ball. (Fig. 11, 4a, b, c, d.) (Pl. iii, 6.)

Proc. Ia. Acad. Sci., iv, 213, 1897.

Vertex longer than width between eyes, acutely angled, dull greenish with a curved line from apex toward each ocellus, and a longitudinal stripe either side of middle, fuscous. Elytra rather long, greenish subhyaline, nervures pale, often slightly fuscous margined. Female segment abruptly produced and black on median third. Male plates long, concavely rounded to blunt apices. Length 3.5 mm.

Feeds in waste places and sheltered areas, on short grasses during June, July and in late summer.

New Haven, 22 Sept., 1918 (F. H. L. and D. M. D.); 11 July, 1920 (B. H. W.); North Branford, 2 June, 1921 (B. H. W.).

D. acus Sanders and DeLong.

Penn. Bur. Pl. Ind., Tech. Bull. No. 1, 10, 1920.

Vertex sharply angled, one-fifth longer on middle than width between eyes. Greenish yellow, an arcuate line from apex to eye, pale brown. Elytra milky hyaline, veins paler, faintly bordered with fuscous. Female last ventral segment slightly longer than preceding, hind margin with median half produced, forming a broad pointed tooth with sinuate sides, margined with brown. Male valve triangularly rounded, as long as, but narrower than, last ventral segment. Plates at base as broad as last ventral segment, twice length of valve, concavely narrowed to round pointed tips. Length 4 mm.

An abundant and widespread species found in grassy and swampy areas and which apparently has been confused for some time with *melsheimerii* and *nominatus*, both of which it resembles.

New Haven, July 11, 1920 (B. H. W.).

D. simplex Van Duzee.

Trans. Am. Ent. Soc., xix, 304, 1892.

Vertex at least one-third wider than long, very bluntly and obtusely angled, greenish yellow with four black spots just back of margin, a pair of triangular spots at apex and one next either eye just above ocellus. Elytra rather long, dull green or whitish, veins bright green. Female segment with lateral lobes rounded, excavated either side of broad median tooth. Portions of under segment visible at the sides. Male plates very broad at base, concavely, abruptly narrowed at half their length to elongated pointed tips. Length 5-5.5 mm.

Occurs on *Spartina patens* in swampy areas.

Stratford, 21 July, 1912 (at light), 9 July, 1920 (B. H. W.); also reported from Branford and Stony Creek without specific dates; New Haven, 1 Aug., 1920 (B. H. W.); Fairfield, 26 Aug., 1920 (B. H. W.).

D. osborni Van Duzee.

Trans. Am. Ent. Soc., xix, 304, 1892.

Broad and robust, vertex one-third wider than long, very blunt, almost rounded at tip, a pair of large black spots at apex, and often a smaller one each side next ocellus. Sometimes with fuscous blotches on disc. In pale specimens some or all of these markings may be absent. Pronotum yellowish with longitudinal white stripes. Elytra broad, dull yellow, subhyaline, nervures white, broadly fuscous margined. Female segment slightly bisinuated and dark margined at middle. Male plates broad at base, concavely rounded to acute tips. Length 4.5-5 mm.

Found on tall grasses often in swampy places, but usually in rather small numbers during July, August and September.

D. balli Van Duzee. *nigrifrons* Van Duzee.

Check List Hemip., 71, 1916; Trans. Am. Ent. Soc., xxi, 293, 1894.

Vertex twice as long as wide, rounded anteriorly, yellow with four large black spots above margin and a smaller one next either eye. The outer spots are often fused with paler areas on the disc almost forming a transverse band. Face black with a median stripe and numerous arcs, yellow. Venter black. Elytra brownish green, subhyaline, nervures paler. Female segment concave with a slight median tooth and brownish portion at middle. Male plates gradually narrowed to sharp acute tips. Length 4 mm.

An important pest of cereal and forage crops and a very common member of the meadow and pasture groups feeding on cultivated and wild grasses.

Kent, 31 Aug., 1904 (W. E. B.); New Haven, 22 Sept., 1918 (F. H. L.).

Aconura Lethierry.

Athysanella Baker.

Vertex broad, obtusely angled, rounding to front. Pronotum usually shorter than vertex, transversely wrinkled posteriorly. The elytra are usually short and with abbreviated venation. Ovipositor very long comparatively.

The species of this genus feed upon short grasses of the prairie type which are found on dry uplands. Most of them occur throughout the plains region of the west but one species is known to occur in the New England states.

A. acuticauda (Baker). *Athysanella acuticauda* Baker.

Psyche, viii, 186, 1898.

Vertex blunt, angularly or roundingly produced, and broadly rounding to front. Pronotum very short and broad. Elytra short

covering only basal two or three segments of abdomen; occasionally reaching almost to tip of abdomen. Ovipositor in female long, body gradually tapering and wedge-shaped. Color dull green to brownish, vertex with a pair of large round black spots extending over on to the front and a spot on middle of front visible from above. Elytra often striped with brown, abdomen marked with brownish spots and darker areas. Female segment with lateral angles produced, between which the posterior border is emarginate either side of a slightly produced broad median lobe. Male valve strongly roundly produced, plates short and broad, divergent, bluntly pointed, notched on outer margins. Length female, 4 mm.; male, 3 mm.

A rather abundant species in dry upland pastures and meadows where the soil is well drained and short grasses are the principal species.

New Haven, 8 May, 1921 (B. H. W.).

Driotura Osborn and Ball.

Head short, almost parallel margined, obtuse, face short and broad. Pronotum short, transversely striate posteriorly. Elytra coarsely rugose, short, extending either to second abdominal segment only, or almost to end of abdomen.

D. gammaroides (Van Duzee) *Athysanus gammaroides* Van Duzee. (Fig. 10, 1.)

Bull. Buff. Soc. Nat. Sci., v, 209, 1894.

Black, shining, usually unmarked, short, robust, elytra coarsely rugose, usually extending only to second segment of abdomen. Length 3-4 mm.

Frequents waste areas where wild grasses are common, or often pastures of several years standing. Common in many areas.

Stonington, 16 May, 1906; New Haven, 13 May, 1911 (B. H. W.); 31 July, 8 Aug., 1920 (B. H. W.); Killingworth, 31 May, 1920 (B. H. W.); Hamden, 10 Apr., 1921 (B. H. W.); Ellington, 25 Aug., 1920 (B. H. W.); Orange, 21 July, 1905 (W. E. B.).

Euscelis Brullé.

Phrynomorphus Curtis.

Athysanus Burmeister.

Opsius Fieber.

Body usually robust, vertex obtuse, often roundly angled, sometimes rounded and almost parallel margined, not forming a definite margin with front. Elytra usually shorter or only slightly exceeding abdomen, with one cross vein.

Four very distinct groups any one of which might easily be considered as a genus are found here. So the species can scarcely

be characterized as regards many structural characters. If the cross nervures between the sectors were of importance they would be of service here as factors in classification, but their relative significance is still an open question.

In regard to feeding habits they closely resemble and are associated with species of *Deltocephalus*, being found almost entirely on grasses and low forms of vegetation.

Key to Species.

1.

Anterior margin of vertex slightly produced before the eyes, wider than long

2
- Anterior margin of vertex usually well produced before the eyes, angled with front or somewhat conical

5
2.

Vertex with heavy black band between the eyes, elytra greenish, nervures pale

3
- Margin of vertex with two large round black spots, elytra whitish hyaline, nervures dark

exitiosus
3.

Length 4.5 mm. or more, head very slightly produced

4
- Smaller, 3.5 mm., wedge-shaped, head more produced at middle

cuneatus
4.

Vertex slightly produced at middle, band on vertex narrow, length less than 5 mm.

striolus
- Vertex parallel margined, band on vertex broad, length 6 mm.

parallelus
5.

Vertex wider than length at middle

6
- Vertex as long as width at base, yellow with two large round spots above apex

curtisi
6.

Species rather short and very broad, elytra short, scarcely exceeding abdomen, central anteapical cell not constricted

7
- Species smaller and more elongate, elytra usually longer than abdomen. Central anteapical cell constricted at middle

11
7.

Very broad, pale, or light brown with white spot on cross nervure

8
- Narrower, usually black, or dark brown, without white spot on cross nervure

10
8.

Vertex rounded, less than twice as long at middle as next the eye

9
- Vertex angled, twice as long on middle as next the eye, two spots close to apex, and an interrupted band between eyes

extrusus
9.

Vertex unmarked or with two round spots

relativus
- Vertex with transverse bands, a broad white spot on cross nervures

varus
10.

Vertex angled, nearly twice as long on middle as next eyes, yellow at base

uhleri
- Vertex rounding, little longer on middle than next eye. Shining black

anthracinus
11.

Elytra distinctly longer than body, more than 4 mm. in length

12
- Elytra not exceeding abdomen in length, vertex with transverse band between anterior margins of eyes

arctostaphyli
12.

Shorter and broader, vertex more obtusely angled, elytra broader at tip, color brownish, nervures pale, dark margined

13
- Long and very narrow, vertex sharply angled, elytra tapering, color black, vertex with pale lines and markings, nervures pale

elongatus
13.

Vertex brown with transverse fuscous markings, face dark

14
- Vertex fulvous without definite markings, face testaceous

symphoricarpace
14.

Pale olive testaceous tinged with tawny, tibia orange

vaccinii
- Dark brown without tawny color legs dark

striatulus

E. exitiosus (Uhler). *Cicadula exitiosus* Uhler.

Am. Ent., iii, 72, 1880.

A variable species with rounded head. Two black spots on rounded margin of vertex, two oblique dashes on basal angles, and a dark crescent-shaped band between eyes. Four transverse black spots near anterior margin of pronotum and black markings in basal angles of scutellum; elytra hyaline, nervures black. Length 3.5-4.5 mm.

A southern and southwestern species, no doubt found occasionally in the state during July, August and September.

E. cuneatus Sanders and DeLong.

Penn. Bur. Pl. Ind., Tech. Bull. i, 17, 1920.

The smallest of the black banded vertex species of this group. Wedge-shaped, head including eyes wider than pronotum, vertex slightly produced and rounded. Yellowish green, a line below ocelli, a band between eyes, sometimes interrupted and a triangular spot at apex, black. Elytra smoky subhyaline, nervures yellowish. Face with black arcs, sutures and antennal pits. Female last ventral segment with pointed lateral angles, posterior margin concave to a short median black tooth. Male valve broadly triangular with rounded apex, plates long, tapered to attenuated tips. Length 3-3.5 mm.

A very common and abundant species in moist places. It frequents lagoon margins and has been taken from *Juncus* and *Cyperus*.

New Haven, 20 Aug., 1920, 19 June, 1921 (B. H. W.); Hamden, 20 Aug., 1922 (B. H. W.); Madison, 24 Sept., 1922 (B. H. W.).

E. striolus (Fallen). *Cicadula striolus* Fallen. *Jassus frenatus* Germar. (Fig. 10, 6.)

Acta Holm, xxvii, 31, 1806.

Vertex a little longer on middle than next eyes, almost parallel margined, green with a transverse black stripe on vertex between eyes, a waved one on margin, and arcs on face, black. Elytra sordid green, nervures paler. Female last ventral segment strongly concavely rounded. Male valve obtusely triangular, plates with outer margins straight, tips bluntly angled. Length 3.5-4.5 mm.

Occurs in swampy and boggy places and is found in great numbers on *Juncus* along moist margins of ponds and lagoons during July, August and September.

Reported from Branford; Stratford, 9 June, 1920 (B. H. W.).

E. parallelus (Van Duzee). *Athysanus parallelus* Van Duzee. (Fig. 8, 6; Fig. 10, 2.)

Can. Ent., xxiii, 169, 1891.

A much larger and broader species than the two preceding. Vertex parallel margined, green, with a broad transverse band

covering anterior portion of vertex, and arcs of face, black. Elytra often with longitudinal black markings, nervures pale. Female last ventral segment with broadly rounded lateral angles, posterior margin rather narrowly, deeply concave. Male valve obtusely angled, plates short and broad, tips broadly, bluntly rounded. Length 6 mm.

Occurs in company with the two preceding species in swampy places on small sedges. It should be found abundantly in the state.

Branford, 21 July, 1920 (B. H. W.); New Haven, 11 July, 1920 (B. H. W.).

E. extrusus (Van Duzee). *Athysanus extrusus* Van Duzee.
Athysanus venosus Osborn.

Can. Ent., xxv, 283, 1893.

Rather short, quite broad; vertex obtusely angled, yellowish with four triangular spots and often an interrupted transverse band between eyes. Pronotum irregularly marked with brown. Elytra short and broad, nervures pale, margined with fuscous. Female last ventral segment with lateral angles triangularly produced, posterior margin truncated on middle half. Male valve obtusely triangular, plates divergent to the parallel outer margins. Style-like tips of pygofers extending far beyond the plates. Length 4.2-5.2 mm.

Frequently found in meadows on grasses, but rarely in sufficient abundance to be considered of economic importance. It commonly occurs in marshy places on sedges.

Mount Carmel, 25 May, 1906; New Haven, 19, 26 June, 1910; Hamden, 28 May, 1911; North Branford, 8 June, 1912, 23 May, 1922 (B. H. W.); Killingworth, 31 May, 1920 (B. H. W.); Cornwall, 5 June, 1921 (B. H. W.); East Haven, 10 May, 1921 (B. H. W.); Guilford, 13 July, 1921 (B. H. W.); Portland, 25 July, 1920 (B. H. W.).

E. relativus (Gillette and Baker). *Athysanus relativus* Gillette and Baker. *Athysanus obsoletus* Provancher.

Hemip. Col., 93, 1895.

Vertex quite bluntly angled, rounding in front, pale straw yellow, sometimes with a pair of dark spots on vertex. Elytra very short, often not reaching the tip of abdomen, yellowish subhyaline, nervures indistinct. Female last ventral segment with posterior margin roundingly, rather shallowly emarginate, a small pointed black tooth in its apex. Male valve short, triangular; plates three times as long as valve, roundingly narrowed to broad, blunt apices. Length 4.5-5 mm.

A northern form which has been taken in the state although more abundant in the western United States. It feeds on grasses in meadows.

New Haven, 9 Nov., 1903 (H. L. V.); 22 Sept., 1920 (B. H. W.).

E. varus (Ball). *Athysanus varus* Ball.

Can. Ent., xxxiii, 5, 1901.

Vertex with broad, sloping apex, straw yellow with transverse

bands; form slender, elytra long and narrow, dark with light nervures, especially the cross nervures. Female last ventral segment with posterior margin nearly truncate, median third slightly produced. Male valve semicircular, plates triangular, three times as long as valve. Length 4.25-5 mm.

Perhaps very rare in the state, occurring normally on the plains in the west.

Definitely reported from Connecticut.

E. uhleri (Ball). *Athysanus uhleri* Ball. *Athysanus plutonius* Provancher.

Can. Ent., xliii, 200, 1911.

Vertex obtusely angled, sides straight, black, a pale transverse band on base of vertex, and pale spots near apex. Pronotum and scutellum mottled. Elytra exceeding abdomen, almost truncate at apex, nervures usually yellow. Length 4-4.5 mm.

Often collected in company with *anthracinus* in high pastures, frequently on poor land where only very short rather dry grasses are found.

New Haven, 26 June, 1912 (at light); 5 Aug., 1920, 4 July, 1921 (B. H. W.); Cornwall, 18 July, 1921 (B. H. W.); Guilford, 24 July, 1921 (B. H. W.); Huntington, 9 July, 1921 (B. H. W.); New Haven, 12 June, 1921; 4 July, 1921 (B. H. W.).

