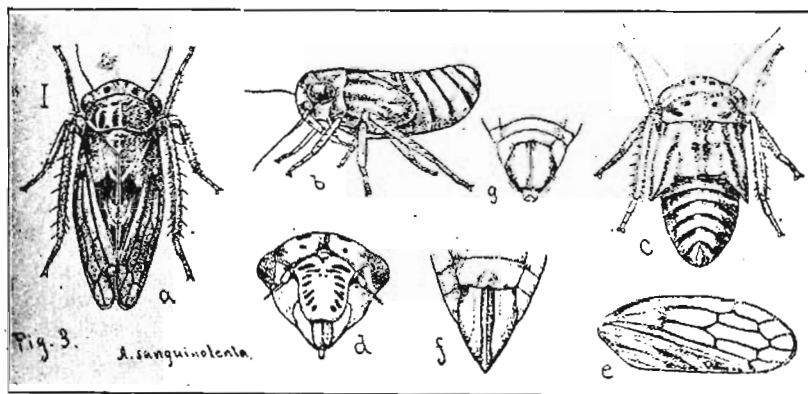


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Agallia sanguinolenta

One of the species of greatest economic importance in Tennessee. Destructive to grasses, clover and alfalfa.

THE LEAFHOPPERS OR JASSOIDEA OF TENNESSEE

BY DWIGHT M. DELONG

KNOXVILLE, TENNESSEE
JUNE, 1916



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INTRODUCTION

The insects known as leafhoppers and belonging to the superfamily Jassoidea are widely distributed and of great abundance on almost all kinds of vegetation, but on account of insufficient literature with which to identify them, the average student of Entomology knows little of the group and their relative systematic position. It was primarily for this reason, with the intention of submitting it as a thesis at Ohio State University, that a faunistic study of this group and keys and descriptions were written for the entire Tennessee list. And it is hoped that it will be of some assistance to students in systematic work. In collecting an attempt was made to find the number and abundance of species and their distribution throughout the State, rather than their ecologic and economic importance, although many notes relating to these phases of the subject were taken during the summer and have been added; also a short discussion of their economic importance. But in order to find such economic bearing it is first necessary to find which forms occur in the State and to what extent.

The material used for this bulletin was collected by the author, with the exception of a few species from Mr. Crumb and Mr. Ainslee, and was taken during the summer of 1915 between the middle of June and the middle of September. A large part of these specimens were collected while employed at the Clarksville Laboratory, Clarksville, Tenn., but three weeks prior to and following this engagement were spent in different parts of the State entirely at collecting. Consequently the list cannot be counted as complete, although it is thought to be representative of the species of the State, and to include all the widely distributed and common species occurring there as well as some which are considered rare or even new. The list at present numbers 212 species and varieties, from which it is apparent that Tennessee is richer in its "Jassid" fauna than any State which has previously published a list of these forms.

One of the interesting facts concerning the Tennessee fauna is the overlapping of typical and in some cases extreme northern and southern forms. For instance *Deltocephalus sayi* and *Athysanus curtisii*, typical northern species, and *Xestocephalus nigrifrons*, a species recently described from Maine, were found in the State, as were also *Draecula cephalo reticulata*, a typical southern form, and *Tinobregmus viridescens*, the members of which genus have heretofore been reported only from Texas and Louisiana.

ACKNOWLEDGMENT

I am under obligations to several who have assisted me in this work. Especially am I indebted to Prof. Herbert Osborn for the use of his private library, private collection, containing type specimens with which to compare, for suggestions and constant help and encouragement. I am indebted to Mr. A. C. Morgan, of the Clarksville Station, Clarksville, Tenn., for his kindness in permitting the collecting for this list while employed under his direction, and for the arrangement of the work in such a way as to make collecting possible; to Mr. S. E. Crumb, of Clarksville, Tenn., for his suggestions in regard to the best collecting grounds, and for additional records; to Mr. Geo. G. Ainslee, of the Nashville Station, Nashville, Tenn., for specimens and records, and to Prof. G. M. Bentley, State Entomologist, for the use of the University collection at Knoxville, Tenn. To these and to all others who have in any way assisted me in the completion of this bulletin, I wish to express my sincere thanks.

THE LEAFHOPPERS OR JASSOIDEA OF TENNESSEE

ECONOMIC IMPORTANCE

The question of economic importance is, of course, the final object of all work upon this group, and in order to understand it thoroughly, much detailed ecological and life history work is necessary. Prof. Osborn has undoubtedly worked more along this line than any other entomologist, and many of the facts in this discussion are taken from his papers. On the other hand the author was able to make many observations during the past season of certain conditions which exist in Tennessee, and these will be included.

The group may be roughly divided into two distinct classes as regards economic importance, those which affect grasses, cereals, forage crops, fruit trees, etc., which are important as food plants, and those which feed almost entirely upon such plants as willow, honey-locust, alder and canebrake, which are not recognized as important, and consequently the species affecting them do not concern us especially in considering real economic value. If we consider, however, that these plants are of importance in the manufacture of certain articles or materials, then we must consider those species as having some real bearing upon this question. But in the estimation of the author, in order that sufficient control measures may be studied and worked out, it is just as necessary to know which species live on plants not of importance as to know which ones affect food crops. Only in that way can economic species be singled out, and for that reason this list has been made to include all the species found in the State.

It is the opinion of many who have worked to a large extent upon the Jassoidea that the real injury caused to plants by these insects is not appreciated and due consideration is not given them. Prof. Osborn estimates from actual collecting observations that about one million occur on an acre of grass or meadow. They are all small insects, some very minute, and the average farmer does not realize that a great number of these on a single leaf or blade of grass will cause even more damage to his crops than a few large insects. Often protective coloration or their habit of feeding on the unexposed side of the leaf also help to conceal them and cause them to be less conspicuous. Usually only a close examination will reveal the injury and damage done; this is especially true on grasses and cereals, while on grapevines, when the insects are abundant, the injury is quite noticeable.

In many cases the damage is attributed to other insects or to parasitic fungi, which are easily seen and thus receive the blame.

The nature of the injury is another factor which causes their attacks to be unnoticed, for it is not a destroying directly of the leaf tissues, as is the case of injury caused by many species of insects, but is caused by taking the nourishment from the leaves and stems in the form of sap or plant juices, which causes a withering, curling, and often distorting and discoloration of the leaves, and a lowering of the vitality of the whole plant. This taking of nourishment is accomplished by a sucking-tube or

beak which contains fine, piercing organs for the rupturing of the epidermis. By such injury the plant often does not do well and may be stunted or in some instances die, yet to the common observer no outward signs of injury will betray the real method by which damage is caused to the crop.

It is also possible that fungous diseases may obtain a hold and affect certain plants through these injuries in the epidermis. Many insects are known to harbor and carry upon their bodies certain fungi, and although the exact relations existing between the Jassids and plants are not known, we may assume from the great numbers both of species and individuals, and from the knowledge of other insects and fungi, that this is a probable occurrence. Even if the punctures are not necessary for their entrance to the plant cells, the distribution of such fungi may be largely assisted by the leaf-hoppers.

Certain plants and crops seem to have a few species of Jassids which are always found upon them, and which are, apparently, food plants of certain species. It might be well to mention a few of those here.