E. anthracinus (Van Duzee). *Athysanus anthracinus* Van Duzee.

Can. Ent., xxvi, 136, 1894.

Black shining, vertex more rounded than in *uhleri*, tibia of first and second legs yellow. Traces of pale arcs on face. Elytra black, veins indistinct. Length 3.5-4 mm.

Collected in rather high and dry meadows where it feeds in abundance on very short grasses.

Thompson, 11 July, 1905 (H. L. V.); Orange, 21 July, 1905 (W. E. B.); New Haven, 4, 5 July, 1920, 3, 9 July, 1921 (B. H. W.); Cornwall, 5 June, 1921 (B. H. W.); North Branford, 16 June, 1922 (B. H. W.).

E. symphoricarpae (Ball). *Athysanus symphoricarpae* Ball.

Can. Ent., xxxiii, 5, 1901.

Vertex broadly rounded, apex blunt and conical. Pale testaceous, vertex usually reddish. Elytra with pale nervures. Length 4.5 mm.

Reported for Massachusetts and undoubtedly has a wider distribution throughout New England.

E. arctostaphyli (Ball). *Athysanus arctostaphyli* Ball.

Ent. News, x, 172, 1899.

Vertex slightly, obtusely angulate, apex conically produced, yellowish with two and often three rather definite transverse bands. Elytral nervures pale, margined with fuscous. Length 3.5-4 mm.

Occurs on bearberry (*Arctostaphylos*), and usually found in a heath habitat on high ground, and in mountainous regions, July and August.

E. striatulus (Fallen). *Cicada striatulus* Fallen. *Jassus plutonius* Uhler. *Athysanus vaccinii* Osborn and Ball.

Hemip. Suec., Cicad., 45, 1826.

Dark brown without tawny tinge, legs dark in color, vertex with three dark interrupted transverse lines between eyes. Length 4-4.5 mm.

A common form in bogs on blueberry and allied plants in August and September.

New Haven, 4 July, 1921; Portland, 25 July, 1920 (B. H. W.).

E. vaccinii (Van Duzee).

Ent. Amer., vi, 135, 1890.

Perhaps not distinct from *striatulus* and at least quite similar in form and coloration. Paler and with fewer dark markings, olive testaceous tinged with tawny, all the tibia orange. Length 4-4.5 mm.

Found with the preceding in boggy areas occurring on blueberry.

New Haven, 4 July, 1920, 4 July, 1921 (B. H. W.). Sweet fern.

E. elongatus (Osborn). *Athysanus elongatus* Osborn.

Me. Agr. Expt. Sta., Bull. 238, 1915.

Narrow, black with yellow markings. Vertex obtusely angled, black with basal spots and three on disc, yellow. Frontal arcs on face, spots on anterior margin of pronotum and outer angles of scutellum yellow. Elytra yellowish hyaline, veins fuscous margined. Length 3.25-4 mm.

Often common in low pasture land on grasses during July and August.

E. curtisii (Fitch). *Amblycephalus curtisii* Fitch. *Jassus nervatus* Provancher. (Pl. iii, 9.)

Homop. N. Y. St. Cab., 61, 1851.

Vertex angled, greenish yellow with two large black spots on disc and an irregular one at apex black. Anterior half of pronotum and a narrow posterior margin, black. Elytra dark fuscous, margins and nervures yellow. Length 3-3.5 mm.

Occurs in good numbers in grassy pastures and meadows.

Thompson, 11 July, 1905, Putnam, 12 July, 1905 (H. L. V.); New Haven, 22 Sept., 1918 (F. H. L., D. M. D.), 20 June, 1920 (B. H. W.); Branford, 21 July, 1920 (B. H. W.); Cornwall, 22 Oct., 1920 (B. H. W.); Orange, 22 June, 1920, Waterbury, 15 Oct., 1920 (B. H. W.); North Branford, 12 June, 1921 (B. H. W.).

Eutettix Van Duzee.

Vertex rather short and sloping, distinctly transversely impressed, elytra rather broad with one cross nervure between the sectors. Ramose pigment lines when present, aggregated into oblique bands or saddle areas. Usually conspicuously and often brightly colored.

Several of the species of the genus are two brooded, others only one and the food plants although specific in most cases for each species, range from trees and shrubs to various grasses and herbs. As a group they seem to prefer wooded and shaded areas.

Key to Species.

1. Elytra with one cross nervure between the sectors, costal margin without supernumerary veinlets 2
 Elytra with two cross nervures between the sectors or supernumerary veinlets to costa 7
2. Elytra without markings in the form of transverse bands or ramose lines 3
 Elytra with a definite oblique band across posterior half of clavus 6
3. Vertex and pronotum pale, usually yellow, elytra dark with a white commissural spot 4
 Vertex often pale, pronotum same color as elytra 5
4. Vertex and pronotum yellow, unmarked, elytra tawny, nervures indistinct *luridus*
 Margin of vertex with a transverse black band, elytra creamy with brownish coloring around pale commissural spot *slossoni*
5. Whole insect mottled with brown *marmoratus*
 Uniformly reddish or chestnut-brown *southwicki*
6. Pronotum and anterior half of elytra milky white, posterior portion with a transverse brownish band *seminudus*
 Whole insect with reddish tint, band on posterior half usually much darker *strobi*
7. Vertex with six black spots on anterior margin, elytra fulvous yellow with white spots *johnsoni*
 Vertex unmarked, elytra fuscous with a definite light band across first cross nervure between the sectors *cinctus*

E. luridus (Van Duzee). *Thamnotettix luridus* Van Duzee.
 Can. Ent., xxii, 250, 1890.
 Vertex, pronotum and scutellum fulvous, elytra testaceous brown, paler toward costa, with commissural spot creamy yellow. Length 6 mm.
 Occurs on undergrowth in wooded or cut over areas, a rather widely distributed form which should occur in New England during August and September.

E. marmoratus Van Duzee. *Eutettix incerta* Gillette and Baker.
 Trans. Am. Ent. Soc., xix, 302, 1892.
 Pale yellowish brown, vertex with a line in transverse depression, two spots at apex, four along base and median impressed line, testaceous. Elytra subhyaline with testaceous blotches and a white spot on commissure. Length 5.5 mm.
 Frequently found on herbaceous plants in wooded areas during early spring and August.
 Lyme, 16 June, 1918 (B. H. W.); Stonington, 19 May, 1914 (I. W. D.); Plainville, 2 Sept., 1921 (B. H. W.).

E. southwicki (Van Duzee). *Eutettix brunneus* Osborn.
 Bull. Buff. Soc. Nat. Sci., v, 209, 1894.
 Vertex dull yellowish irregularly marked with testaceous.

Pronotum brown, elytra of a uniform testaceous color, smoky at tips. Length 4 mm.

Occurs under similar conditions as preceding in early spring and late summer.

E. slossoni Van Duzee.

Bull. Buff. Soc. Nat. Sci., v, 210, 1894.

Creamy yellow, a broad black band on base of front, extending a little upon vertex, bisected at middle. A faint brownish transverse band on posterior portion of pronotum. Elytra mottled with brown. Length 5.5 mm.

A southern form which may be taken in the state.

E. johnsoni Van Duzee. (Fig. 9, 12.)

Can. Ent., xxvi, 137, 1894.

General appearance of *Mesamia vitellina* but smaller with shorter vertex and marked with black. Orange-yellow, an interrupted line below margin and six dashes above, black, three stripes on pronotum and oval spots on elytra milky white. Length 5 mm.

Apparently two brooded; occurs in rather open woods on undergrowth.

New Haven, 23 Oct., 1903 (H. L. V.); 22 Sept., 1918 (D. M. D.); 8 July, 1912 (at light); 4, 5, 7, 8, 11, 14, 31 July, 1920 (B. H. W.); East River, 2 Aug., 1910 (C. R. E.); Bridgeport, 20 Sept., 1920 (B. H. W.); Guilford, 26 July, 1920 (M. P. Z.); Orange, 17 July, 1920 (B. H. W.); New Canaan, 3 Sept., 1920 (B. H. W.); Norwalk, 8 Sept., 1920 (B. H. W.); Stratford, 9 July, 1920 (B. H. W.); Cornwall, 18 July, 1921 (B. H. W.); Milford, 13 July, 1920 (M. P. Z.); North Branford, 13 July, 1920, 16 June, 1921 (B. H. W.).

E. seminudus (Say). *Jassus seminudus* Say. (Pl. ii, 5; Fig. 10, 9.)

Jour. Acad. Nat. Sci. Phila., vi, 307, 1831.

Creamy white, scutellum irregularly marked with brown. Elytra milky white crossed on posterior half of clavus by a broad testaceous brown saddle narrowed at costa. Length 4.5-5 mm.

This form apparently has more than one food plant, often taken on shrubs or by sweeping in open fields.

New Haven, 27 June, 1908; 30 Aug., 1909 (W. E. B.); 4 Aug., 1909 (B. H. W.); 26 June, 8 July, 1912 (at light); 8 July, 1914 (M. P. Z.); 16, 29 July, 8 Aug., 1920 (B. H. W.); Cromwell, 27, 30 Aug., 1920 (B. H. W.); New Canaan, 3 Sept., 1920 (B. H. W.); Hamden, 11 June, 1921 (B. H. W.); Marlborough, 15 July, 1922 (B. H. W.).

E. cinctus Osborn and Ball. *E. Jucunda* Van Duzee. (Pl. ii, 4.)

Proc. Dav. Acad. Sci., vii, 97, 1898.

Vertex with apex bluntly conical, dirty greenish with saffron tint, pronotum brownish irrorate. Elytra pale, nervures reddish. A broad brown band across posterior half of clavus and extending obliquely back to costa. Length 5.3-6 mm.

Not abundant in northern states, occurring in wooded pasture areas on grasses and associated herbaceous plants.

New Haven, 21 Aug., 8 Oct., 1909 (B. H. W.); Plainville, 2 Sept., 1921 (B. H. W.).

E. strobi (Fitch). *Bythoscopus strobi* Fitch.

Homop. N. Y. St. Cab., 58, 1851.

Vertex, pronotum and scutellum fulvo-testaceous, irrorate. Elytra milky white with basal and apical bands and a median saddle of reddish brown. Eyes red. Length 4.5-5.25 mm.

A two brooded species, the immature forms feeding on lamb's quarters. The adults occur on a variety of plants during June, July and August.

Westville, 9 Sept., 1907 (W. E. B.); New Haven, 8 July, 1912 (at light); 29 July, 1920 (B. H. W.); Hamden, 19 July, 1914 (M. P. Z.); Manchester, 16 Sept., 1920 (B. H. W.); Marlborough, 15 July, 1922 (B. H. W.).

Phlepsius Fieber.

Paraphlepsius Baker.

Parallogyus Melichar.

Vertex usually obtusely angled or roundly produced, the anterior margin often angled, drawn out to a fine edge or frequently almost rounding to front. Elytra inscribed with ramose brown pigment lines, usually rather uniform, but when unevenly marked not forming saddle areas along suture.

A number of large species belong to this genus. The entire group feed on grass or herbaceous plants, and a number are

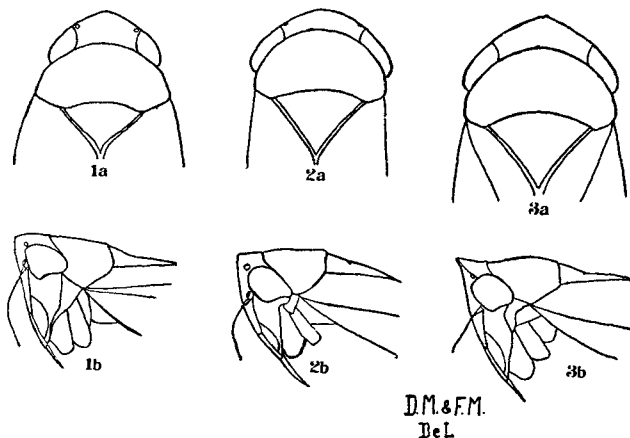


FIG. 12. (1a) *Phlepsius decorus* Osborn and Ball,—head, dorsal view; (1b) same, lateral view. (2a) *Phlepsius fuscipennis* Van Duzee,—head, dorsal view; (2b) same, lateral view. (3a) *Phlepsius solidaginis* Walker,—head, dorsal view; (3b) same, lateral view. All greatly enlarged. Drawing by D. M. and F. M. DeLong.

meadow and pasture pests. Others live almost exclusively in heath, swamp or bog conditions, and with knowledge of their habitats often definite species can easily be collected since their conditions of living are often very restricted.

Key to Species.

1. Head narrower than pronotum. (Fig. 12, 1a.) 2
 Head as wide as or wider than pronotum. (Fig. 12, 2a.) 4
2. Large, exceeding 6.5 mm. in length, broad, but rather elongate ... 3
 Shorter and broader, not exceeding 6 mm. in length **decorus**
3. Resembling a *Gypona* in general, very large, 9 to 10 mm., bright reddish brown **majestus**
 Smaller, not exceeding 7 mm., fulvous, elytra with pale trilobate commissural line **excultus**
4. Margin of vertex often rather sharp and angulate, but never thin or foliaceous. (Fig. 12, 2b.) 5
 Margin of vertex with a thin sharp edge sometimes foliaceous. (Fig. 12, 3b.) 12
5. Margin of vertex very bluntly angled with the front which is rather strongly inflated 6
 Margin of vertex more angulate, rather sharp, front not strongly inflated 7
6. Head angularly produced, longer on middle than next eye, elytra sparsely inscribed, male plates short and broad **lobatus**
 Head not produced, scarcely longer on middle than next eye, elytra more heavily inscribed, male plates long, tapering. (Fig. 12, 2a.) **fuscipennis**
7. Elytra rather uniformly inscribed, usually no conspicuous dark blotches or bands 8
 Elytra with light and dark areas often appearing as transverse bands, usually conspicuous or with vertex and pronotum pale, and elytra dark 11
8. Short and robust not exceeding 5 mm. in length, female segment almost truncate with median notch **pusillus**
 Sometimes rather short but not robust, usually more than 5 mm. or if short with female segment not notched 9
9. Female segment truncate without teeth or incisions **truncatus**
 Female segment strongly incised or excavated on posterior margin 10
10. Broad with rather blunt head. Female segment roundly produced with deep triangular incision, not uniformly irrorate . **incisus**
 Narrow with angled vertex. Female segment with rather deep, square excavation containing broad median tooth, rather uniformly irrorate **irroratus**
11. Vertex, pronotum and scutellum pale yellow, elytra with lighter areas at middle and apex of clavus, female segment with prominent angles, shallowly excavated with median notch **collitus**
 Vertex, pronotum and scutellum darker, elytra with clavus paler, female segment deeply, squarely excavated almost to base ... **apertus**
12. Small, 5.5-6.5 mm. 13
 Larger, 7-8.5 mm. Vertex and pronotum with markings, elytra evenly inscribed or stippled 14
13. Vertex, pronotum and scutellum pale yellow, unmarked, elytra uniformly evenly inscribed with heavy pigment lines, appearing very dark in color **fulvidorsum**
 Vertex often thick but flattened near apex, appearing pressed in above and below, vertex and pronotum pale in color heavily and irregularly mottled with brown. Elytra banded **tullahomi**

14. Entire dorsal surface rather evenly and thickly irrorate with small round black dots. A broad black band on base of face.....

atropunctatus n. sp.