A rather constant group of Jassids are found on willows, which consists of species of *Idiocerus* and *Pediopsis*, *Scaphoideus immistus*, *Cicadula punctifrons*, *Tettigoniella gothica*, *T. heiroglyphica*, *Diedrocephala versuta* and a few species of *Empoasca*. Certain species of *Bythoscopidae* are especially abundant on this plant and were found to occur in all parts of the State where an opportunity was given for collecting.

One species in particular seems to have as a food plant the alder. *Empoasca splendida* was taken in great abundance from all such shrubs, and numerous cast nymph skins were found on the under surfaces of the leaves.

Macropsis apicalis and a few species of *Typhlocyidae* are very numerous on honey-locust.

The "Cane-brake Fauna," an interesting and rather unusual group, may be attributed to a somewhat restricted and typical southern flora, the occurrence of large patches of cane-brake along the Cumberland and Tennessee Rivers. At certain periods of the year these are swarming with a few species of Jassids, some of which so far as collecting has been done cannot be found on any other plant. It consists of such species as *Chlorotettix galbanata*, *C. nacreosa*, *C. suturalis*, *Thamnotettix shermani*, *T. flavotinctus*, *T. crumbi*, *T. inornata*, *Deltocephalus aurundineus*, and three species of *Scaphoideus*. The group seems to be one of isolated and a few previously unnoticed forms, two species of which were recently described by Mr. Crumb and three others are apparently new.

A few species such as *Homalodisca triquetra*, *Aulacizes irrorata*, *Oncometopia undata* and *O. lateralis* affect the cotton crops in the southwestern part of Tennessee.

Many species are abundant on grasses, cereals and forage crops; a few are of so great importance as to deserve specific mention. *Draeculacephala reticulata* is especially abundant on Bermuda grass; *D. mollipes* is also found on Bermuda grass, as well as blue-grass, Johnson-grass and numerous others. *Deltocephalus inimicus*, *D. nigrifrons*, and *Phlepsius irroratus* occur on many grasses and are abundant in pastures and meadows. *Del-*

locapahius oculus, *Athysanus exitiosus* and *Cicadula 6-notata* are abundant on wheat and oats. *Agallia constricta* and *A. sanguinolenta* are serious pests of clover and alfalfa, and *Empoasca mali* is abundant on soy beans and peas. The injury of the last three species mentioned was noticed especially on the crops of the experiment farm of the N., C. & St. L. Ry. at Tullahoma, Tennessee.

Typhlocyba comes and *T. obliqua*, with their varieties, do great damage to grapevines. A special case of this came to my notice at Clarksville during the summer, where a certain vine was so badly infested that practically all the leaves turned brown and curled up. Between fifty and one hundred specimens were found on a single leaf and cast nymph skins were thickly scattered over the under surfaces. Similar conditions, but not so bad, were found on the vines at the Experiment Station at Knoxville.

Empoasca mali and *E. flavescens* were found in abundance on the apple trees at the Experiment Station orchard at Knoxville, Tennessee.

It is a noticeable fact that in well-cultivated land Jassids are not so numerous as where portions of the farm are in permanent pasture, such places forming wintering quarters. The pastures and meadows in Tennessee proved to be the best places for collecting, and were swarming with a few common species as well as several which were not taken in abundance.

A method of farming which seems to be prevalent in certain parts of the State is a feature which promotes the rapid multiplication of these forms and the abandonment of which would no doubt help to control many species. Around the margin of the fields wide plots are left unplowed and permitted to grow up with trees, shrubs, weeds and grasses. These are often fifteen or twenty feet wide and make an ideal place for Jassids with such an abundance and variety of vegetation. After the field is planted great numbers of these insects which have possibly passed the winter here will migrate to the crops and continue to live on them during the summer. I would recommend very strongly the cleaning up of such places as a control measure for these insects.

In view of the fact that the Jassids have suctorial mouthparts, they are hard to control, for stomach poisons are of no avail and contact sprays are often impracticable; consequently no uniform method of control which is adequate and successful has yet been found, although several methods have been given by Prof. Osborn, in Bulletin 108 of the Bureau of Entomology, U. S. Department of Agriculture, which will at least assist in their control. He cites the following:

The mowing of grasses at the time the eggs and very young nymphs are present will destroy the eggs, and the large majority of the nymphs cannot migrate to another field and will generally die of shortage of food.

Burning grass plots late in the fall or early in the spring will destroy great numbers, and in the first case will often destroy wintering quarters. But more extensive experiment must be performed along this line before definite data can be given.

Spraying with kerosene emulsion, using a machine with a spread of ten or fifteen feet, should prove effective. Only a small amount of experimental work has been done on this problem, and it will probably often prove impracticable, for a number of species are always found close to

the ground, and others will conceal themselves in that way when disturbed. The success of such a method lies in causing them to jump up and be covered with the spray.

Hopper dozers, although not controlling them, will destroy great numbers. They are made of pieces of sheet iron covered with coal tar and drawn rapidly across the field. A large number will hop on this and be caught. A similar contrivance has been successfully used in controlling the grapevine leafhopper.

By far the most successful and practical methods are those of crop rotation and clean farming. This was merely mentioned above in regard to farming methods in Tennessee. The fence rows should be plowed as close as possible, all rubbish and trash should be burned, and no field kept in permanent pasture for a long duration of time. These are the places that are ideal for hibernation, and by destroying such wintering quarters they can be more readily controlled.

The following figures with explanations of terms and parts used in the keys and descriptions will undoubtedly prove useful in identification to those not acquainted with the group.

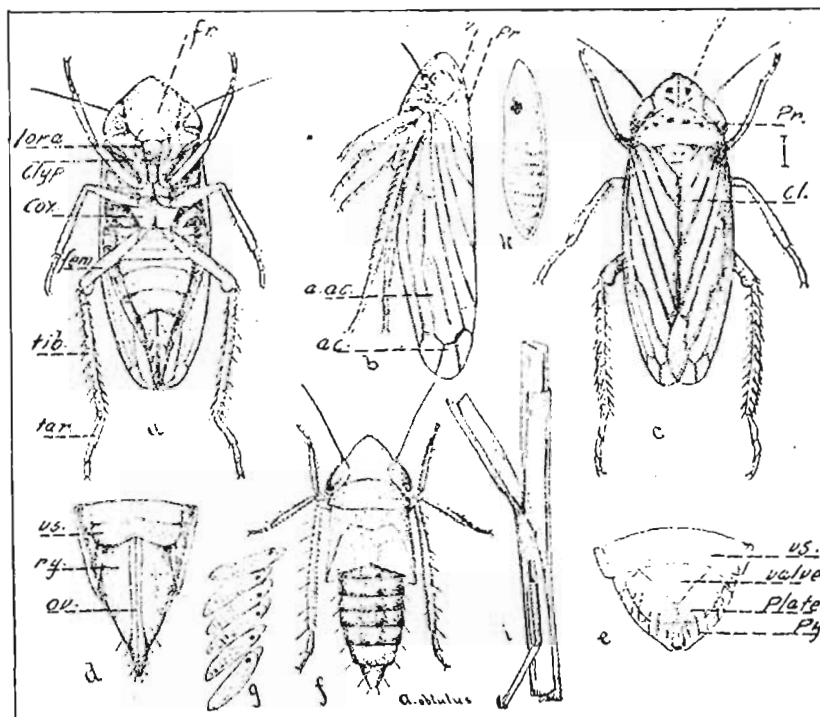


FIG. 1.—Explanation of terms from drawing of *Athysanus obtutus*: a, Female from beneath; b, from side; c, from above; d, female genitalia; e, male genitalia; f, larva or nymph; g, eggs, showing developing larva; h, egg enlarged; i, eggs in position beneath sheath of grass stem. Structural details: ac, Apical cells; aac, anteapical cells; cl, clavus; clyp, clypeus; cox, coxa; fr, front; fem, femur; lora, lora; iora, iora; ov, ovipositor; plate, plate; pr, prothorax; py (male), py (female), pygofer; tar, tarsus; tib, tibia; v, vertex; vs, terminal ventral segment; valve, valve. All enlarged. (After Osborn and Ball.)