Dorsal surface marked with brownish ramose pigment lines..... 15
15. Vertex thin at margin, not foliaceous and only moderately produced. Vertex sloping, not concave. (Fig. 12, 3b.) 16

Vertex thin and foliaceous, strongly produced, margin slightly upturned, forming a slight concavity **ramosus**
16. Length 8-8.5 mm. Elytra distinctly narrowed apically **nebulosus**

Length 7-7.5 mm. Elytra slightly narrowed apically **solidaginis**

P. majestus Osborn and Ball.

Proc. Ia. Acad. Sci., iv, 229, 1897.

Very large and broad, resembling a *Gypona*, chestnut-brown. Head narrow, very slightly produced, a dark band between the eyes, often interrupted, and two spots before it and above apex, black. Anterior portion of pronotum with dark vermiculate markings. Elytra heavily inscribed with brown pigment lines. Length 9-10 mm.

Lives on tall grasses in thickets or rather densely shaded areas, and is a species difficult to capture because of its quick movements.

Lyme, 20 Aug., 1910; New Canaan, 14 Sept., 1911, Hamden, 6 Aug., 1922 (B. H. W.).

P. excultus (Uhler). *Jassus excultus* Uhler.

Bull. U. S. Geol. Geog. Surv. Terr., iii, 467, 1877.

A narrow-headed form with vertex, pronotum and scutellum yellowish, a pair of small brown spots at base of vertex, and a pair of curved spots behind them on pronotum just back of margin. Elytra very closely inscribed with dark brown. Three lighter areas along suture indicating a trilobate spot. Female segment broadly roundly excavated at center. Length 7 mm.

On grasses usually in open fields. Primarily a southern form, but may occur in restricted northern areas.

P. decorus Osborn and Ball. (Fig. 12, 1.)

Proc. Ia. Acad. Sci., iv, 230, 1897.

A very short, broad, narrow-headed species. Vertex with two rather indefinite dark areas at tip and posterior half brownish. The elytra along scutellum and three spots along suture pale. Elytra not closely inscribed and with several pale areas, especially along costa. Length 6 mm.

On grasses, usually in wooded areas. A rather common but not abundant species throughout New England, May, June, July and September.

P. incisus Van Duzee.

Trans. Am. Ent. Soc., xix, 73, 1892.

Elytra brown, vertex, pronotum and scutellum yellow, mottled with brown. Vertex a little longer on middle than next eye. Female segment roundly triangulate with a rather broad deep notch at middle of hind margin. Length 6-6.5 mm.

A common pasture form on grasses during July and August in shaded areas, or in open woods. Often taken with *irroratus* which it resembles superficially.

Scotland, 17 July, Hartford, 9 Aug., 1904 (B. H. W.); Cornwall, 17 July, 1922 (B. H. W.).

P. fuscipennis Van Duzee. (Fig. 12, 2a, b.)

Trans. Am. Ent. Soc., xix, 70, 1892.

Vertex short, blunt, rounded in front without sharp edge. Pronotum strongly wrinkled. Male darker in color. Fulvous brown, elytra closely inscribed with fine brown lines. In female clouded with fulvous brown, a rather indefinite pale saddle on suture. Length 6-7 mm.

In great abundance in marshy areas on *Juncus-Eleocharis* especially during August and September.

Branford, 28 June, 1905 (H. W. W.); Stratford, 21 July, 1908 (B. H. W.); Westport, 24 June, 1921 (W. E. B.).

P. collitus Ball.

Can. Ent., xxxv, 227, 1903.

Vertex, pronotum and scutellum yellow, elytra brown with conspicuous irregular white areas. Vertex slightly angled, female segment deeply excavated either side of a prominent median tooth which is incised at center. Length 5-6 mm.

A common form occurring in open field and wooded areas on grasses during July, August and September.

Thompson, 11 July, 1906 (H. L. V.); New Haven, 21 Aug., 1909 (A. I. B.); 22 Sept., 1918 (D. M. D.); 8 July, 1920 (B. H. W.); Cromwell, 30 Aug., 1920 (B. H. W.); Cornwall, 5 June, 1921 (B. H. W.); Hamden, 20 Aug., 1922 (B. H. W.); New Haven, 16 July, 1920 (M. P. Z.).

P. irroratus (Say). *Jassus irroratus* Say. *Jassus testudinarius* Burmeister. Irrorate Leafhopper. (Fig. 10, 5.)

Jour. Acad. Nat. Sci. Phila., vi, 308, 1831.

A common small slender species, almost uniformly inscribed and irrorate with brown. Vertex angled, elytra long, narrowed posteriorly. Female segment squarely abruptly excavated with a broad median tooth. Length 5.5-6.5 mm.

In abundance over large areas occurring on many types of vegetation, and under various conditions, but especially found on grasses in pastures and meadows.

New Haven, 24 June, 1902 (E. J. S. M.); 3 Oct., 1902 (B. H. W.); 16 Oct., 1903 (H. L. V.); 27 June, 1908 (W. E. B.); 12, 17, 26 June, 1912; 8, 9 July, 1912 (at light); 4, 11, 14, 16, 29 July, 1920 (B. H. W.); Yalesville, 19 Oct., 1903 (H. L. V.); New Canaan, 14 Sept., 1906 (W. E. B.); 3 Sept., 1920 (B. H. W.); East Haven, 21 July, 1920 (B. H. W.); Hamden, 18 July, 1920 (B. H. W.); Guilford, 13 July, 1920 (B. H. W.); East Hartford, 16 Sept., 1920, Cornwall, 22 Oct., 1920, Bridgeport, 20 Sept., 1920 (B. H. W.); Milford, 13 June, 1921 (B. H. W.); North Branford, 25 June, 1922 (B. H. W.); North Haven, 4 Sept., 1921 (B. H. W.); Norwalk, 8 Sept., 1920 (B. H. W.); Waterbury, 15 Oct., 1920 (B. H. W.); Plainville, 2 Sept., 1921 (B. H. W.).

P. truncatus Van Duzee.

Trans. Amer. Ent. Soc., xix, 72, 1892.

Resembling *irroratus* in size and coloration. Vertex bluntly angled, one-fifth longer on middle than next eye. Color pale fulvus irrorate with brown, some white spots on posterior margin; elytra white very closely and finely reticulated causing a dark brown appearance. Female last ventral segment twice as long as preceding, truncated posteriorly, angles rounded. Male valve short, truncated, plates narrow, tips more obtuse than in *irroratus*. Length 5.5 to 6 mm.

This species is a grass feeder and has been taken with *irroratus* which it so closely resembles. The genital characters of both sexes will readily separate it.

Guilford, 26 July, 1920 (M. P. Z.).

P. pusillus Baker.

Ent. News, ix, 66, 1898.

Closely resembling and related to *altus* but slightly smaller, and with different genital characters. Short and robust, vertex obtusely angled. Pronotum very broad and short, elytra short. Color pale fulvous with darker markings, vertex and pronotum irregularly irrorate, elytra finely irrorate with brown. Female last ventral segment almost truncate, lateral lobes only slightly produced and broadly rounded, slightly concave either side of a median V-shaped notch. Male valve triangularly produced, plates broad at base gradually narrowed to rather blunt, incurved apices.

Specimens have been examined from other Atlantic coast localities and it seems to be eastern and southern in its distribution. The species occurs on short grasses.

New Haven, 31 July, 1920 (B. H. W.); 22 Sept., 1920 (B. H. W.).

P. lobatus Osborn.

Proc. Ia. Acad. Sci., v, 247, 1898.

Small, vertex obtusely angled, slightly produced. Pale brown in color, not closely inscribed on elytra. Female segment with marginal lobes, and a convex posterior border between them minutely notched at center. Length 5.5-5.75 mm.

Usually found in sandy or dry areas on short grasses during August.

Branford, 28 June, 1905 (H. W. W.).

P. apertus Van Duzee.

Trans. Am. Ent. Soc., xix, 76, 1892.

Vertex with obtusely angled apex. Elytra irregularly banded, often a cloud at base, a fulvous band across middle and another across anteapical areoles. Head and pronotum tinged with fulvous. Female segment squarely, deeply excavated almost to base. Length 6.5 mm.

A northern form occurring throughout New England in pastures and moist areas during August and September.

P. tullahomi DeLong.

Tenn. St. Bd. Ent., Bull. 17, 73, 1916.

A banded species, closely related to *franconianus* but with a sharp-edged vertex, usually angularly produced as viewed from above. Vertex somewhat variable in length, from one-fourth to two-fifths as long at middle as width between the eyes. Face, vertex and pronotum pale, irregularly mottled with brownish. Elytra pale, the anterior half rather sparsely and the posterior half rather heavily inscribed with fine brownish lines and dots, giving the appearance of a pale anterior and a dark posterior portion. The coloration on posterior portion often broken into a more or less distinct narrow anterior, and a broader posterior, band.

Female last ventral segment almost twice as long as preceding; lateral angles prominent, posterior margin shallowly concavely rounded to two rather blunt, produced teeth at the middle between which is a shallow concave notch. Male valve triangular, as long as, and as wide at base as, last ventral segment, almost twice as wide as long. Plates twice longer than valve, rather narrow at base and gradually narrowed to very acutely pointed tips. These structures were incorrectly figured by the author in the Tennessee bulletin and the female has not previously been described.

The group of banded *Phlepsi* species is somewhat confusing but recent study has seemed to prove the specific rank of this form.

It is a meadow species and can easily be separated from *franconianus* which lives on pine.

New Haven, 7 July, 1920 (B. H. W.); Windsor, 27 Sept., 1922 (P. G.).

P. fulvidorsum (Fitch). *Jassus fulvidorsum* Fitch. (Pl. II, 6.)

Homop. N. Y. St. Cab., 62, 1851.

Resembling *collitus* but larger, vertex more angulate and elytra without white areas. Vertex well angled, edge sharp. Vertex, pronotum and scutellum yellow, elytra appearing dark brown, closely and heavily inscribed with pigment lines. Female segment broadly and deeply excavated, then slightly produced at middle and incised. Length 6-7 mm.

Rather abundant on short grasses and other low plants in dry and well shaded areas. This apparently is its optimum habitat.

New Haven, 17 July, 1908, 1, 22 Aug., 1920 (B. H. W.); Lyme, 20 Aug., 1910 (B. H. W.).

P. nebulosus Van Duzee.

Trans. Am. Ent. Soc., xix, 77, 1892.

Large, robust, vertex scarcely angled almost rounded, edge thin. Vertex and pronotum rather evenly irrorate with fulvous brown. Elytra rather closely and evenly inscribed, often with fulvous markings appearing in form of bands. Female segment broadly, shallowly excavated, slightly notched at middle. Length 8.5 mm.

Not abundant, usually taken from low grasses on dry or sandy areas.

Short Beach, 14 July, 1904; New Haven, 9 July, 1912 (B. H. W.).

P. solidaginis (Walker). *Acocephalus solidaginis* Walker.
Phlepsius humidus Van Duzee. (Fig. 12, 3a, b.)

List. Homop., iii, 847, 1851.

Large, broad, vertex produced, obtusely angled, anterior edge thin. Vertex and scutellum usually pale, yellowish. Elytra with three indistinct pale transverse bands. A fuscous spot on suture at middle and apex of clavus. Female segment with central half produced beyond lateral angles and notched at center. Length 7-7.5 mm.

Common on coarse grasses or sedges in moist areas or swamps, often abundant in low pastures and meadows.

New Haven, 20 July, 1908; 27 July, 1920 (B. H. W.); Hamden, 24 July, 1910; Lyme, 20 Aug., 1910 (B. H. W.); East Haven, 29 July, 1921 (B. H. W.).

P. ramosus (Baker). *Paraphlepsius ramosus* Baker.

Can. Ent., xxix, 158, 1897.

Similar to *solidaginis*, vertex strongly produced, apex angled, edge broadly thin. Elytra with dark and paler areas. Usually a dark transverse band across middle and often ramose brown lines forming an oval pale area including almost entire clavus. Female segment sinuated and notched at middle. Length 7 mm.

More abundant in boggy areas, occurring on grass clumps in a mixed Sphagnum-Tamarack habitat. It should occur under these conditions in the state.

***P. atropunctatus** DeLong, n. sp. (Fig. 13, 1-5.) (Pl. ii, 8.)

Vertex, pronotum, scutellum and elytra dull yellow, irrorate with small black spots. Length 7-7.2 mm.

Broad, very robust, vertex flat, one-half to two-thirds wider between eyes than median length, a little shorter than pronotum, anterior edge sharp. Face almost as broad as long, suddenly constricted to clypeus. Elytra rather broad, opaque, flaring at tips, veins rather obscure, appendix wanting.

Color: Vertex, pronotum, scutellum and elytra dull yellow, rather densely and finely irrorate with round black dots. Venation slightly brown, apical veins broadly margined with dark fuscous. Face yellowish, with two heavy black bands, sometimes fused, just below margin of vertex. Clypeus dusky at apex. Coxae of legs, and venter, black, male plates yellow, irrorate with black. Female venter milky white, last ventral segment and pygofers brownish, marked with black spots.

Genitalia: Female last ventral segment three and one-half times the length of preceding, side margins strongly curved, covering lateral plates. Lateral angles rounded and prominent; posterior margin sinuately concave a very shallow central notch. Ovipositor

distinctly longer than pygofer. Male plates longer than combined width at base, rather broad, gradually narrowed two-thirds their length then suddenly constricted and produced. Greatly exceeded by pygofer which are keeled at middle as in *Chlorotettix unicolor*.

Described from three specimens, a female and a male, collected at New Haven, July 29 and Sept. 22, 1920 (from willow), and a male from New Canaan, Conn. (Stephen Hoyt's Sons Nursery),

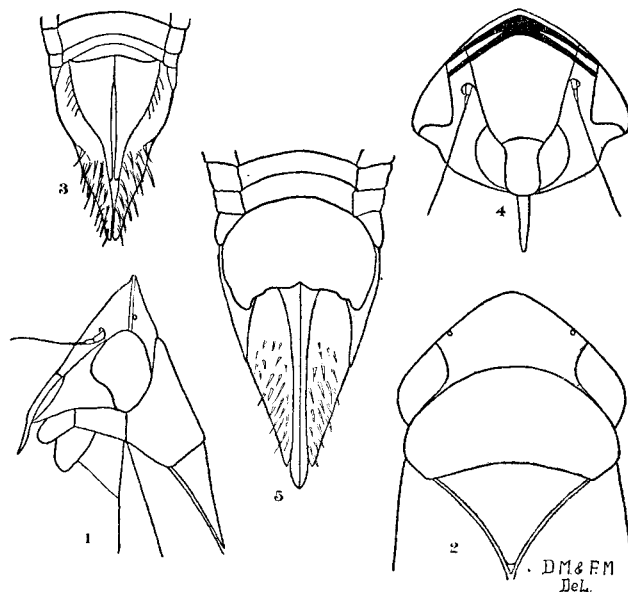


FIG. 13. *Phlepsius atropunctatus* DeLong,—(1) head, lateral view, (2) head, dorsal view, (3) male genitalia, (4) face, (5) female genitalia. All greatly enlarged. Drawing by D. M. and F. M. DeLong.

Sept. 17, 1918, all collected by B. H. Walden. This species apparently does not belong to an American genus and it has been quite difficult to place it with its closest relatives. In face characters it resembles a *Scaphoideus* but in general appearance a *Phlepsius* of the *ramosus* group.

This may not be an American species, but after considerable study of European material I have been unable to connect it even temporarily with a described species and it seems best to treat it as new in order that the record be established for North America. If the species later proves to be good it may be necessary to erect a genus for it.

Acinopterus Van Duzee.

Head narrower than pronotum, vertex short, obtusely angled. Elytra rather narrow, without appendix, costa feebly convex, narrowed to apex which is acutely angled.

A. acuminatus Van Duzee. (Fig. 9, 6; Fig. 10, 7.)

Psyche, vi, 308, 1892.

Easily recognized by the fulvous brown and greenish coloration, and the elytra which are acutely angled at apex. The basal angles of scutellum and tips of elytra often darker, nervures pale, disc of costa and discal areoles of corium whitish hyaline. Length 5-6.5 mm.

A grass-feeding species found commonly in the south but only occasionally in the north in pastures and waste places.

Rockville, 23 Aug., 1905 (H. L. V.).

Thamnotettix Zetterstedt.

Body usually elongate, vertex varying from broadly rounded to obtusely angled, the former type rounding to the front and the latter usually angled with front. Elytra as a rule possessing but one cross vein between the sectors. This will not hold good, however, for all species of the genus, as some resemble *Deltocephalus* in that respect.

They are diverse in food habits as well as structural characters and while some apparently live and feed entirely on trees or shrubs, others are grass feeders. Also some are two brooded and others apparently have but a single brood each season.

Key to Species.

1. Vertex short, broadly rounded, scarcely produced before eyes, almost parallel margined, rounded to meet face without definite margin 2

Vertex longer, somewhat produced, usually angulate, never parallel margined, decidedly angled with the front forming a definite margin 8

2. Vertex with two large black spots on rounded margin of apex ... 3

Vertex yellowish unmarked, pronotum, scutellum, outer margin and apex of clavus brown, clavus yelloweburatus

3. Elytra dark or subhyaline without yellow spot on clavus 4

Elytra dark with costal margin and a large spot on clavus, yellow 7

4. No dark bands on vertex, pronotum without band covering posterior half, wings dark or smoky, venation inconspicuous 5

A dark band on base of vertex between the eyes, a pale band covering posterior half of pronotum, elytra smoky with pale conspicuous venationbelli

5. Entire insect brownish, not flecked with red, claval suture pale ... 6

Brownish, completely flecked with bright red, elytral veins same colormorsei

6. Species large, 6 to 6.5 mm., claval suture conspicuous, narrow band across middle of pronotumkennicotti

Species smaller, less than 6 mm., claval suture almost concolorous with elytra, faint suggestion of a band on pronotumbrittoni

7. Yellow spot on clavus oval in form, and on central portion, *clitellarius*
Yellow spot narrow and elongated, extending along suture of elytra
from apex of scutellum to apex of clavus, vertex slightly pointed
collaris
8. Species usually green, vertex with definite markings in form of
spots or bands 9
Species green or yellow, vertex without definite markings in the
form of spots or bands 15
9. Vertex with two or more spots on or above margin 10
Vertex with a broad black band on margin between eyes, species
dark green, elytral apices smoky *smithi*
10. Principal markings on margin of vertex in form of black spots or
dashes 11
Principal markings in the form of spots above margin on vertex .. 14
11. Markings on front four in number, either spots or dashes 12
Two elongated black spots on margin of vertex near apex, and two
smaller ones above, one nearer either eye *decipiens*
12. Four spots on margin of vertex 13
Four elongated narrow dashes almost forming line on margin
between eyes, vertex and pronotum pale with brownish longi-
tudinal lines across them, elytra dark, nervures pale *cypraceus*
13. Four large round black spots on margin *melanogaster*
Four spots on margin, central two large, elongate, outer two
smaller, a small black spot above either ocellus connected with a
fine black line extending across antennal pit to base of clypeus *ciliatus*
14. Vertex angulate, four round black spots above margin, pronotum
with pale longitudinal striae, elytra yellow, venation conspicuous,
face pale *fitchi*
Vertex less angulate, six round black spots above margin, one very
close to either eye, face black with pale arcs *nigrifrons*
15. Elytra quite hyaline, greenish or yellowish not dark or smoky 16
Elytra dark smoky only, subhyaline, veins yellowish, conspicuous,
species broad *chlamydatus*
16. Greenish species, long and slender, head sharply angled, female
segment truncated or slightly waved, without median tooth *inornatus*
Orange-yellow, rather broad, head quite bluntly angled, female
segment excavated with a rather broad median tooth *placidus*

T. kennicotti (Uhler).

Trans. Am. Ent. Soc., ii, 161, 1863.

Rather large, vertex blunt, broadly rounded, almost parallel margined, two large black spots on rounded margin, ocelli and usually a line or band behind them, red. Pronotum with a pale median transverse band, rather narrow. Elytra brownish, smoky, claval suture conspicuously and broadly white. Length 6.5-7 mm.

A species commonly taken in shrub habitats often on oak, occurring usually in small numbers throughout the summer.

New Haven, 17 July, 1908; 20 Aug., 1909, and 26 June, 1910 (B. H. W.); 4, 7, 11, 25, 28 July, 3 Oct., 1920 (B. H. W.); East Haven, 21 July, 1920 (B. H. W.); North Branford, 13 July, 1920 (B. H. W.); Portland, 25 July, 1920 (B. H. W.).

***T. brittoni** Osborn.

Proc. Dav. Acad. Sci., x, 166, 1907.

Resembling *kennicotti* in general appearance but smaller, darker colored without conspicuous white claval vein. Dark brown,

vertex yellowish mottled with brown and with two black spots at apex. Vertex rounded in front. Elytra very dark brown. Length 5-5.75 mm.

A shrub-feeding form originally described from specimens collected by Dr. W. E. Britton in Connecticut. At present the known distribution is much greater.

New Haven, 6, 15, 20 July, 1904 (W. E. B.) (type material); 4, 5, 8, 11, 17, 31 July, 1920, 16 June, 1921 (B. H. W.) on *Steironema ciliatum*.

T. morsei Osborn.

Me. Agr. Expt. Sta., Bull. 238, 134, 1915.

Large brown species entirely flecked with red. Vertex rounded in front with a faint suggestion of an angle at apex, yellowish, closely flecked with red, two large black spots at apex. Elytra dark, deep red in appearance. Length 6 mm.

Feeds on willow shrubs from which it can be collected during August.

New Haven, 22 Sept., 1920, 16 June, 1921 (B. H. W.).

T. clitellarius (Say). *Jassus clitellarius* Say. The Saddle-Backed Leaf-hopper.

Jour. Acad. Nat. Sci. Phila., vi, 309, 1831.

A common dark brown species with an oval yellow "saddle" area on middle of elytra and a broad transverse yellow band on posterior portion of pronotum. Vertex rounded, yellow, apex with a pair of large black spots. Length 5-5.5 mm.

A common form in pastures and often taken from shrubs. It may be a cosmopolitan feeder, and breeding records will perhaps show that to be the case. This is one of our very common forms, and is of economic importance throughout the summer.

Woodmont, 22 June, 1904 (P. L. B.); West Haven, 27 June, 1905 (H. L. V.); New Haven, 8 June, 1904, 22 June, 1910 (W. E. B.); 27 July, 1904 (P. L. B.); 17, 22, 26 June, 8 July, 1912 (at light); 10, 14, 20 June, 31 July, 1920 (B. H. W.); Hamden, 14 June, 1911 (W. E. B.); Derby, 11 June, 1915 (M. P. Z.); Bridgeport, 20 Sept., 1920 (B. H. W.); Cromwell, 30 Aug., 1920 (B. H. W.); West Haven, 27 June, 1905 (H. L. V.); Cornwall, 5 June, 1921 (B. H. W.).

T. eburatus Van Duzee.

Can. Ent., xxi, 10, 1889.

Resembling somewhat *clitellarius* but paler and without spots on vertex. Vertex uniform dull yellow, pronotum brownish, darker anteriorly. Elytra yellowish to whitish hyaline, claval suture, base and tips of clavus along sutural margin, brown. Remainder of clavus yellowish, tips of elytra smoky. Length 6 mm.

Occurs in cut-over areas and on herbaceous plants in woodland. Its food plant is not definitely known.

East River, Aug., 1908 (C. R. E.); Guilford, 13 July, 1920 (B. H. W.).

T. collaris Ball. *T. exquisitos* Osborn. (Pl. II, 9.)

Can. Ent., xxxiv, 15, 1902.

Belonging to the *clitellarius* group but with "saddle" spot of yellow on the dark brown elytra more linear and elongated, extending from apex of scutellum to tip of clavus. Costal margin broadly pale to near apex. Vertex obtusely angled, yellow, apex with two black spots. A yellow transverse band across posterior half of pronotum. Length 5.5-6 mm.

Rather abundant in cool moist woods on *Impatiens* in the coarse grass-fern association during August, but occurring only in thick woods.

T. belli (Uhler). *Jassus belli* Uhler. *Thamnotettix sonorae* Gillette and Baker.

Bull. U. S. Geol. Geog. Surv. Terr., iii, 471, 1877.

Yellow to tawny, vertex slightly angled, two large black spots at apex and an interrupted band between eyes. Posterior portion of pronotum banded with pale. Elytra tawny with oblique pale lines parallel to claval vein. Length 5 mm.

A northern form occurring on shrubs in New England in May, July and August.

T. chlamydatus (Provancher). *Deltocephalus chlamydatus* Provancher. *T. infuscatus* Gillette and Baker. *T. punctiscuta* Gillette and Baker.

Pet. Faune Ent. Can., ii, 339, 1890.

Rather large robust species with vertex angled, brownish with a greenish tint seldom with definite markings. Elytra dark, veins paler. Female segment shallowly emarginate posteriorly. Length 6 mm.

A typical northern form apparently feeding on shrubs from which it is usually taken. Reported as occurring on birch and hazel in spring and late summer.

T. melanogaster (Provancher). *Jassus melanogaster* Provancher. Nat. Can., iv, 378, 1872.

Yellow to green, vertex obtusely angulate with four large black spots about equidistant on margin of vertex. Female segment produced, slightly emarginate posteriorly. Length 5 mm.

A very common grass-feeding species throughout the summer in low wet pastures, and meadows. Abundant to such extent that it is of economic importance.

Yalesville, 19 Oct., 1903 (H. L. V.); New Haven, 26 June, 1910 (B. H. W.); 7, 11, 17 July, 22 Sept., 3 Oct., 1920 (B. H. W.); Branford, 21 July, 1920 (B. H. W.); New Canaan, 3 Sept., 1920, North Branford, 13 July, 1920, Orange, 17 July, 1920 (B. H. W.); Bridgeport, 20 Sept., 1920 (B. H. W.); Hamden, 23 Oct., 1921 (B. H. W.); Cornwall, 18 July, 1921 (B. H. W.).

T. ciliatus Osborn.

Proc. Ia. Acad. Sci., v, 244, 1898.

Greenish with yellow vertex which is strongly rounded in front and has four black spots on margin. Two large ones at apex on

margin and a smaller one either side toward the eyes; just above each of outer spots on vertex is a fine black point and a black line extends over margin through antennal pit and follows suture of face to clypeus. Length 5-5.5 mm.

Feeds on grasses in pasture land during August and September.

T. decipiens Provancher.

Pet. Faune Ent. Can., iii, 285, 1890.

Greenish, elytra with iridescent tint and pale veins. Vertex very broadly obtusely angled, two large black spots on margin at apex and a smaller one on either side toward eye and above margin, frontal sutures black. Female segment broadly excavated. Length 4.5-5 mm.

Common on coarse grasses and sedges in swampy areas of pasture land during August and September.

T. smithi Van Duzee.

Can. Ent., xxiv, 266, 1892.

Quite long and slender. Vertex broadly rounded. Yellow, with a broad black band on margin between eyes. Pronotum greenish, mottled with yellow. Elytra dull greenish, hyaline, posterior third smoky, veins distinctly visible. Female segment roundly produced, posterior margin shallowly emarginate. Length 5 mm.

A grass-feeding species found in open fields and especially on *Spartina michauxiana* in swampy pastures. Abundant during early summer and autumn.

New Haven, 25 June, 1921 (B. H. W.).

T. fitchii Van Duzee. (Fig. 10, 4.)

Ent. Amer., vi, 133, 1890.

Yellow to pale brown, vertex obtusely angled, four black spots just above margin, pronotum with about five longitudinal stripes. Elytra pale brownish, veins yellow. Female segment rounded either side to a median excavation forming a small notch either side of a broad median tooth. Length 4.5 mm.

Very common in swamps, wet meadows and pastures on coarse grasses throughout the summer.

New Haven, 27 July, 3 Oct., 4 July, 1921 (B. H. W.); North Haven, 6 Aug., 1922 (B. H. W.); East Haven, 29 July, 1921 (B. H. W.); Hamden, 25 Sept., 1921 (B. H. W.); Madison, 24 Sept., 1922 (B. H. W.).

T. nigrifrons (Forbes). *Cicadula nigrifrons* Forbes. *T. punctata* Van Duzee.

Rept. Ill. St. Ent., xiv, 67, 1884.

Vertex obtusely angled, yellow with a row of six black spots above margin continuing to extend over margin to front and before the eyes. Face usually black by coalescing arcs. Elytra tinged with green, often smoky. Length 5 mm.

Very abundant on grasses apparently more so in wet areas, but

has been taken on cultivated grasses and grains in upland areas and frequents pastures and meadows.

New Haven, 16, 21, 31 Oct., 4, 9 Nov., 1903 (H. L. V.); 22 June, 1912 (at light); 3 Oct., 1920 (B. H. W.); West Haven, 27 June, 1905 (H. L. V.); Wethersfield, 24 June, 1913 (L. B. R.); Bridgeport, 20 Sept., 1920 (B. H. W.); New Canaan, 3 Sept., 1920 (B. H. W.); Wilton, 19 Oct., 1920 (B. H. W.); North Haven, 24 Sept., 1921 (B. H. W.); Madison, 24 Sept., 1922 (B. H. W.).

T. inornatus Van Duzee.

Trans. Am. Ent. Soc., xix, 303, 1892.

Pale green to yellow, unmarked. Vertex strongly angled in front. Ocelli black, elytra greenish, hyaline. Female segment with posterior margin slightly waved or truncated. Length 5-5.5 mm.

Taken in large numbers from wild rye from June to September. A common *Calamagrostis* meadow species.

New Haven, 22 Sept., 1920, 9 July, 1921 (B. H. W.); Madison, 24 Sept., 1922 (B. H. W.).

T. placidus Osborn.

Rept. N. Y. St. Ent., xx, 536, 1905.

Orange-yellow, rather short and broad, head very blunt, scarcely angled, without definite markings. Female segment rather deeply and broadly excavated, a very broad short tooth at its apex. Length 5 mm.

A northern form feeding on coarse grasses in moist areas during August.

T. cypraceus Osborn.

Proc. Ia. Acad. Sci., v, 245, 1898.

Pale yellowish brown with reddish fuscous stripes. Vertex with four black transverse dashes on margin, a broad longitudinal fuscous band on vertex next either eye extending across pronotum to basal angles of scutellum, and a narrow one often more reddish from apex of vertex to disc of scutellum. Elytra fuscous with white veins. Length 5-5.5 mm.

Common in swamps on tall coarse sedges. Swept from *Scirpus-Cyperus* association, July, August and September.

Madison, 24 Sept., 1922 (B. H. W.).

Chlorotettix Van Duzee.

Vertex broad, usually broadly rounded or obtusely angled, a little longer at middle than next the eyes, vertex rounding to front without a definite margin. Elytra long, appendix well developed, venation obscure. Usually of a uniform green or yellowish green with few markings.

Key to Species.