THE SUPERFAMILY JASSOIDEA

The members of this group can be distinguished from the *Cercopidae*, to which they are closely allied, by the structure and arrangement of the spines on the hind tibiae. In the Jassoidea two distinct rows extend the length of the tibia, while the *Cercopidae* have a circlet of spines at the tip.

Key to Families of the Jassoidea

- A—Elytral nervures branching on the disc.
 - B—Ocelli on disc of vertex *Tettigoniellidae*
 - BB—Ocelli on margin of vertex *Jassidae*
 - BBB—Ocelli on front below margin of vertex *Bythoscopidae*
- AA—Elytral nervures not branching on disc, branched at base *Typhlocybidae*

FAMILY

Bythoscopidae

All the members of the family have the ocelli located on the front below the margin of the vertex.

Key to the Genera of the Bythoscopidae

- A—Anterior margin of the pronotum not produced beyond the anterior margin of the eyes; vertex distinctly rounded anteriorly.
 - B—Head narrower than pronotum *Macropsis*
 - BB—Head as wide as, or wider than the pronotum.
 - C—Elytra with a distinct appendix *Idiocerus*
 - CC—Elytra without appendix *Agallia*
- AA—Anterior margin of the pronotum distinctly produced beyond the anterior margin of the eyes; vertex obtusely angulate.
 - B—Striation of the pronotum transverse *Bythoscopus*
 - BB—Striation of the pronotum oblique from the anterior margin to hinder angles *Pediopsis*

GENUS

Macropsis

(Lewis.)

Head with eyes narrower than pronotum, very short, parallel margined, broadly, slightly rounded, almost truncate. Frontal sutures not reaching base of antennae. Pronotum large, finely transversely striate. Elytra short and broad, subcoriaceous, deeply punctured.

Only one species belonging to this genus was found in Tennessee.

Macropsis apicalis

(O. & B.)

Macropsis apicalis, O. & B., Proc. Dav. Acad. Nat. Sci., VII, p. 64, 1898.

Bright green in color, elytra subhyaline, with green pubescence. Length, 4.5 to 5 mm.

Vertex short and narrow, parallel margined and slightly curved. Pronotum two and one-half times as long and broader than the vertex, side margins long, emarginate posteriorly, surface transversely striate. Elytra exceeding abdomen in length and with a broad appendix; whole surface except appendix covered with short hairs.

Color: Green, often with vertex and anterior half of pronotum washed with yellow. Elytra green covered with greenish hairs. Faint line along claval suture, apex of clavus, and apical margin of elytra, brown to black. Ventral surface and legs deep green, tips of tarsi black.

Genitalia: Female, last ventral segment twice as wide as long, rounding, with a slight notch. Male valve long, rounded behind, elevated along median line.

Taken at Covington June 18 and at Clarksville June 29 to July 24. Most of the specimens at hand were swept from honey-locust, a few were collected from willow. Several specimens have been collected by Mr. S. E. Crumb from the same food plants.

GENUS

Idiocerus

(Lewis.)

The species are all rather large in size and have a wedge-shaped appearance. The head is short but broad, exceeding in width the pronotum, which is broader than the elytra at the base. The vertex is short, parallel margined, and rounding to the face. Ocelli on face between the eyes. Male antennae usually bear a disc-like swelling at the tip, which may be lacking. Elytra, as a rule, longer than the abdomen, rather narrowly folded behind, possessing a distinct appendix.

Four species were found in the State.

Key to Species

- A—Vertex with two round black spots on the margin.
 - B—Color dark, length exceeding 5 mm. *alternatus*
 - BB—Color pale, size less than 5 mm. *verticis*
- AA—Margin of vertex without black spots.
 - B—Size large, 6 mm. or more in length, elytra pale green. *pallidus*
 - BB—Size small, less than 5 mm. in length, elytra yellowish or greenish-hyaline, exposing dark nervures of wing *nervatus*

Idiocerus alternatus

(Fitch.)

Idiocerus alternatus, Fitch, Homop. N. Y. State Cab., p. 59, 1851.

Bythoscopus alternatus, Walk., Homop. III, p. 876, 1851.

Idiocerus alternatus, Osb., Proc. Ia. Acad. Sci., Bul. II, p. 126.

General color brownish-fusous, elytra subhyaline marked with white. Vertex with two distinct black spots. Length, 5 to 5.25 mm.

Vertex with two black spots on the margin, usually with a brownish crescent. Face yellow, male with four stripes on the lower part and mottled with brown in the female. Pronotum brown with dark markings at the base, and a light stripe on the middle, extending from the vertex to the apex of the scutellum; scutellum with the basal angles and two spots on the disc, separated by a median line, black. Elytra sub-hyaline, extending beyond the abdomen, marked with white, nervures fuscous. A light spot across the middle, and one at the apex of the clavus white.

Genitalia: Last ventral segment of female short, rather truncate. Male plates long and narrow.

Occurs throughout the State abundantly on willows. Taken at Paris June 16; Dyersburg, June 17, and at Clarksville between June 29 and July 17. This is the only food plant on which the species was found.

Idiocerus verticis

(Say.)

Jassus verticis, Say, Jour. Acad. Nat. Sci., Phila., VI., p. 308, 1831.*Bythoscopus verticis*, Uhler, Bull. U. S. Geol. and Geog. Surv., III, p. 465, 1877.*Idiocerus verticis*, Osb. & Ball, Proc. Dav. Acad. Nat. Sci., VII, p. 132, 1898.

Pale brownish in color with black spots on the vertex. Length, 4.5 mm.

Vertex brown with two black spots on the margin; face light yellowish, becoming green toward the clypeus. Ocelli black. Pronotum light brown, with darker markings on the anterior margins of the disc. Scutellum yellow with apex white, and the basal angles black. Elytra pale brown or white, nervures brown, inner sector with a long interruption before the transverse nervure; light spot on the middle of suture.

Genitalia: Last ventral segment of female short, truncate; pygofers long and narrow, exceeded by the ovipositor. Male plates long and narrow.

One specimen, female, taken by the author at Covington, June 18, is quite certain to be this species; all the markings are distinct with the exception of the spots on the vertex, which are rather obscure.

Idiocerus pallidus

(Fitch.)

Idiocerus pallidus, Fitch, Homop. N. Y. State Cab., p. 59, 1851.*Idiocerus unicolor*, Osborn, Proc. Ia. Acad. Sci., I, p. 12, 1892.*Idiocerus obsoletus*, Walk., Homop., III, p. 873, 1851.*Idiocerus pallidus*, O. & B., Proc. Dav. Acad. Nat. Sci., VII, p. 134, 1898.

Size rather large and broad, pale green, often with iridescent tinge. Length, 6 to 6.5 mm.

Face and clypeus very pale green; vertex and pronotum uniform greenish, eyes reddish brown. Scutellum green with basal angles orange to red. Elytra greenish, sub-hyaline, apex often washed with fuscous, nervures indistinct, but nervures of under wings sometimes showing through. In some specimens the elytra have a rather definite iridescence. Tergum green to black.

Genitalia: Last ventral segment of the female short, produced on the central posterior margin to form a broad, rounding lobe; pygofers rather narrow, and greatly exceeded by the ovipositor.

Three specimens, all females, were swept from willows during the past summer by the author, at Clarksville, June 29 and July 5.

Idiocerus nervatus

(Van Duzee.)

Idiocerus nervatus, V. D., Bull. Buffalo Soc. Nat. Sci., V, p. 4, 1894.*Idiocerus nervatus*, O. & B., Proc. Dav. Acad. Nat. Sci., VII, p. 137, 1898.

The species can easily be distinguished from the preceding by its smaller size, more distinct, darker, greenish color, and by the female genitalia. Length, 4.5 to 4.75 mm.

Short, robust, rather uniform, pale green to yellow in color, with posterior margin of pronotum, and basal angles of scutellum often tinged with reddish fuscous. Elytra greenish, hyaline, and rather long, greatly exceeding the green abdomen; the dark nervures of the under wings show through them distinctly.

Genitalia: Last ventral segment of female about as long as wide, truncated behind, ovipositor extending beyond the pygofers. Male with the pygofers long and narrow.

Occurs abundantly on willows. Numerous specimens were taken at Covington, June 18; Memphis, June 21, and at Clarksville at different times during the first half of July.

GENUS

Agallia

(Curtis.)

All the species of the genus are small, and varying from white to brown in color, usually with two round black spots on the vertex. Head, including eyes, wider than elytra at base, vertex slightly rounding, parallel margined or nearly so, antennae long. Ocelli on face between the eyes, face as long as wide. Pronotum rather long with anterior margin rounding, and produced almost to the anterior margin of the eyes, side margins short. Elytra without appendix. Supernumerary cell at the apex formed by a continuation of the marginal cell of the wing.

Key to Species

- A—Pronotum with two round, black spots on posterior half, reduced to mere points in poorly marked specimens. Length, exceeding 3.5 mm.
- B—Broad, robust, dark, almost unicolorous, except for four spots on vertex and pronotum, elytra convex, length, 4 mm.... *4-punctata*
- BB—Narrower, lighter, usually with a dark, median, longitudinal line on the anterior two-thirds of the pronotum, elytra less convex.
- C—Elytra almost unicolorous, last ventral segment of female broadly rounding behind, two spots on vertex, length, 3.5 to 4 mm.... *constricta*
- CC—Narrow, wedge-shaped, sutural margin of clavus light, four spots on vertex, last ventral segment of female deeply emarginate, length, 3.75 mm. *novella*
- AA—Pronotum with black spots on the anterior half or wanting. Size small, not exceeding 3 mm.
- B—Color uniform cinereous, spots on pronotum usually wanting, length, 2.5 mm. *cinerea*
- BB—Color darker, pronotum and elytra definitely marked with black, length, 3 mm. *sanguinolenta*

Agallia—4-punctata (Prov.)

Bythoscopus 4-punctata, Prov. Nat. Can., IV., p. 376, 1872.

Ulopa canadensis, V. D., Trans. Amer. Ent. Soc., XIX, p. 301, 1892.

Agallia 4-punctata, O. & B., Proc. Dav. Acad. Nat. Sci., VII, p. 49, 1898.

This species is rather easily distinguished from the other species of the genus by its broader, more robust appearance. Length, 4 mm.

Vertex short, transverse, anterior edge rounding to the face. Face broad and short. Pronotum more than twice as broad as long, anterior margin strongly produced, lateral margins obsolete, slightly emarginate posteriorly. Elytra broad, convex, extending beyond the abdomen.

Color: Yellowish brown, vertex with two black spots, a faint brown median line extending to frontal suture. Ocelli, antennal pits, and facial sutures brown to black. Pronotum brown, anterior half usually darker, two black spots near posterior margin. Elytra uniformly brown subhyaline, nervures lighter.

Genitalia: Last ventral segment of female broad, posterior margin angularly elevated, pygofers broad and short. Male valve large, twice broader

than long, posterior margin medially produced, plates forming a triangle longer than basal width.

Specimens were swept from grasses in low pasture land at Tullahoma August 10; Monteagle, August 6, and at Clarksville from August 21 to August 31.

Agallia constricta

(V. D.)

Agallia constricta, V. D., Can. Ent., XXVI, p. 90, 1894.

Agallia constricta, O. & B., Proc. Dav. Acad. Nat. Sci., VII, p. 52, 1898.

A little smaller than the preceding, not so robust, and with elytra less convex. Length, 3.5 to 4 mm.

Vertex rounding to the front with posterior margin slightly elevated. Pronotum with anterior margin strongly produced, lateral margins obsolete, often slightly excavated posteriorly. Elytra longer and narrower than in 4-punctata.

Color: Testaceous yellow, antennal pits and two round spots on vertex black. Vertex with median line extending across pronotum, and with a line next each eye, brownish. Pronotum with large spots on anterior margin and an oblique mark on humeral margin brown. Two spots near posterior margin black. Elytra brown with light nervures.

Genitalia: Female, last ventral segment long, posterior half constricted, posterior margin obtusely rounded. Male valve long, plates long and narrow, constricted in the middle, tips rounding, pygofer prominent.

This is one of the very abundant species found throughout the State, and apparently has a large variety of food plants. It was swept from weeds, grasses and shrubs at Paris, June 16; Dorain, June 19, Memphis, June 21; Moscow, June 23; Tullahoma, August 1 to 15, and at Clarksville frequently during July and August.

Agallia novella

(Say.)

Jassus novella, Say, Jour. Acad. Nat. Sci., Phila., VI, p. 309, 1831.

Macropsis nobilis, Forbes, 14th Rept. Ill. St. Ent., p. 22, 1884.

Agallia novella, O. & B., Proc. Dav. Acad. Nat. Sci., VII, p. 54, 1898.

Narrower than *constricta* and has a wedge-shaped appearance, four black spots on the anterior margin of vertex. Length, 3.75 mm.

Vertex short, broadly curved behind eyes. Pronotum twice wider than long, anterior margin elevated and produced on middle half, laterally depressed, and apparently overlapped by the vertex; side margins wanting, truncated posteriorly. Elytra long and narrow, greatly exceeding tip of abdomen.