- I. Vertex with anterior margin rounded, usually broadly curved, the length at middle equaling or slightly exceeding length next the eyes 2

- Anterior margin of vertex distinctly but usually bluntly angulate, at least one-third longer on the middle than next the eyes 5
2. General color lighter, pale green or yellowish 3
- General color sordid green, usually very dark with brownish cast
3. Female, last ventral segment notched but without spatulate process **tergatus** 4
- Female, last ventral segment broadly notched, a broad spatulate process extending backward from its apex. Male plates long gradually tapering **spatulatus**
4. Size large, 7.5 mm., female segment evenly, somewhat concavely and rather deeply notched, male plates long and produced .. **unicolor**
- Size smaller, 6-7 mm., apple-green in color, female segment broadly notched each side with a short blunt lateral tooth; male plates very short, broadly rounded **viridius**
5. General color greenish, without color markings 6
- Distinctly reddish brown in color, vertex with a transverse band across middle between the eyes **lusorius**
6. Female segment notched, bearing a spatulate process at its apex, length 7 mm. **balli**
- Female segment without a spatulate process 7
7. Female segment with lateral lobes broad and rounded; male valve broad and obtusely angled. Length 6 to 6.5 mm. **galbanatus**
- Female segment black margined, notched at center; broadly shallowly, emarginate either side; male valve rather narrow, and rounded. Length 7.5 mm. **nudatus**

C. unicolor (Fitch). *Bythoscopus unicolor* Fitch. (Fig. 10, 3.) Homop. N. Y. St. Cab., 58, 1851.

Large, uniformly green without definite markings. Vertex well rounded in front, two and one-half times as broad as long. Female segment rather long, broadly and shallowly notched. Length 7.5 mm.

Common in the north and throughout New England on Blue-grass and allied grasses in pastures and meadows throughout the summer.

New Haven, 20, 24 June, 1902 (E. J. S. M.); 3 Oct., 1902 (B. H. W.); 16 Oct., 1903 (H. L. V.); 11, 16, 20, 27, 31 July, 8, 22 Aug., 1920 (B. H. W.); West Haven, 27 June, 1905 (H. L. V.); East Hartford, 13 Aug., 1906 (B. H. W.); Yalesville, 16 Oct., 1906 (W. E. B.); Hamden, 18, 24 July, 1920 (B. H. W.); East Haven, 21 July, 1920 (B. H. W.); Danbury, 29 Aug., 1920 (B. H. W.); Branford, 21 July, 1920 (B. H. W.); Cornwall, 18 July, 1921 (B. H. W.); Guilford, 24 July, 1921 (B. H. W.); North Branford, 5 July, 1921 (B. H. W.); North Haven, 6 Aug., 1922 (B. H. W.).

C. spatulatus Osborn and Ball.

Proc. Ia. Acad. Sci., iv, 225, 1897.

In general appearance resembling *unicolor* but usually a more yellowish green, uniformly colored and without markings. Head well rounded before. Female segment deeply excavated, bearing a long spatulate process at the apex. Length 7 mm.

Often found in company with *unicolor*, in grassy pastures and meadows. It resembles so closely in size and color this species that they are easily confused in the field.

New Haven, 23 July, 1921 (B. H. W.); North Haven, 4 Sept., 1921 (B. H. W.).

C. tergatus (Fitch). *Bythoscopus tergatus* Fitch.

Homop. N. Y. St. Cab., 58, 1851.

Size and form of *unicolor* but with a dark sordid green color, elytra smoky. Head broadly rounded on anterior margin. Female segment with a broad V-shaped notch extending half way to the base, lateral lobes rounded. Length 7 mm.

Common on grasses in moist areas during July, August and September.

Salisbury, 30 Aug., 1904 (W. E. B.); Cornwall, 10 Aug., 1918 (B. H. W.); Kent, 10 Aug., 1918 (M. P. Z.); New Haven, 22 Sept., 1918 (F. H. L.); 16, 27 July, 3 Aug., 1920 (B. H. W.); Durham, 10 Aug., 1922 (M. P. Z.); East Hartford, 13 Aug., 1906 (B. H. W.); North Haven, 4 Sept., 1921 (B. H. W.); also from Branford without specific date.

C. viridius Van Duzee.

Psyche, vi, 309, 1892.

With rounded vertex, but smaller than allied round-headed species, and with a uniform apple-green color. Female segment broadly excavated almost to base, each side of incisure bearing a short obtuse tooth at middle. Male plates triangular and transverse. Length 6-7 mm.

A common pasture species throughout the southern states and often occurs in small numbers in the north.

Guilford, 24 July, 1921 (B. H. W.); Madison, 24 Sept., 1922 (B. H. W.); Milford (George Dimmock).

C. galbanatus Van Duzee.

Psyche, vi, 310, 1892.

Yellowish green with obtusely angled vertex, a half longer at middle than next the eyes. Female segment long, a rather broad lingulate incisure reaches nearly to base forming a broad, rounded lobe either side. Length 6-6.5 mm.

A common pasture and meadow species throughout New England, June to September.

West Haven, 27 June, New Haven, 4 July, 1905 (H. L. V.); 27 June, 1908 (W. E. B.); 22 Sept., 1918 (F. H. L.); 31 July, 8 Aug., 22 Sept., 1920 (B. H. W.); New Canaan, 22 Sept., 1910 (W. E. B.); Bridgeport, 20 Sept., 1920 (B. H. W.); Guilford, 13 July, 1920 (B. H. W.); North Branford, 13 July, 1920 (B. H. W.); Hamden, 5 July, 1920 (P. G.); Marlborough, 15 July, 1922 (B. H. W.); North Haven, 4 Sept., 1921 (B. H. W.); Windham, 3 Aug., 1922 (B. H. W.).

C. balli Osborn.

Proc. Ia. Acad. Sci., v, 246, 1898.

Easily distinguished from all others by the obtusely angled head and the female spatulate process. Vertex one-half longer on middle than next eyes. Uniform yellowish green without markings. Female segment notched and bearing a spatulate process. Length 7-7.25 mm.

Usually occurs in more abundance in sheltered areas on grasses, but has frequently been taken in open fields.

Winnipauk, 4 Aug., 1908 (C. W. J.).

C. lusorius (Osborn and Ball).

Proc. Ia. Acad. Sci., iv, 226, 1897.

Vertex one-half longer on middle than at eyes. Olive-brown with a faint crescentiform band between eyes. Brownish tinged with red, especially on elytra. Female segment emarginate posteriorly, with a broad, angular, dark-margined median tooth half as long as acutely rounding lateral angles. Length 7-8 mm.

Found on coarse grasses during July and August, but always in open woods or sheltered areas. From collecting observations it seems to be a woodland species.

New Haven, 30 July, 1909 (B. H. W.); 22 Sept., 1918 (D. M. D.); 20 July, 1920 (B. H. W.); New Canaan, 3 Sept., 1920 (B. H. W.); North Banford, 13 July, 1920 (B. H. W.); Portland, 25 Aug., 1920 (B. H. W.); Cornwall, 10 Aug., 1918 (B. H. W.); Hamden, 25 Sept., 1921 (B. H. W.); North Haven, 6 Aug., 1922 (B. H. W.).

C. nudatus Ball.

Can. Ent., 32, 340, 1900.

A large species of the genus with vertex twice longer on middle than next the eyes. Pale green with some brownish areas on pronotum, scutellum and elytra. Female last ventral segment with posterior border dark margined, a notch at center and a shallow emargination either side divides the segment into four lobes. Lateral angles prominent. Male valve narrow, roundly angulate; plates broad at base, three times the length of the valve, gradually narrowed to acute, slightly produced tips.

A grass-feeding species with a southern distribution. The collecting of this species in Connecticut establishes a very interesting and unique record. It is apparently distributed along the Atlantic coastal area.

Windham, 3 Aug., 1922 (B. H. W.).

Jassus Fabricius.*Coelidia* Germar.*Deridna* Walker.

Head narrower than pronotum, vertex broadly curved, quadrate, rounding to front. Pronotum very short, emarginate posteriorly, scutellum large, triangular, very wide at base. Apex of elytra broadly rounded.

J. olitorius Say. (Fig. 10, 8 and 15.)

Jour. Acad. Nat. Sci., Phila., vi, 310, 1831.

Head blunt and rounded, vertex yellow, pronotum brownish, a dark stripe on either side of a median pale stripe. Basal angles of scutellum and two spots on disc black. Elytra brown, a pale band before middle of clavus and one across apex of anteapical cells. Male with pronotum, scutellum and elytra darker than in female. Length, male 6 mm., female 7.5 mm.

A shrub-feeding species often collected from sassafras during July, August and September.

New Haven, 5 Aug., 1904; 21 Aug., 1906; 28 Aug., 1908 (B. H. W.); 30 Aug., 1909, 7 Sept., 1910 (W. E. B.); 3 Aug., 1909 (A. I. B.); 28 Aug., 1913 (L. B. R.); 5 Aug., 1920 (B. H. W.); East Hartford, 13 Aug., 1906 (B. H. W.); Westville, 9 Sept., 1907 (W. E. B.); Lyme, 20 Aug., 1910 (B. H. W.); Wallingford, 27 Aug., 1910 (D. J. C.); Hartford, 16 Aug., 1911, Stamford, 16 Aug., 1912 (W. E. B.); Portland, 12 Aug., 1913 (B. H. W.); New Canaan, 3 Sept., 1920 (B. H. W.); Cornwall, 23 Aug., 1920 (K. F. C.); Hamden, 6 Aug., 1922 (B. H. W.); Kent, 10 Aug., 1918 (B. H. W.); North Branford, 1 Aug., 1922 (B. H. W.); North Haven, 6 Aug. (B. H. W.).

Neocoelidia Gillette and Baker.

Short and robust, head narrower than pronotum, short, rather bluntly conical. Pronotum short and broad, scutellum large. Elytra broad with four apical cells, appendix wanting, first sector branched once on apical two-thirds.

N. tumidifrons Gillette and Baker. (Fig. 10, 14.)

Hemip. Col., 104, 1895.

Robust, uniformly pale yellowish or greenish, often tinged with orange. Basal angles of scutellum usually with black spots. Length 3.5-4.5 mm.

Lives in pastures and grassy areas where it is swampy or very moist during June, July and August.

North Branford, 12 June, 1921, 16 June, 1922 (B. H. W.).

Paracoelidea Baker.

With about the same characters as found in the preceding genus, but the clypeus here is tuberculate and the wings are long as in *Thamnotettix*. One species has been described in this genus.

P. tuberculata Baker.

Can. Ent., xxx, 292, 1898.

Vertex produced and subacute, yellowish, elytra subhyaline with internal margin and apex slightly infuscated. Female segment truncated. Male valves long, tapering, plates obtuse at tips. Length 5 mm.

Common on pine in New England. Massachusetts is cited as a type locality, and since it occurs on Long Island and in New Jersey will undoubtedly be found on pines at intervening points.

Cicadula Zetterstedt.

Macrosteles Fieber.

Thamnus Fieber.

Limotettix Sahlberg.

Vertex slightly obtusely angled or rounded at apex, longer on middle than next eyes and rounding to front. Elytra exceeding

abdomen, with distinct appendix, outer branch of first sector usually wanting.

Most of the species which belong here have two broods with perhaps a partial third. With the exception of one or two which are shrub-feeders, they apparently feed almost exclusively on herbaceous plants. A few are common on *Juncus*, one or two feed on *Impatiens* and others apparently live on grasses and sedges and seem to prefer moist habitats.

Key to Species.

1. Small, less than 5 mm. in length, usually with several markings on vertex 2
Larger, more than 5 mm. in length, vertex with two large black spots close to margin, a pair in basal angles of scutellum, elytra usually with a striped appearance**punctifrons**
2. Species average size 4-5 mm. 3
Species minute less than 3 mm. 6
3. Vertex with four or six black marks on or above margin 4
Vertex with only two round black spots located just above margin, usually an arcuate band on pronotum, parallel to and just back of the margin**arcuata**
4. Vertex with two round black spots on margin and two round spots close to base 5
Vertex with six marks in pairs, usually a pair of transverse spots or dashes on margin, a pair just above margin, and a pair of round ones near base**sex-notata**
5. With only four spots on vertex, elytra extremely variable in coloration, usually with dark blotches. (Fig. 10, 10 and 13.)**variata**
With four spots and an additional small one on the margin next either eye**lepida**
6. Vertex yellow with six or more spots often partially fused. A pair of black spots in angles of scutellum, elytra mottled**slossoni**
Vertex dark fuscous with yellow markings, scutellum dark on disc, yellow margined**potoria**

C. punctifrons (Fallen). *Cicada punctifrons* Fallen.

Hemip. Suec. Cicad., 42, 1826.

Larger than the other species, pale greenish yellow with two large black spots on vertex just back of margin, nearer to eyes than median line. Tips of elytra slightly infuscated. Often swept from willows on which it no doubt feeds. Common from June to September. Length 6 mm.

C. punctifrons var. **repleta** Fieber. *C. punctifrons* var. *americana* Van Duzee.

Revue d'Ent., iv, 49, 1885.

As in preceding but with more coloration. Face and disc of pronotum infuscated, basal angles of pronotum each with a large black spot. Inner half of elytra dark with pale veins, giving it an obliquely striped appearance. Length 5.5-6 mm.

C. variata (Fallen). *Cicada variata* Fallen. *Jassus fumatus* Herrich-Schaeffer. (Fig. 10, 10 and 13.)

Acta Holm, xxvii, 34, 1806.

Head produced but with apex rounded and varying extremely in color. Always with four black spots on vertex, two large ones on margin and two usually smaller behind on disc, one either side of median line. Pronotum and elytra usually mottled but varying to a uniform black in extreme cases. Scutellum yellow, basal angles black. Length 4 mm.

A common and abundant species occurring on *Impatiens* in moist habitats throughout the summer.

Bridgeport, 20 Sept., 1920 (B. H. W.), on *Impatiens*; New Haven, 22 Aug., 1920 (B. H. W.); North Haven, 4 Sept., 1921 (B. H. W.); Cornwall, 18 July, 1921 (B. H. W.).

C. lepida Van Duzee.

Can. Ent., xxvi, 139, 1894.

Resembling *variata* with two black spots on margin and two on disc of vertex, but with an additional spot next either eye on margin. Elytra usually greenish or slightly mottled. Length 3.5-4 mm.

Often found with the preceding on *Impatiens* in very moist, usually wooded areas, where this plant is found in abundance, June to September.

New Haven, 3 Oct., 1920 (B. H. W.); Bridgeport, 20 Sept., 1920 (B. H. W.), on *Impatiens*; Orange, 17 July, 1920 (B. H. W.); Hamden, 6 Aug., 1922 (B. H. W.); Fairfield, 26 Aug., 1920 (B. H. W.); North Haven, 4 Sept., 1921 (B. H. W.); North Branford, 2 June, 1921 (B. H. W.).

C. arcuata Gillette and Baker.

Hemip. Col., 105, 1895.

Vertex produced and rounded at apex, yellowish, two large black spots above margin nearer eyes than apex. Pronotum with an arcuate, black line nearly parallel to anterior margin. Elytra pale greenish hyaline, nervures yellow. Length 4.5-4.75 mm.

Feeds on herbaceous vegetation. No definite food plant is known apparently. It is doubtful whether this species occurs in New England, but is reported for New York.

C. sexnotata (Fallen). *Cicada sexnotata* Fallen. *C. quadri lineata* Forbes. (Fig. 9, 10.)

Acta Holm, xxvii, 34, 1906.