Color: Light testaceous, often varying to slate or brownish color. Vertex yellowish, with median brown line and four round spots on anterior margin black; front brownish. Pronotum with a brown median line, either side of which is a black spot just behind the middle. Elytra with light nervures, and sutural margin light, tip of clavus white, in front of which a dark saddle crosses the suture.

Genitalia: Female, last ventral segment with posterior margin deeply, circularly excavated toward the base. Male valve truncate behind, plates long parallel margined, pygofer large, inflated, convex, forming a hollow box which the plates close as a lid.

Abundant throughout the State. Swept from weeds and grasses at Dyersburg, June 17; Colliersville, June 22; Clarksville during July; Tullahoma, August 1 to 15; Nashville, September 11, and at Knoxville, September 14.

Agallia cinerea
(O. & B.)

Agallia cinerea, O. & B., Proc. Dav. Acad. Nat. Sci., VII, p. 62, 1898.

Small, broad and more flattened than the preceding, elytra short and broad, slightly longer than abdomen. Length, 2.5 mm.

Vertex broad, one-half the length of pronotum. Face convex, frontal suture strongly rounded. Pronotum slightly narrower than head, anterior margin broadly rounding, humeral margin oblique, emarginate posteriorly; distinct transverse suture before the disc almost parallel to anterior margin. Elytra short slightly exceeding abdomen.

Color: Pale cinereous, vertex with two small, round, black dots, often with yellow markings. Face pale yellow with red ocelli. Pronotum pale, often with faint longitudinal lines, darker. Elytra sub-hyaline, pale, with lighter nervures indistinct.

Genitalia: Female last ventral segment short and broad, posterior margin slightly rounding with a faint median notch. Male valve short and broad, posteriorly rounded, plates longer than broad, narrowed to truncated apices.

It occurs very abundantly in the southwestern part of the State. Numerous specimens were taken at Moscow, June 23, and Lexington, June 25. Four specimens taken at Clarksville during July, although not agreeing exactly, are referred to this species.

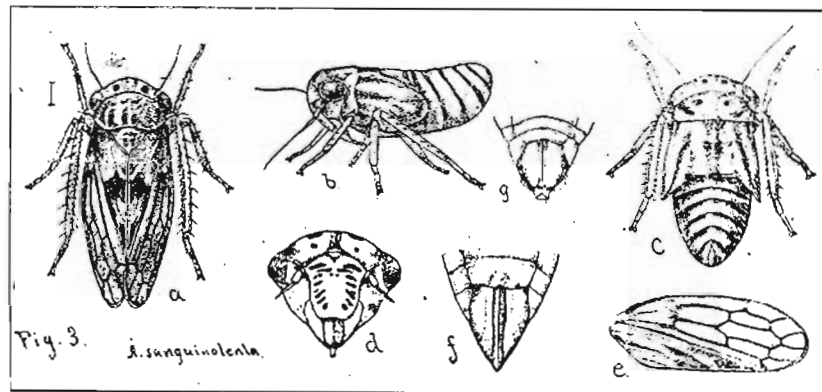


FIG. 3.—*Agallia sanguinolenta*: a, adult; b, nymph, side view; c, nymph, dorsal view; d, face; e, elytron; f, female; g, male genitalia. (After Osborn and Ball.)

Agallia sanguinolenta
(Prov.)

Bythoscopus sanguinolenta, Prov. Nat. Can., IV, p. 375, 1872.

Agallia sanguinolenta, O. & B., Proc. Dav. Acad. Nat. Sci., VII, p. 58, 1898.

Small and compact, slightly larger than the preceding. Length, 3 mm.

Vertex short and broad, four times wider than long, margin broadly rounding, nearly parallel. Face broad, clypeus half longer than broad, sides parallel. Pronotum twice wider than long, transversely rugulose, broadly rounded anteriorly, side margin short, posterior margin truncated. Elytra broad, convex, scarcely narrowed to apex, slightly longer than abdomen.

Color: Light gray with variable dark markings. Vertex with two large black spots, a median line, and one next each eye, brown. Face light, sutures, six or seven frontal arcs, and a longitudinal line on clypeus, brown. Pronotum light gray marked with reddish fuscous. Elytra usually light, part of nervures, claval suture, internal areas of clavus, and an indefinite saddle on the back, brownish.

Genitalia: Last ventral segment of female short, posterior margin with median notch, slightly sinuate on either side. Male valve short, truncate, plates broad, truncated at apex, the base enclosed by the pygofer, whose tips are thickly set with coarse hairs.

One of the few species of greatest economic importance which occurs in the State. Swept in great abundance from weeds, grasses, clover and alfalfa, in all parts of the State. It is a well known pest of the last two crops mentioned. Taken at Paris, June 16; Dorain, June 19; Lexington, June 25; Clarksville at various dates during July and August, and at Tullahoma, August 1 to 15.

GENUS

Bythoscopus

(Germ.)

Head with eyes as wide as pronotum. Vertex short, almost parallel margined, much deflexed. Ocelli on front of face, antennae rather short. Pronotum somewhat convex, anterior margin rounded, concave posteriorly, surface rugose. Elytra produced a little beyond the abdomen, without appendix. Wings with nervures distinct.

Only one species has been collected in the State; at least records for no other species could be found.

Bythoscopus distinctus

(V. D.)

Bythoscopus distinctus, O. & B., Proc. Dav. Acad. Nat. Sci., VII, p. 65, 1898.

Resembling somewhat a *Pediopsis* in shape, but much smaller and with the pronotum deeply, transversely striated. Length, 4 to 4.5 mm.

Vertex short but broad, reduced to a curved line surrounding the pronotum. Pronotum deeply pitted and with the anterior margin strongly produced beyond the anterior margin of the eyes. Elytra exceeding abdomen in length.

Color: Vertex green to brown; pronotum light brown, coarsely pitted with black. Scutellum greenish with basal angles black. Elytra gray to light fuscous, a broad basal band, one at apex, and a narrow one at apex of clavus, black. Ventral surface yellow.

Several specimens were swept from walnut by the author at Tullahoma, August 2, and at Clarksville, August 31. A number of specimens have also been taken by Mr. Crumb at Clarksville from the same food plant.

GENUS

Pediopsis

(Burm.)

Head almost entirely deflexed, parallel margined or nearly so, and obtusely angulate, together with eyes as wide as pronotum. Ocelli on face between eyes. Pronotum short and broad, strongly produced on anterior

margin, sides short, posterior margin broadly concave. Scutellum transversely depressed before apex. Elytra thin, without appendix, apex rounded. Abdomen short, laterally depressed.

Two species are known to occur in the State.

Key to Species

- A—Female specimens exceeding 5 mm. in length, male with a black spot on each propleura *viridis*
 AA—Females less than 5 mm. in length, propleura of the male unmarked *gleditschiae*

Pediopsis viridis

(Fitch.)

Pediopsis viridis, Fitch, Homop. N. Y. State Cab., p. 59, 1851; reprinted in Lintner's 9th Rept., p. 399, 1893.

Pronotum obliquely rugulose, distinctly produced, vertex obtusely angled. Length, female, 5.5 mm.; male, 4.85 mm.