Vertex produced but rounded at apex, always marked with six more or less distinct black spots. A pair of transverse ones on margin, another pair transverse above these and between eyes, and a pair of small round ones near base. Basal angles of scutellum often marked with black. Elytra green, smoky at apices, venation paler. Length 4 mm.

A cosmopolitan feeder taken usually on herbaceous plants and common on grasses in pastures and meadows throughout the summer. It is often a pest on cultivated grasses and truck crops.

New Haven, 16, 19, 21 Oct., 9 Nov., 1903 (H. L. V.); 6 June, 1916 (B. H. W.); 10, 14 June, 7, 20, 29 July, 22 Sept., 3 Oct., 1920 (B. H. W.); Cromwell, 27 Aug., 1920 (B. H. W.); Branford, 20 July, 1905 (H. W. W.);

21 July, 1920 (B. H. W.); East River, 10 July, 1909 (C. R. E.); Yalesville, 19 Oct., 1903 (H. L. V.); Bridgeport, 20 Sept., 1920 (B. H. W.); Hamden, 20 June, 1920 (B. H. W.); New Canaan, 3 Sept., 1920 (B. H. W.); Stratford, 9 July, 1920 (B. H. W.); Waterbury, 15 Oct., 1920 (B. H. W.); Madison, 24 Sept., 1922 (B. H. W.); Orange, 2 June, 1920 (W. E. B.); North Haven, 24 Sept., 1921 (B. H. W.); Plainville, 2 Sept., 1921 (B. H. W.).

C. slossoni Van Duzee.

Can. Ent., xxv, 281, 1893.
A small robust species with blunt head. Arcs on front, a pair of transverse spots at margin and two pairs irregular in shape above these, black. These are often fused on vertex, causing an almost black coloration. Scutellum with disc and basal angles marked with black. Elytra mottled. Length 2.5-3 mm.
Common on *Juncus* in wet pastures, but apparently occurs only in this habitat.

New Haven, 20 Aug., 1920 (B. H. W.); North Branford, 12 June, 1921 (B. H. W.).

C. pоторia Ball.

Can. Ent., xxxii, 346, 1900.
Vertex nearly right-angled, apex conical, dark fuscous, the margins a median line and two dashes on either side, yellow. Pronotum and scutellum fuscous, yellow-margined, elytra long milky subhyaline sometimes mottled. Length 2.2-2.5 mm.
A swamp or wet pasture species feeding on *Juncus* and *Eleocharis* and always found in a restricted habitat.

Balclutha Kirkaldy.

Elongate, slender, vertex very short, almost parallel margined, obtuse and rounded before. Head not wider than pronotum, usually narrower and pronotum strongly produced and rounded forward from humeral angles, concave posteriorly. Elytra greatly exceeding abdomen with a well-defined appendix, and the outer branch of the first sector wanting.

Key to Species.

- 1. Elytra without markings, colored some shade of green or yellow 2
Elytra marked with black spots or irregular blotchespunctata
 - 2. Robust bright green. Length 4 mm.osborni
Smaller, 3.5 mm. in length, dull or pale green, often with elytra
whitishimpicta
- B. punctata (Thunberg). *Cicada punctata* Thunberg. *Eupteryx clypeata* Curtis. *Cicadula spreta* Zetterstedt. *Typhlocyba rosea* Provancher. *Typhlocyba jacosa* Provancher.

Acta Upsala, iv, 21, 1782.
Vertex obtusely produced in front, dull green, yellow or tinted with red. Vertex, pronotum and scutellum often marked with black or fuscous in the form of longitudinal lines. Elytra with black spots arranged in two oblique bands. Length 3.5-4 mm.

Very common on herbaceous vegetation in pastures, meadows and undergrowth in woodland areas.

New Haven, 16 Oct., 1903 (H. L. V.); 1 June, 1911 (B. H. W.); 22 Sept., 1918 (D. M. D.); 20 May, 1920 (B. H. W.); Yalesville, 19 Oct., 1903 (H. L. V.); Bridgeport, 20 Sept., 1920 (B. H. W.); Hamden, 20 June, 1920 (B. H. W.); Huntington, 9 July, 1920 (B. H. W.); Killingworth, 31 May, 1920 (B. H. W.); North Branford, 30 May, 1920 (B. H. W.); Cornwall, 5 June, 1921 (B. H. W.); Milford, 2 May, 1921 (B. H. W.); Plainville, 2 Sept., 1921 (B. H. W.).

B. osborni Van Duzee. *Gnathodus viridis* Osborn.

Check List Hemip., 75, 1916; N. Y. St. Ent., xx, 541, 1905.

A moderately large green species resembling closely green specimens of *punctatus* but without dark markings. Vertex a little produced and obtuse. Deep green, vertex and scutellum often yellowish, elytra pale hyaline, nervures dark green to clavus, apex smoky. Length 3.5-4 mm.

Common on grasses in pastures and meadows. Apparently prefers moist areas.

New Haven, 18, 29, 31 July, 1920 (B. H. W.); Hamden, 6 Aug., 1922 (B. H. W.).

B. impicta (Van Duzee). *Gnathodus impictus* Van Duzee. (Fig. 9, 9; Fig. 10, 11.)

Can. Ent., xxiv, 113, 1892.

Dull green to gray, often with a smoky tint. Head and pronotum usually tinted with green or fuscous, elytra whitish or smoky, subhyaline, nervures indistinct. Head very blunt and rounded, narrower than pronotum. Length 3.5 mm.

Common in pastures and meadows throughout the summer and occurs abundantly in New England.

Reported from Connecticut without specific data.

Eugnathodus Baker.

Vertex not produced, almost transverse and parallel margined, wider than pronotum which is truncated or slightly convex posteriorly and broadly gently curved in front. Elytra with appendix distinct, and outer branch of first sector wanting.

E. abdominalis (Van Duzee). *Gnathodus abdominalis* Van Duzee. (Fig. 10, 12.)

Can. Ent., xxiv, 113, 1892.

Vertex rounded, parallel margined, scarcely produced before eyes. Greenish white, pronotum and scutellum often tinged with fuscous or marked with longitudinal lines. Elytra whitish, subhyaline often smoky at apex. Length 3 mm.

A pasture and meadow form, sometimes swept from shrubs. Common and abundant over large areas and easily confused with the *Typhlocybini* because of its fragile character.

Hamden, 23 Oct., 1921 (B. H. W.); North Haven, 24 Sept., 1921 (B. H. W.).

Tribe TYPHLOCYBINI.

Eupteryginae.

The chief characters which separate this group are used in the preceding key. The frequent absence of the ocelli and the unbranched condition of the sectors which extends to the apical cells before dividing or giving off cross nervures, so that no anteapical cells are formed, are characteristic of the following species.

Although this group is composed of the smallest and most fragile of the entire family, it contains some of greatest economic importance which are known for their damage from coast to coast.

Key to Genera.

1. Posterior wings with sectors ending in a marginal vein. (Fig. 14, 1b, 3b, 4a.) 2
Posterior wings without marginal vein, sectors extending to wing margin. (Fig. 14, 5c, 6b, 7b.) 4
2. Elytra with well-defined appendix. (Fig. 14, 1c.) *Alebra*, p. 147
Elytra without appendix. (Fig. 14, 3c, 4b.) 3
3. Posterior wing with two apical cells. (Fig. 14, 3b.) *Dikraneura*, p. 148
Posterior wing with one apical cell. (Fig. 14, 4a.) *Empoasca*, p. 151
4. First two sectors of posterior wing uniting so that only three veins extend to wing margin. (Fig. 14, 6b, 7b.) 5
Posterior wing with all four sectors ending in the wing margins. (Fig. 14, 5c.) *Typhlocyba*, p. 155
5. Elytra with outer sector not uniting in any part with middle sector; a common cross vein between them forming base of oblong apical cell. (Fig. 14, 6a.) *Erythroneura*, p. 159
Elytra with outer and middle sectors uniting for a short distance, posterior to cross veins, thus forming a triangular apical cell. (Fig. 14, 7a.) *Empoa*, p. 157

Alebra Fieber.

Characterized by the blunt feebly curved, parallel-margined head, which is narrower than pronotum, the elytra with a distinct appendix and the wing with a marginal vein.

Key to Species.

1. Entirely orange-yellow or white with yellowish elytral suture, without dark markings *albostriella* 2
Dark in color or pale with dark markings
2. White to yellow, a brownish area on tip of clavus and scutellum and disc of pronotum brownish *albostriella* var. *wahlbergi*
Deep smoky to black, especially clavus and tips of elytra dark, face yellowish *fumidus*

A. *albostriella* (Fallen). *Cicada albostriella* Fallen. *Cicada elegantula* Zetterstedt. *Typhlocyba pallidula* Walsh. (Fig. 14, 1a, b, c.)

Hemip. Suec., Cicad., 54, 1826.

Head blunt, rounded and parallel-margined, white or pale yellow, often with a yellow stripe along suture. Tarsi black and tips of elytra smoky. Length 4 mm.

More often found on shrubs, but sometimes taken from herbaceous plants. It is usually present in good numbers on linden. New Haven, 4 Aug., 1920 (B. H. W.).

A. albotriella var. **fulveola** (Herrich-Schaeffer). *Typhlocyba aurea* Walsh.

Fauna Germ., cxiv, No. 16, 1839.

Many of the preceding are a uniform orange-yellow in color, and are placed under this varietal name.

Occurs with the preceding.

New Haven, 26 June, 8 July, 1912 (at light); Hamden, 29 June, 1913 (B. H. W.) (on linden); 5 July, 1910 (B. H. W.); North Branford, 1 Aug., 1922 (B. H. W.); Ellington, 8 Aug., 1922 (B. H. W.).

A. albotriella var. **wahlbergi** Boheman.

Hemip. Homop., Br. Ids., 193, 1896.

Whitish elytra with a stripe along suture, one in brachial area and another along costa yellow. Disc of pronotum, scutellum and an irregular blotch on tip of clavus brownish.

The capturing of this species in Connecticut is a new American record. It is common in Europe on elm.

New Haven, July 5, 1920 (B. H. W.) on elm.

A. fumida Gillette.

Proc. U. S. Nat. Mus., xx, 714, 1898.

A dark smoky color above often intermingled with yellow. Face yellow, smoky at base. Elytra darkest on clavus and at tips. Length 3.75 mm.

No doubt is a shrub species as it has been taken only in sweepings from shrubs or undergrowth close to them, and occurs in small numbers.

Cornwall, 18 July, 1921 (B. H. W.); on *Crataegus*.

Dikraneura Hardy.

Chloroneura Walsh.

Form long and slender, vertex produced, usually angled, elytra without appendix, wing with submarginal nerve complete.

Most of these are pasture forms, and they occur often in great numbers. One or two species have been found on shrubs and possibly feed on these.

Key to Species.

1. Elytra with apical cell on costal margin lanceolate or wanting, elytra usually yellowish or greenish with more angulate vertex .. 2
- Elytra with a deep triangular cell on apical margin; milky white, always with a smoky cross vein and often with red dashes on clavus and inner corium **cruentata**
2. Species with elytra greenish or whitish, vertex rather sharply angled. (Fig. 14, 2.) 3
- Species with elytra yellowish, vertex bluntly angled. (Fig. 14, 3a.) 4

- 3. Broad and robust, vertex broad, elytra whitish, nervure indistinct. .**mali**
Long and very narrow, vertex very pointed, elytra greenish or above
abdomen a bluish cast, head pronotum and scutellum yellowish
abnormis
- 4. Uniform deep yellow, abdomen above black, vertex uniform yellow-
ish**flavipennis**
With pale yellow color, vertex usually with a distinct orange tinge
on margin**feberi**

D. cruentata Gillette.

Proc. U. S. Nat. Mus., xx, 717, 1898.
Vertex produced, apex moderately rounded, yellow, often with
a sanguineous blotch on middle, two lines on pronotum, scutellum
sanguineous, a blotch on clavus and another along inner sector of
corium. Red coloration frequently absent, but with elytron smoky
on cross veins. Length 2.75 mm.
Has been reported from alder and witchhazel as adult in early
spring and late summer.

D. mali (Provancher). Erythroneura mali Provancher. Dik-
raneura communis Gillette.

Pet. Faune Ent. Can., iii, 298, 1890.
Rather large, head produced, blunt but angled, sordid milky
white; vertex, pronotum and scutellum tinged with yellow, no
distinct markings above. Length 3.75 mm.
A grass- and grain-feeding species, and one of our common
pasture and meadow pests throughout spring and summer.

West Haven, 11 May, 1905 (B. H. W.); New Haven, 22 Sept., 1918
(F. H. L.); 24 May, 1920 (B. H. W.); Stratford, 9 July, 1920 (B. H. W.);
Westbrook, 21 Sept., 1920 (B. H. W.); Hamden, 10 Apr., 1921 (B. H. W.);
Milford, 2 May, 1921 (M. P. Z.); Madison, 24 Sept., 1922 (B. H. W.).

D. abnormis (Walsh). Chloroneura abnormis Walsh. (Fig.
14, 2.)

Proc. Bost. Soc. Nat. Hist., ix, 316, 1864.
Long and very narrow, head produced, pointed but tip slightly
rounded. Pale green often with two longitudinal sanguineous
lines crossing vertex and pronotum. Elytra subhyaline at tips, an
obscure red stripe on costa and another parallel to it half way to
costa. Length 3.5 mm.

A grass feeder and occasionally found in large numbers injuring
grain.

North Branford, 12 June, 1921 (B. H. W.).

D. flavipennis (Zetterstedt). Cicada flavipennis Zetterstedt.
D. armata Buckton.

Fauna Lapp., 292, 1828.
Vertex roundly angled, color yellowish unmarked. Abdo-
men dark, margins yellow, elytra deep yellow, apex whitish hyaline,
hind tibiae with a row of distinct black spots. Length 3.75 mm.
A pasture species which may occur in Connecticut.