Color: Female, green, elytra brownish sub-hyaline, apex brown; male a deeper green color, washed with fuscous, elytra brownish at apex, but lacking, on base and costa. Propleura of male with a small black spot.

The species occurs abundantly on willow and was taken during June at Clarksville, at Paris, June 16; Dyersburg, June 17, and Covington, June 18.

Pediopsis gleditschiae

(O. & B.)

Pediopsis gleditschiae, O. & B., Dav. Acad. Nat. Sci., VII, p. 62.

This species may be readily distinguished from the preceding by its smaller size, darker green color, and the absence of the spots on the propleura. Length, 4 to 4.75 mm.

Vertex roundingly, obtusely angled, shorter than *P. viridis*; pronotum obliquely rugulose, disc convex.

Color: Deep green, males washed with fuscous, sometimes deepening to brown on the elytra. Elytra hyaline, moderately long, broadly rounded behind, in females with apical margins slightly brownish; propleura of either sex without distinct markings.

Records show the species to have been taken only in the western half of the State. Swept from willows at Covington, June 18, and at Clarksville, June 17.

FAMILY

Tettigoniellidae

The family is characterized by having the ocelli situated on the disc of the vertex.

Key to Sub-families

- A—Form usually elongate, cylindrical *Tettigoniellinae*
 AA—Form usually more flattened, broadly oval, compact *Gyponinae*

Key to Genera of Tettigoniellinae

- A—Antennal sockets usually overhung by a distinct ledge, elytra narrow, not covering lateral margins of abdominal segments.
 B—Thorax roundingly six-angular, posterior margin rounding, longitudinal furrow on vertex *Aulacizes*

- BB—Thorax four-angular, posterior margin broadly emarginate, claval veins united or tied by a cross vein at middle.
 C—Vertex triangular, longer than basal width, face in profile almost straight *Homalodisca*
 CC—Vertex obtusely rounded, shorter than, or as long as basal width, face in profile roundly angulate.... *Oncometopia*
 AA—Ledge above antennal sockets small, elytra broad, covering lateral margin of abdomen.
 B—Elytra not reticulate veined at apex, head not greatly produced.
 C—Margin of vertex roundly obtuse.
 D—Pronotum not twice as long as scutellum, posterior margin slightly emarginate, reflexed portion of front not elevated.
 E—Vertex bluntly conical, lateral margins somewhat rounded, not distinctly in a line with the outer margins of the eyes *Tettigoniella*
 EE—Vertex subconically narrowed, lateral margins in a line with outer margins of the eyes *Kolla*
 DD—Pronotum more than twice as long as scutellum, posterior margin deeply emarginate, reflexed portion of the front, elevated *Helochara*
 CC—Vertex flat, margin sharp, acutely angled with front.....
 *Diedrocephala*
 DD—Elytra reticulate veined on the apical third, head distinctly produced, often longer than pronotum.... *Draeculacephala*

GENUS

Aulacizes

(Am. & Serv.)

Head inclined, vertex moderately long, bluntly rounded, furrowed front gibbous. Clypeus as seen from side, obtusely angled, antennal sockets overhung by a distinct ledge. Pronotum rather long, six-angular, widest at lateral angles, slightly emarginate behind. Elytra long, not concealing lateral margin of abdomen.

One species of the genus is known to occur in the United States, and is found in Tennessee.

Aulacizes irrorata

(Fab.)

Cicada irrorata, Fab. Ent. Syst., IV, p. 33, 1794.*Aulacizes pollinosa*, Foul. Bio. Homop., II, p. 218.*Aulacizes irrorata*, Ball, Proc. Ia. Acad. Sci., VII, p. 6, 1901.

Long, cylindrical, brown, irrorate with yellow. Length, 12.5 mm.

Head, with eyes, a little wider than pronotum, triangular, apex rounded. Vertex a little shorter than basal width, surface irregular, with median furrow and margin carinate. Front gibbous, right angled with clypeus. Pronotum six-angular, coarsely pitted, elytra long.

Color: Reddish brown, varying from light to dark, black blotches on vertex and scutellum, spot before apex of latter; spots on costal margin, and numerous irrorations yellow. Front yellow, black below, and four black spots above. Abdomen red above, yellow below.

Genitalia: Last ventral segment of female about as long as preceding, posterior margin broadly rounding, shallowly notched in the middle. Male valve small, plates concavely triangular, clothed with fine hair.

Taken throughout the State. Occurs on weeds and shrubs, frequently swept from oak. Collected at Memphis, June 19 and 21; Clarksville, July and August; Tullahoma, August 3; and Knoxville, September 4.

GENUS
Oncometopia
(Stal.)

Head broader than pronotum, vertex rounded, obtuse; disc convex, running to front, eyes prominent, front gibbous. Pronotum short, broadly rounded in front, concave posteriorly, lateral margins straight, sub-parallel. Elytra rather long and narrow, margin almost parallel; lateral margin of abdomen exposed.

Two species belonging to the genus were collected in Tennessee.

Key to Species

- A—Size large, 12 mm. or more, vertex yellowish orange, marked with black, vertex two-thirds as long as basal width *undata*
AA—Size small, not exceeding 10 mm., vertex black, irrorate with yellow, one-half as long as basal width *lateralis*

Oncometopia undata
(Fab.)

Cicada undata, Fab. Ent. Syst., IV, p. 32, 1794.

Oncometopia undata, Foul. Bio. Homop., II, p. 231.

Oncometopia undata, Ball, Proc. Ia. Acad. Sci., VIII, p. 8, 1901.

Resembling *A. irrorata* in size and general appearance, but with a shorter, broader, and more rounded head. Length, 13 mm.

Head broad, eyes prominent, inclined in same plane as the anterior of pronotum. Vertex roundly right-angled, two-thirds as long as basal width. Front gibbous; pronotum convex, elevated, one-half wider than long. Elytra long, narrow.

Color: Vertex, anterior margin of pronotum and scutellum yellow orange. Vertex with an incomplete circle before the middle, open in front, and with eight radiating lines, a marginal line from eye to apex, and markings on anterior of pronotum, black. Scutellum marked very similarly to vertex. Pronotum and elytra slaty blue or brown, often reddish. Front orange, median line black.

Genitalia: Last ventral segment of female longer than preceding, posterior margin forming three equal rounded lobes, the lateral ones around ovipositors. Male plates short, half the length of last ventral segment, slightly elongate.

The species is common and occurs on several weeds, many specimens being swept from iron-weed. Taken at Memphis, June 19 and 21; Dyersburg, June 17; Lexington, June 25, and Clarksville during July and August.

Oncometopia lateralis
(Fab.)

Cicada lateralis, Fab., Ent. Syst. Sup., p. 524, 1798.

Tettigoni pyrrhotelus, Walk., Homop., III, p. 775, 1851.

Oncometopia lateralis, Ball, Proc. Ia. Acad. Sci., VIII, p. 10, 1901.

Head resembling *undata*, but shorter; species shorter, almost as broad; black, elytra red, black veined. Length, 7 to 8 mm.

Head and pronotum slightly inclined, twice as long on middle as next the eye, one-half as long as basal width. Front moderately gibbous. Elytra broad and short.

Color: Vertex and pronotum black irregularly irrorate with yellow, reflexed portions margined with yellow. Scutellum black, median line and other markings on the basal portion yellow, elytra red, nervures black.

Face black, narrow yellow margin between vertex and front extending along abdomen to pygofers.

Genitalia: Last ventral segment of female twice the length of preceding, truncate posteriorly. Male plates triangular, a little longer than basal width.

Abundant throughout the State, occurring especially on small grasses and weeds. Taken at Memphis, June 21; Moscow, June 23; Clarksville, July 12, and Tullahoma, August 8.

GENUS

Homalodisca

(Stal.)

Head wider than pronotum, eyes prominent, vertex and pronotum inclined, vertex triangular, apex obtuse, longer than pronotum; front and vertex acutely angled at junction. Pronotum short, quadrangular. Elytra rather long, narrow, hyaline. Claval nervures united for considerable distance at the middle.

One species belonging to the genus occurs in the State.

Homalodisca triquetra

(Fab.)

Cicada triquetra, Fab., Syst. Rhyngt., p. 63, 1803.

Plera vitipennis, Foul., Bio. Homop., II, p. 221.

Homalodisca triquetra, Ball. Proc. Ia. Acad. Sci., VIII, p. 12, 1901.

Head broad, triangular, body long and slender, elytra hyaline. Length, 13 mm.

Vertex as long as basal width, longer than pronotum, disc flat with median depression, apex bluntly rounded. Pronotum coarsely pitted, anterior and posterior margins almost parallel. Elytra sub-hyaline, venation strong.

Color: Vertex, pronotum and scutellum brown, irrorate with yellow. Face orange yellow. Elytra smoky sub-hyaline, a broad, milky band before middle, and a red spot behind this on the costal margin. Nervures red, abdomen above blue-black.

Genitalia: Last ventral segment of female twice as long as preceding, lateral angles acute; posterior margin incised one-third its depth, apex of incision blunt. Male plates long, triangular, concavely narrowed to acute apex.

One specimen, male, taken at Challanooaga, September 12, is the only known record for the State.

GENUS

Tettigoniella

(Geoff.)

Head bluntly conical, slightly sloping, eyes and ledge over antennal sockets not prominent. Front and vertex convex, the one rounding to the other. Pronotum rather long, broadest at lateral angles. Elytra covering tergum of abdomen, venation simple not reticulate.

Four species belonging to the genus were found in Tennessee.

Key to Species

- A—Head as wide as pronotum, vertex shorter than basal width, face in profile strongly curved.
 B—Head pattern complex, transversely marked, more than 6 mm. in length.
 C—Color, reddish or greenish*hieroglyphica*
 CC—Color, shining black*var. dolabrata*
 BB—Head pattern simple, spots or longitudinal stripes, not exceeding 6 mm. in length.
 C—Two large black spots on posterior margin of vertex.....*hartii*
 CC—Disc marked with longitudinal lines*gothica*
 AA—Head narrower than pronotum, vertex as long as wide, face in profile slightly curved*occatoria*

Tettigoniella hieroglyphica var. *hieroglyphica*
 (Say.)

Tettigonia hieroglyphica, Say, Jour. Acad. Nat. Sci., Phil., VI, p. 313, 1831.
Tettigonia hieroglyphica, var. *hieroglyphica*, Ball, Proc. Ia. Acad. Sci., VIII, p. 17, 1901.

Rather stout, greenish in color, vertex with complex pattern, black spot on apex. Length, 6 to 7 mm.

Vertex conical, bluntly right-angled, three-fourths the length of pronotum. Elytra rather broad and compact, face in profile rounding.

Color: Slaty green. Vertex with black spot at apex, encircled by white; two divergent lines before the middle, not meeting at center, a circle either side of disc at base, and ocelli, black. Pronotum light anteriorly, posterior portion brownish marked with pale. Scutellum with central portion yellowish. Elytra slate, nervures dark.

Genitalia: Last ventral segment of female more than twice longer than preceding, posterior margin triangularly produced, apex rounded. Male plates long-triangular, apices acute, clothed with hairs.

One specimen, female, swept from willow at Colliersville, Tenn., June 22, is the only record which I have been able to obtain for the State.

var. *dolabrata*
 (Ball.)

Var. *dolabrata*, Ball, Proc. Ia. Acad. Sci., VIII, p. 18, 1901.

Agrees with the preceding in structural and genital characters, slightly smaller, shining black, with margins of clypeus, genae, a line below the margin of pronotum, circle around apex of vertex, line against each eye, and center of scutellum white. Central line on vertex, and one from this to either eye, white. Claval sutures of elytra light margined.

One specimen, male, was swept from willow in company with the above mentioned specimen at Colliersville, June 22. No other records have been found for the State.

Tettigoniella hartii
 (Wood.)

Tettigonia hartii, Wood.
Tettigonia hartii, Ball, Proc. Ia. Acad. Sci., VIII, p. 27, 1901.

Short, robust species with short head; female, gray; male, black. Length: Female, 4.5 to 5 mm.; male, 3.75 to 4 mm.

Vertex two-thirds the length of pronotum, twice wider than long. Pronotum broad and flat. Elytra rather broad. Face in profile rounded.

Color: Female yellowish brown, ocelli and a pair of spots behind them

black; anterior part darker with a light spot at apex. Front brown with median light stripe, and twelve pairs of light arcs either side. Pronotum brownish, anterior margin pale, a dark spot behind either eye. Basal angles of scutellum black. Elytra gray, nervures yellowish, claval margins light blue. Male black shining, spot on apex of vertex, white. Circles around ocelli, and apex of scutellum pale.

Genitalia: Last ventral segment of female one-half longer than preceding, posterior margin truncated, median tooth formed by incision either side of center. Male plates very short, triangular apices blunt.

A large number of specimens were swept from small grasses. One of the food plants upon which it occurs abundantly is *Aristida gracilis*. Taken at Clarksville, July and August, and at Memphis, June 21.

Tettigoniella gothica

(Sign.)

Tettigonia gothica, Sign. Ann. Soc. Ent. Fr., p. 345, 1854.

Tettigoniæ gothica, Ball, Proc. Ia. Acad. Sci., VIII, p. 19, 1901.

Closely resembling *hieroglyphica*, smaller, vertex marked with several almost parallel lines. Length, 5.5 to 6 mm.

Vertex more pointed than in the preceding, slightly conical, margins rounded, more than one-fourth wider than its middle length. Elytra with nervures distinct.

Color: Vertex reddish or greenish yellow, apex black, surrounded by light circle; margins of reflexed portions, a line from this to ocellus, and a loop from the base either side, light, within these lines, black. Front with light median band and short fuscous areas. Pronotum, anterior margin light with dark markings, disc brownish. Scutellum light with definite dark markings. Elytra dirty green, nervures light.

Genitalia: Last ventral segment of female three times as long as preceding, posterior margin triangularly produced. Male plates long, triangular, margins fringed with hairs.

Several specimens were taken in the State at Clarksville during July, and at Tullahoma, August 2 to 10. Most of them were swept from oak shrubs on which they seem to feed.

Tettigoniella occatoria

(Say.)

Tettigonia occatoria, Say, Jour. Acad. Nat. Sci., Phila., VI, p. 311, 1831.