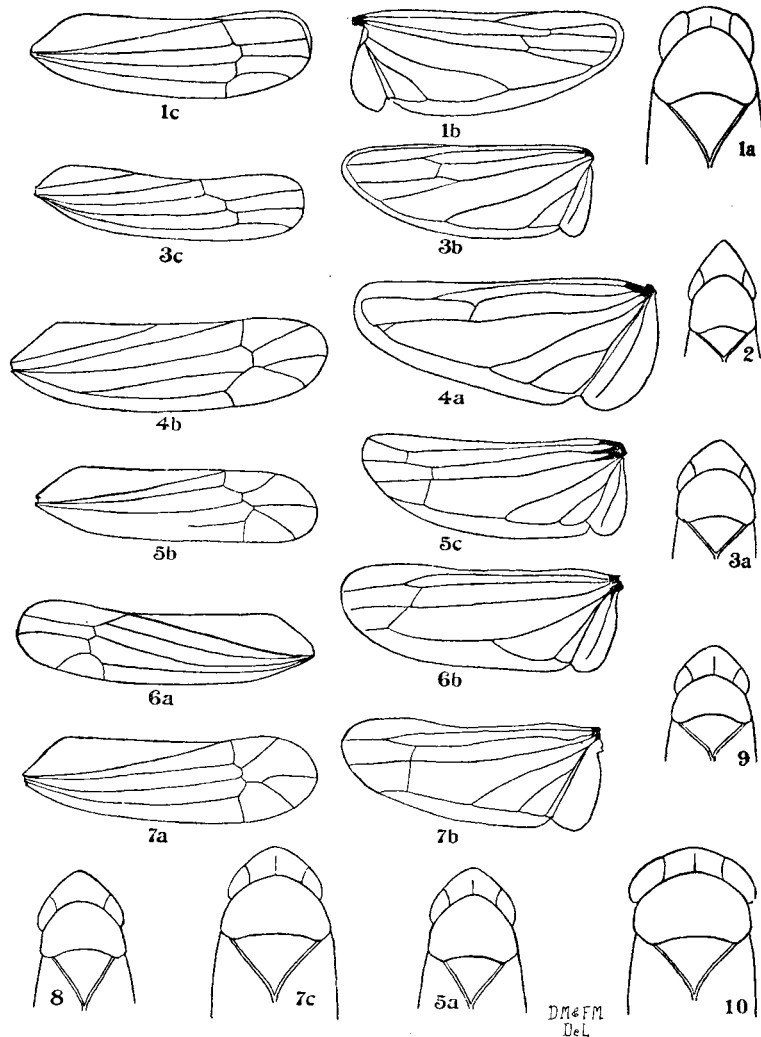


FIG. 14. (1a) *Alebra albostriella* Fallen,—head, dorsal view; (1b) same, wing; (1c) same, elytron. (2) *Dikraneura abnormis* Walsh,—head, dorsal view. (3a) *Dikraneura fieberi* Loew,—head, dorsal view; (3b) same, wing; (3c) same, elytron. (4a) *Empoasca obtusa* Walsh,—wing; (4b) same, elytron. (5a) *Typhlocyba flavoscuta* Gillette,—head, dorsal view; (5b) same, elytron; (5c) same, wing. (6a) *Erythroneura obliqua* Say,—elytron; (6b) same, wing. (7a) *Empoa querci* var. *gillettei* Van Duzee,—elytron; (7b) same, wing; (7c) same, head, dorsal view. (8) *Erythroneura tricincta* Fitch,—head, dorsal view. (9) *Empoasca flavescens* Fabricius,—head, dorsal view. (10) *Empoasca trifasciata* Gillette,—head, dorsal view. All greatly enlarged. Drawing by D. M. and F. M. DeLong.

D. fieberi (Loew). *Notus fieberi* Loew. (Fig. 14, 3a, b, c.)

Kat. Ostr. Cicad., 39, 1886.

Vertex produced obtuse and rounded, yellowish with apex of vertex and base of front rather uniformly washed or spotted with orange-red. This conspicuous marking will distinguish it from others of the genus. Length 3.5 mm.

A very common form throughout the summer in pastures and meadows injuring grasses. It usually occurs in such numbers as to cause severe injury.

New Haven, 24 May, 10, 14 June, 11, 16 July, 8 Aug., 1920 (B. H. W.); Waterbury, 15 Oct., 1920 (B. H. W.); Branford, 21 July, 1920; East Haven, 21 July, 1920 (B. H. W.).

- Empoasca Walsh.
- Chlorita Fieber.
- Cybus Douglas.
- Kybos Fieber.

Vertex varying from slightly produced and broadly rounding to well produced and strongly rounded, or even obtusely angled. The posterior wing with a marginal vein, one apical cell, and second apical area elongate. Species small, some shade of green, usually marked with yellow, white or red.

The members of this genus are diverse in feeding habits, and while some are always found on trees or shrubs, others are found only on herbaceous plants. Most of these species occur throughout the growing season and are serious pests of fruit, grain, pasture grasses and garden crops.

Key to Species.

- 1. Vertex not produced or very slightly so, usually well rounded. (Fig. 14, 10.) 2
- Vertex distinctly produced, often obtusely angled. (Fig. 14, 9.) 9
- 2. Elytra green with black or dark markings in form of stripes or bands 3
- Elytra green without dark markings in form of bands 4
- 3. With three transverse dark bands, one on pronotum and two on elytratrifasciata
- With dark stripe along elytral suture, extending upon pronotum smaragdula
- Vertex distinctly produced, often obtusely angled. (Fig. 14, 9.) 9
- 4. Last ventral segment of female produced and without incisions, or notched only on sides of produced segment 5
- Last ventral segment of female notched at middle 7
- 5. Robust, green unicolorous or without dark markings 6
- Deep green, claval suture blue, a black spot before cross veins, vertex pronotum, and elytra marked with reddish orangeunica
- 6. Sides of last ventral segment of female incised or notched, vertex evenly rounded and with yellowish markings, length 5 mm. aureoviridis

- Sides of last ventral segment of female produced but not notched or incised, vertex distinctly but slightly produced, green unicolorous, scarcely more than 4 mm. *obtusa*
7. Female segment with a broad shallow notch the base of which is a broad blunt tooth 8
 Female segment with a broad U-shaped notch without a tooth, a black spot near apex of elytra *pergandei*
8. Tooth long, species greenish without dark markings on elytra unicolor
 Tooth much shorter, elytra striped with orange-red and with black spot before cross veins *atrolabes*
9. Face and vertex not red 10
 Face and margin of vertex a dark rather bright red *coccinea*
10. Elytra greenish or yellowish, not banded 11
 Elytra greenish, slightly smoky with a darker band across center *birdii*
11. Pale green, nervures not conspicuous 12
 Darker green, line on pronotum and veins of elytra conspicuously pale, tip of elytra smoky *alboneura*
12. Face almost as broad as long 13
 Face one-third longer than broad *viridescens*
13. Pronotum with six or eight white spots along anterior margin ... *mali*
 Pronotum with three white spots or none on anterior margin *flavescens*

E. trifasciata Gillette. (Fig. 14, 10.)

Proc. U. S. Nat. Mus., xx, 726, 1898.

Vertex well rounded in front, color green, vertex and pronotum marked with reddish or golden yellow. A broad black band across posterior half of pronotum, another across middle of elytra and a broader one at apex. Length 4 mm.

A common species but usually found only on cottonwood both as nymph and adult.

Durham, 27 Aug., 1920 (B. H. W.); Norwalk, 8 Sept., 1920 (B. H. W.). On poplar; Portland, 25 June, 1922 (M. P. Z.).

E. smaragdula (Fallen). *Cicada smaragdula* Fallen. *Eupteryx viridipes* Curtis.

Acta Holm, 37, 1806.

Vertex slightly produced, color green, a broad black stripe extending from disc of pronotum across scutellum then along elytral suture and terminating in a larger black area at apex. Length 3.5-4 mm.

Reported from willows and *Crataegus*, but seems to occur in greater numbers on the former during July and August.

East Hartford, 16 Sept., 1920 (B. H. W.); New Haven, 1, 3 Aug., 3 Oct., 1920 (B. H. W.). On willows.

E. unicolor Gillette.

Proc. U. S. Nat. Mus., xx, 731, 1898.

Vertex broadly rounded, color yellow to green, usually with a pale median stripe and a bluish blotch next each eye. Female segment rounded, with an oblique notch either side of a median blunt tooth. Length 3.5 mm.

In some sections this is a severe pest of apple foliage, and is found in company with *E. mali* and *Empoa rosae*.

Portland, 24 July, 1921 (B. H. W.), on poplar.

E. obtusa Walsh. (Fig. 14, 4a, b.)

Proc. Bost. Soc. Nat. Hist., ix, 316, 1864.

Resembling *unicolor*, vertex obtusely rounded not strongly produced, greenish with tips of elytra hyaline. Female segment produced but without notch. Length 4 mm.

Common on willows in early spring and summer.

New Haven, 8 Aug., 1920 (B. H. W.), on *Salix*; 18 July, 3 Oct., 1920 (B. H. W.); Orange, 17 July, 1920 (B. H. W.); Guilford, 13 July, 1920 (B. H. W.).

E. aureoviridis (Uhler). *Typhlocyba aureoviridis* Uhler.

Bull. U. S. Geol. Geog. Surv., iii, 474, 1877.

More robust than *obtusa* with a more rounded and less produced vertex. Color yellowish green to golden yellow, a pale spot behind each eye on pronotum, often a median line extending across scutellum. Female segment strongly produced and notched or slightly incised on either side. Length 5 mm.

A common willow species and rather widely distributed.

New Haven, 3 Oct., 1920 (B. H. W.).

E. unica (Provancher). *Typhlocyba unica* Provancher. *E. splendida* Gillette.

Pet. Faune Ent. Can., iii, 340, 1890.

Vertex slightly produced, orange-yellow anteriorly, deep blue posteriorly. Pronotum reddish orange anteriorly, and bluish posteriorly. Elytra reddish with a rather broad blue stripe along claval and costal veins, apex smoky subhyaline, a black spot before cross nervure of apical cell. Length 3.5 mm.

Common on alder which is its food plant.

New Haven, 20 July, 1911 (A. B. C.); 22 Sept., 1918 (D. M. D.); 4, 7, 8, 9 July, 1 Aug., 22 Sept., 1920 (B. H. W.); Portland, 8 Aug., 1913 (B. H. W.); Huntington, 9 July, 1920 (B. H. W.); Hamden, 5 July, 1920 (P. G.).

E. atrolabes Gillette.

Proc. U. S. Nat. Mus., xx, 736, 1898.

Similar to *unica* with duller colors, greenish golden marked with blue, segment bearing a square, abrupt notch. Elytra marked as in *unica* and with black spot before cross nervures. Length 3.5 mm.

Found on alder throughout the summer in company with the preceding.

New Haven, 3 July, 1920 (B. H. W.).

E. pergandei Gillette.

Vertex rounded, not produced, pale yellowish green, pronotum with whitish mottling and a broad white line on scutellum, a black spot on each elytron before cross nervure of inner apical cell. Female segment with a rather broad, gradually sloping U-shaped notch. Length 3.75 mm.

Perhaps this feeds on herbaceous vegetation, as it has been taken in general sweeping in open areas.

New Haven, 4 July, 1920 (B. H. W.); East Hartford, 16 Sept., 1920 (B. H. W.).

E. coccinea (Fitch). *Empoa coccinea* Fitch.

Rather small, vertex blunt, strongly rounded. Vertex, pronotum, scutellum and face to apex of clypeus, a bright, deep red. Elytra smoky subhyaline, costal vein greenish. Very conspicuously marked. Length 3 mm.

Recorded from pine by Dr. Fitch; although no other collector has designated where it was taken the species is more often found in areas where pines are abundant, and this may prove to be its food plant.

E. alboneura Gillette.

Proc. U. S. Nat. Mus., xx, 743, 1898.

Small robust, vertex somewhat produced and pointed in front. Pale green, a longitudinal pale line across vertex, pronotum, and scutellum. Elytra with tips smoky, and all the nervures pale. Length 3 mm.

From collecting records it would seem that this little species is able to feed both on shrub and herbaceous plants.

E. mali (LeBaron). *Tettigonia mali* LeBaron. *Empoa albopicta* Forbes. Apple Leaf-hopper.

Prairie Farmer, xiii, 330, 1853.

Vertex produced, obtusely angled. Greenish to yellow with a row of six to eight white spots on anterior margin of pronotum. Length 3.25 mm.

A cosmopolitan feeder being a pest of apple, alfalfa, grain and truck crops, and attributed with the carrying of fungus diseases. One of our most important pests.

New Haven, 16, 31 Oct., 1903 (H. L. V.); Cornwall, 18 July, 1921 (B. H. W.); Ellington, 8 Aug., 1922 (B. H. W.), on apple; Hamden, 14 July, 1921 (P. G.), on potato.

E. flavescens (Fabricius). *Cicada flavescens* Fabricius. (Fig. 14, 9.)

Ent. Syst., iv, 46, 1794.

Resembling *mali* in size, form and color, but with three white spots or none on anterior margin of pronotum. Color bright green to yellow. Length 3.25 mm.

It occupies about the same economic position as the preceding, and is found to feed on the same types of vegetation.

New Haven, 10, 14 June, 31 July, 22 Sept., 30 Oct., 1920 (B. H. W.); Bridgeport, 20 Sept., 1920 (B. H. W.); Hamden, 20 June, 1920 (B. H. W.).

E. viridescens Walsh. *E. consobrina* Walsh.

Proc. Bost. Soc. Nat. Hist., ix, 316, 1864.

Vertex produced and rounded at apex, elytra subhyaline with a

faint greenish tinge. Face with a pale line on middle, another on middle of vertex, and one on middle of scutellum. Three spots on anterior margin of pronotum white. Length 3 mm.

Perhaps very closely related to the two preceding and occurring on herbaceous plants.

E. birdii Goding.

Ent. News, i, 123, 1890.

Vertex obtusely rounded in front, color yellow to green, a pale stripe extending across vertex and pronotum, and often scutellum. A pale spot either side of this on base of vertex and anterior portion of pronotum. Elytra yellow smoky crossed by a darker band at middle, sometimes fused with a dark area at base of clavus, and a spot at apex darker. Length 3 mm.

Occurs on a number of plants and shrubs, not an abundant species.

Typhlocyba Germar.

Eupteryx Curtis.

Elongate, slender, vertex crescent-shaped, elytra exceeding abdomen, appendix wanting. Wings without marginal vein, all four veins extending to wing margin, not fused.

Only a few American species belong here and feed upon plants which, for the most part, are not of economic importance.

Key to Species.

1. Milky white, elytra rounded on outer apical margin and concavely truncate toward inner margin, with radiating brown lines on posterior half **inscripta**
Dark in color or marked with black spots, elytra convexly rounded posteriorly 2
2. Usually brown or black in color, vertex almost uniform in color, without spots 3
Light in color, vertex yellowish with three large black spots, two at apex and one median at base, elytra pale with infuscated areas along nervures **melissae**
3. Vertex brownish with pale margin, rounded, whole insect rather uniform in color with pale markings 4
Vertex black, obtusely angled, pronotum and scutellum black, elytra milky white with apex and areas on corium smoky **vanduzeei**
4. Species large, 3.75 mm., anterior margin of vertex, costal margin of elytra and apical nervures pale **nigra**
Smaller, 3 mm. in length, margin of vertex, costal margin of elytra, a median oblong spot on pronotum crossing scutellum, and a broken commissural line along elytral suture, often shown by spots only, yellow **flavoscuta**

T. melissae Curtis (cited as *T. collina* Flor. by Van Duzee).

Eupteryx quinque maculata Baker.

Hemip. Homop. Br. Ids., 204, 1896.

Vertex produced, strongly rounded, two large black spots above apex and a large round black one at base. General color pale

green, pronotum with two central black spots at base, a small one and a curved line behind each eye. Elytra greenish hyaline, smoky at tips, nervures pale and a few cells spotted with fuscous. Length 3 mm.

A common form on catnip, sage and other Labiates. An European species, now known to occur in the United States both on Atlantic and Pacific coasts.

Granby, 10 Sept., 1909 (W. E. B.) (on sage).

T. vanduzei (Gillette).

Proc. U. S. Nat. Mus., xx, 748, 1898.

Vertex produced, scarcely angled, black in color. Pronotum and scutellum black, elytra milky white, smoky at tips, often a dark area along middle of costa. Length 3.75 mm.

Occurs on ferns in New England in July and perhaps August.

Cromwell, 18 July, 1921 (B. H. W.), on ferns.

T. flavoscuta (Gillette). (Fig. 14, 5.)

Proc. U. S. Nat. Mus., xx, 749, 1898.

Vertex produced, bluntly rounded at apex. General color smoky above, yellow beneath. Face, anterior margin of vertex, median spot on posterior portion of pronotum, scutellum, costal and inner margins of elytra yellow. Length 3 mm.

On ferns in wooded areas during July and August.

Bridgeport, 20 Sept., 1920 (B. H. W.); East Haven, 21 July, 1920 (B. H. W.); Guilford, 13 July, 1920 (B. H. W.); Huntington, 9 July, 1920 (B. H. W.); New Haven, 11 July, 1920 (B. H. W.), on ferns; Cornwall, 5 June, 1921 (B. H. W.).

T. nigra (Osborn).

Rept. N. Y. St. Ent., xx, 543, 1905.

Vertex bluntly rounded, more robust than others of the group, black above anterior margin of vertex and costal margin, broadly yellow just before apex, which is smoky with nervures pale. Length 3.75 mm.

Taken only in shaded areas in woodland from ferns in cool moist habitats during July and August.

Bridgeport, 20 Sept., 1920 (B. H. W.); Guilford, 13 July, 1920 (B. H. W.); Hamden, 20 June, 1920 (B. H. W.); New Haven, 11 July, 1920 (B. H. W.); Portland, 25 July, 1920 (B. H. W.); Huntington, 9 July, 1920 (B. H. W.).

***T. inscripta** Sanders and DeLong.

Proc. Ent. Soc. Wash., 24, 99, 1922.

Milky white washed with yellow, elytra with a large central area on apical cross veins dark brown, from which brown lines radiate along veins to apex, costa and corium. Elytra with outer apical margin rounded, then concavely truncate toward inner margin. Female last ventral segment four times as long as preceding, posterior margin roundly excavated one-third the distance to the base, either side of a broad, central rounded tooth one-third

as broad as the segment and equaling in length the lateral angles. Male valve more than twice as long as last ventral segment, posterior margin with broad V-shaped notch extending from the lateral angles one-third the distance to the base. Plates narrower than valve and twice longer, margins almost parallel, tips broadly rounded.

This species was recently described from material collected in New Haven and also material collected in Kew Gardens, London, England, by Prof. J. G. Sanders.

New Haven, on pear; July 6, 1920 (B. H. W.), type material; 4 Aug., 1920 (B. H. W.); 19 June, 1921 (P. G.).

Empoa Fitch.

Anomia Fieber.

Typhlocyba Sahlberg.

Vertex very blunt in front, produced but scarcely angled. Elytral venation distinct as given in key with apical cell formed between outer and middle sectors, triangular. As a rule the species are rather pale in color with few dull markings.

This group of pale species are mostly shrub-feeding and a few are pests of shrubbery and fruit trees. All have two or more broods a season.

Key to Species.

1. White or yellow with bands or spots on the vertex, pronotum or elytra 2
White, yellow or greenish without dark markings 4
2. Elytra not banded, but with a transverse row of dark blotches before the cross veins 3
Whitish with transverse band across elytra*querci*
3. Pronotum with a dark spot on middle of anterior margin*ulmi*
Pronotum without black markings on anterior margin*tenerrima*
4. Yellow or white in color 5
Uniform greenish in color*fabae*
5. Sulphurous or orange-yellow, unmarked*lethierryi*
Very pale yellow or white, unmarked*rosae*

E. querci Fitch. Oak Leaf-hopper. (Fig. 8, 5.)

Homop. N. Y. St. Cab., 63, 1851.

Creamy white to yellowish with three blackish spots in a transverse row just before cross nervures of elytra. Length 4 mm.

Usually occurring on oak, but often taken from other trees and shrubs.

New Haven, 19 June, 1922 (B. H. W.).

E. querci var. *gillettei* Van Duzee. *Typhlocyba bifasciata* Gillette and Baker. (Fig. 14, 7.)

Cat. Hemip.; Hemip. Col., iii, 1895.

As in *querci*, yellowish, but with a broad smoky transverse band just in front of middle and another just before cross nervures. Length 4 mm.

It occurs in abundance on wild cherry during July and August.

New Haven, 26 June, 8 July, 1912 (at light); Hamden, 29 June, 1913 (B. H. W.) (on linden); Manchester, 16 Sept., 1920 (B. H. W.).

E. ulmi (Linnaeus). *Cicada ulmi* Linnaeus. Elm Leaf-hopper. Syst. Nat., Edn. 10, i, 439, 1758.

Yellow, vertex with two black spots on anterior margin and a spot on anterior margin of pronotum. Elytra slightly infuscated on cross nervures, tergum black. Length 3.75 mm.

Originally taken from elm, but it seems to occur on other vegetation also.

E. tenerrima (Herrich-Schaeffer). *Typhlocyba tenerrima* Herrich-Schaeffer. *Typhlocyba rubi* Hardy. *Typhlocyba misella* Boheman.

Fauna Germ., cxxiv, No. 10a; clxiv, No. 16, 1834.

Yellowish with greenish tint, very slender, a transverse row of dusky blotches on the elytra just before cross nervures. Part of cross nervures black. Length 3 mm.

A shrub species, on hazel, and occasionally on alder during the summer.

New Haven, 21 June, 1922 (B. H. W.).

E. lethierryi (Edwards). *Typhlocyba lethierryi* Edwards. *Typhlocyba rosae* Kirschbaum.

Ent. Mon. Mag., xvii, 224, 1881.

Form and size of *rosae*, but is a uniform sulphurous or orange-yellow without dark markings. Apex of elytra pale. Length 3.5 mm.

Reported from elm, but is found on maple and other trees in small numbers.

New Haven, 8 July, 1912 (at light).

E. rosae (Linnaeus). *Cicada rosae* Linnaeus. *Typhlocyba pteridis* Dahlbom. Rose Leaf-hopper.

Syst. Nat., Edn. 10, i, 439, 1758.

Pale yellow to milky white, without dark markings above. The tarsi, tip of proboscis and eyes usually brown. Upper portion of face often darker. Length 3.25-3.5 mm.

A very common and destructive pest on roses and frequently feeds on apple foliage so as to cause severe injury.

Yalesville, 19 Oct., 1903 (H. L. V.); New Haven, 3 Oct., 1902 (B. H. W.); 16, 31 Oct., 1903 (H. L. V.); 27 June, 1916 (B. H. W.); 4 Aug., 30 Oct., 1920 (B. H. W.); Orange, 15 Sept., 1920 (B. H. W.); Guilford, 17 July, 1920 (B. H. W.); New Haven, 4 July, 1921 (B. H. W.).

E. fabae (Harris). *Tettigonia fabae* Harris. Bean-Vine Leaf-hopper.

Rept. Ins. Mass., 186, 1841.

Head crescent-shaped, the male with two long thin recurved plates. Color uniformly pale green, the wings and wing covers transparent and colorless. Hind tarsi bluish. Length 3.5 mm.

Originally described as a pest of beans, but no doubt occurs on other forms of vegetation as do others of this group. A rather uncommon form, and perhaps is an *Empoasca*.
East River, 8 Aug., 1908 (C. R. E.); New Haven, 7 July, 1909 (B. H. W.).

Erythroneura Fitch.
Zygina Fieber.
Idia Fieber.

Vertex produced distinctly but rather bluntly angled, with apex usually slightly rounded. Elytra with apical cell between outer and middle sectors quadrate, elongate, the sectors joined by a cross nervure. Usually brightly colored.
Among the species belonging here are several very destructive to vineyards and known as "grape leaf-hoppers." Some of these are found only occasionally or in limited areas, others are pests and are widespread and distributed over the entire United States. As a group they hibernate as adults under leaves in wooded areas, or under the rough loose bark of shade and fruit trees, and can be found almost anytime during the winter by pulling off the loose bark or sifting among the leaves. Most of these are pale with bright color markings.

Key to Species.

- 1. Without three distinct transverse bands 2
With three distinct transverse dark bands, one crossing pronotum and two crossing elytra **tricineta**
- 2. Almost entire coloring concentrated on elytra before cross nervures 3
Coloring not concentrated on basal portion of elytra, often pale with slight markings 7
- 3. Coloration bright red 4
Coloration in form of a basal brown transverse band on elytra .. **comes** var. **basilaris**
- 4. Base of elytra almost solidly and uniformly red 5
Base of elytra entirely flecked with red **trifasciata**
- 5. Head and pronotum without red markings 6
Head and pronotum marked with red, basal two-thirds of elytra red **crevecoeuri**
- 6. Costal areas and a large round spot at middle of elytra on commissural line, white **hartii**
Elytra without commissural white spot **tunicarubra**
- 7. Elytra without black spot on corium 8
Elytra with a large black spot often red margined, at middle of claval suture; vertex, pronotum and scutellum often each with a red spot **illinoensis**
- 8. Elytra pale with red markings 9
Color dark almost uniform, often with pale spots 10
- 9. An oblique red line on clavus and one on inner sector of elytra **obliqua**
Marking in form of zigzag or broken lines or spots **comes** and var. **maculata**
- 10. A pale median line on vertex, pronotum and scutellum with a dash either side of it on vertex and pronotum 11

Only a few of the varieties occur in vineyards and these in very small proportions. Such forms as *ziczac* are more abundant on woodbine and other vines and are seldom found on grapes. So from field observations it is doubtful whether some of these should have varietal or specific ranking.

New Haven, 16 Oct., 1903 (H. L. V.); 20 May, 1920 (B. H. W.); North Branford, 16 June, 1922 (B. H. W.); East Haven, 10 May, 1921 (B. H. W.).

E. comes var. *ziczac* Walsh.

Proc. Bost. Soc. Nat. Hist., ix, 317, 1864.

With spots and lines coalescing to form a zigzag coloration from anterior costal margin to apical portion, often smoky. A large dark spot at middle of costa.

Hamden, 23 Oct., 1921 (B. H. W.); New Haven, 12 May, 1921 (B. H. W.).

E. comes var. *vitis* (Harris).*

Encyc. Am., viii, 43, 1831.

Usually a red band across scutellum, pronotum and basal angles of elytra, a broad red one across middle, ending in bluish spots on costa, and tips of elytra blackish. Central reddish band surrounded by white.

New Haven, 13 Sept., 1920 (B. H. W.). Boston Ivy.

E. comes var. *basilaris* (Say).

Jour. Acad. Nat. Sci. Phila., iv, 344, 1825.

As in *comes* but with base of elytra dark brown, often extending over scutellum and most of pronotum.

North Haven, 24 Sept., 1921 (B. H. W.).

E. comes var. *infuscata* (Gillette).

Proc. U. S. Nat. Mus., xx, 764, 1898.

A broad black stripe extending over vertex, pronotum, scutellum and along elytra to apex. A dark spot at tip of clavus is surrounded by a white ring.

E. comes var. *rubra* (Gillette).

Proc. U. S. Nat. Mus., xx, 764, 1898.

Spots coalescing so as to give almost entire reddish coloring above.

E. comes var. *maculata* (Gillette).

Proc. U. S. Nat. Mus., xx, 764, 1898.

Lines broken up into a great number of round reddish spots.

New Haven, 16 Oct., Yalesville, 19 Oct., 1903 (H. L. V.); North Haven, 24 Sept., 1921 (B. H. W.).

E. comes var. *scutellaris* Gillette.

Proc. U. S. Nat. Mus., xx, 764, 1898.

Scutellum black, elytron often milky white without red markings.

* McAtee evidently regards *vitis* as a species and described the var. *stricta*. See Trans. Am. Ent. Soc., xlv, 305, 1920. (W. E. B.)

E. illinoiensis (Gillette). *Typhlocyba illinoiensis* Gillette.

Proc. U. S. Nat. Mus., xx, 758, 1898.

White or yellowish, elytra always with three black spots, one at base of inner apical cell, one midway along costa and the third and largest margined with red and situated just outside of clavus not quite half way to its apex. Vertex, pronotum and scutellum each often with a large red spot. Length 3 mm.

Feeds on grape and other vines, often found in woodland.

E. obliqua (Say). *Tettigonia obliqua* Say. (Fig. 14, 6.)

Jour. Acad. Nat. Sci. Phila., iv, 342, 1825.

Whitish, vertex, pronotum and scutellum with two red longitudinal lines. Elytra with three oblique red stripes extending toward inner margin. Length 3 mm.

With its varieties this species occurs on grapes and is taken in practically all sweepings from shrubs and trees in woodland. It hibernates as an adult under leaves or bark in sheltered places and can be found on warm days in winter and early spring coming out of these shelters.

Yalesville, 19 Oct., 1903; New Haven, 7 May, 1904 (H. L. V.); 22 Sept., 1918 (F. H. L.); Orange, 15 Sept., 1920 (B. H. W.); East Hartford, 16 Sept., 1920 (B. H. W.); Hamden, 25 Apr., 1921 (B. H. W.); North Haven, 24 Sept., 1921 (B. H. W.).

E. oblique var. **dorsalis** (Gillette).

Proc. U. S. Nat. Mus., xx, 757, 1898.

Coloration coalescing to form a broad red or dark median dorsal stripe extending from apex of vertex to tip of elytra.

New Haven, 22 Sept., 1920 (B. H. W.); North Haven, 4 Sept., 1921 (B. H. W.).

E. obliqua var. **noevus** (Gillette).

Proc. U. S. Nat. Mus., xx, 757, 1898.

Differs from typical *obliqua* only by a black area covering all of scutellum and median posterior part of pronotum.

E. obliqua var. **fumida** (Gillette).

Proc. U. S. Nat. Mus., xx, 758, 1898.

Dark or entirely dusky colored throughout.

E. vulnerata Fitch.

Homop. N. Y. St. Cab., 62, 1851.

Brownish green to black, marked with white. A common white line on vertex and pronotum. Elytra with costa white crossed near middle by a black line. A few pale areas usually conspicuous. Length 3 mm.

Collected from many vines and shrubs and apparently feeds on more than one plant. Among those recorded are grape, Virginia creeper and elm. It hibernates as an adult.

New Haven, 14 May, 1904 (H. L. V.); 13 Sept., 1920 (B. H. W.).

E. vulnerata var. **nigra** (Gillette).

Proc. U. S. Nat. Mus., xx, 765, 1898.

Black with a white area on middle of costa and a yellow spot on inner basal angle of elytra behind scutellum.

E. crevecoeuri (Gillette).

Proc. U. S. Nat. Mus., xx, 767, 1898.

Yellowish pronotum and scutellum with two red longitudinal lines, face yellow suffused with red. Scutellum entirely red or black, elytra with basal two-thirds reddish, yellow beyond tip of clavus and with costal area at base more or less yellowish. Length 3 mm.

Occurs in wooded areas on foliage, not a common species.

Family MEMBRACIDAE.

By WILLIAM DELBERT FUNKHOUSER, A.M., PH.D.

CHARACTERS OF THE FAMILY.

The family Membracidae is characterized by the extreme development of the pronotum which usually extends backward to cover the mesonotum and metanotum and often completely conceals the entire abdomen, the presence of two ocelli only, the poorly developed hair-like antennae situated below and slightly in front of the eyes, the trimerous tarsi, and the usually membranous and characteristically veined wings.

TAXONOMIC POSITION.

Although the taxonomic position of the families of the Homoptera, and indeed the validity of the systematic divisions themselves, have long been a subject of discussion among hemipterists, there seems to be abundant evidence to indicate that the Membracidae are entitled to only a very low place in the phylogenetic arrangement of the families. The pronotum, to be sure, is highly specialized, but the sensory system is very poorly developed, the wings are extremely generalized, and the genital organs have developed very little from the ancient type.

Phylogenetic studies would suggest that the Membracidae should be placed between the Cicadidae (which may be considered the lowest or most generalized of the homopterous families) and the Cicadellidae, with strong affinities toward, and probably from the same stem as, the latter.

DISTRIBUTION.

The family Membracidae is primarily a tropical and subtropical group of insects and is represented in greatest numbers in South America, northern Africa and southern Asia. It is in these