Tettigonia occatoria, Ball, Proc. Ia. Acad. Sci., VIII, p. 23, 1901.

Form long and narrow, yellow, with four lines on vertex and five on pronotum. Length 6 mm.

Vertex bluntly angled, flat, as long as basal width. Pronotum broader than head, slightly longer than vertex. Elytra long and narrow, venation indistinct.

Color: Vertex yellow, a black spot at apex below the margin, a stripe arising above and either side of this, extending across vertex and pronotum, and a pair inside and parallel to them, meeting on anterior of pronotum, black. A median line arising at base of vertex and extending to apex of scutellum, dark brown. Elytra with three stripes on corium formed from one arising just behind the eye, and three on clavus, black; apex black, the remainder yellow, beneath yellow.

Genitalia: Last ventral segment of female scarcely twice as long as preceding, posterior margin obtusely rounded. Male plates rather broad, triangular, short, apices somewhat produced.

Several specimens were swept from weeds and small shrubs at Covington, June 18; Memphis, June 19; Lexington, June 25; Clarksville, July and August, and Nashville, September 11.

GENUS

Kolla

(Distant.)

"Allied to *Tettigoniella*, but differing by the structure of vertex of the head, which is sub-conically narrowed anteriorly, with the lateral margins in a line with the outer margins of the eye; near the inner margin of the eyes the vertex is also more or less foveate; face with the lateral areas somewhat strongly, transversely striate, and centrally, longitudinally smooth and flattened."

The above is the original description of the genus, and it is rather hard to separate the species of this one from those of *Tettigoniella*. Three species found in Tennessee, I am certain, belong to this genus.

Key to Species

- A—Green with white transverse bands on vertex and pronotum, vertex blunt, conical.
 B—Size, large, 5.5 mm. in length, nervures of elytra broadly black....*bifida*
 BB—Size, smaller, not exceeding 5 mm. in length, elytra without black stripes*geometrica*
 AA—White, three spots on vertex and elytral nervures brown, head longer and more pointed*tripunctata*

Kolla bifida

(Say.)

Tettigonia bifida, Say, Jour. Acad. Nat. Sci., Phila., IV, p. 313, 1831.

Tettigonia bifida, Ball, Proc. Ia. Acad. Sci., VIII, p. 24, 1901.

Kolla bifida, Osb., Maine Agr. Exper. Sta. Bull. 238, p. 99, 1915.

Head short and blunt, green with white transverse bands on the head and pronotum, nervures of elytra black. Length 5.5 to 6. mm.

Vertex short, almost twice as wide as long, half as long as pronotum, bluntly conical. Elytra broad, venation simple. Face, in profile, gently curved.

Color: Vertex black, two spots at apex, transverse band across disc, and one on posterior margin white. Face black, sides of front rufous. Pronotum margined with a black band anteriorly, posterior margin white, just in front of which is a black band; disc green. Elytra green, nervures black. tips smoky.

Genitalia: Last ventral segment of female one-half longer than preceding, posterior margin roundly produced at middle. Male plates short, equilaterally triangular, tips slightly produced.

Numerous specimens were taken throughout the State. Swept from small shrubs, and from weeds and grasses in pasture land. Taken at Memphis, June 21; Dyersburg, June 17; Clarksville, during July, August and September, and at Knoxville, September 14.

Kolla geometrica
(Sign.)

Tettigonia geometrica, Sign, An. Soc. Ent. Fr., p. 12.
Tettigonia geometrica, Ball, Proc. Ia. Acad. Sci., VIII, p. 25, 1901.

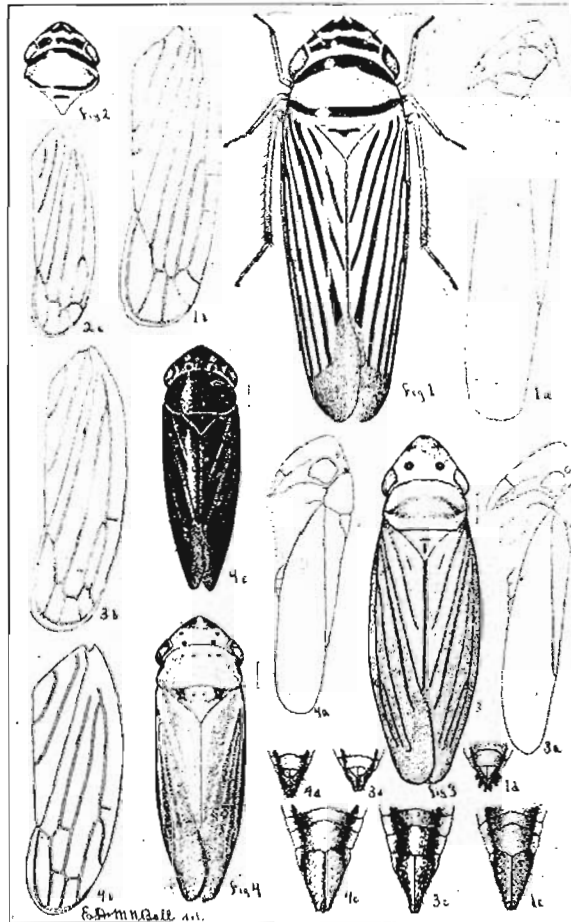


FIG. 1.—*Kolla bifida*: female: a, profile; b, elytron; c, female genitalia; d, male genitalia.

FIG. 2.—*Kolla geometrica*: b, elytron.

FIG. 3.—*Kolla tripunctata*: a, profile; b, elytron; c, female genitalia; d, male genitalia.

FIG. 4.—*Tettigonicilla hartii*: female: a, profile; b, elytron; c, female genitalia; d, male genitalia; e, male. (After Ball.)

Resembles *bifida* in color, but smaller, and without black nervures on the elytra. Length 4.5 to 5. mm.

Vertex a little shorter than in *bifida*, but slightly more pointed; elytra rather long.

Color: Vertex black, marked with two apical spots and two transverse

bands as in the preceding, bright yellowish, face black. Pronotum and scutellum as in *bifida*. Elytra bright green, nervures faintly black, apex smoky, three spots in front of this and costal margin light.

Genitalia: Last ventral segment of female posteriorly rounded, male plates short, triangular. These characters are very similar to the preceding.

Numerous specimens were swept from weeds and grasses in pasture fields, many being taken on Iron-weed (*Vernonia glauca*), at Clarksville, July and August, and Knoxville, September 10.

Kolla tripunctata

(Fitch.)

Tettigonia tripunctata, Fitch, Homop. N. Y. St. Cab., p. 55, 1857.

Tettigonia tripunctata, Ball, Proc. Ia. Acad. Sci., VIII, p. 26, 1901.

With a sharper head than in the preceding, white with three spots on the vertex, and nervures of elytra black. Length 5. mm.

Vertex long, almost as long as basal width and as pronotum, conically pointed. Pronotum at lateral angles as wide as eyes. Elytra with venation simple, no cross nervures between the sectors.

Color: White, vertex with spot at apex, and a ring around each ocellus, black; brown arcs on reflexed portion of front. Front with brown arcs, the ends of which form four longitudinal lines. Pronotum with two transverse bands on disc, one parallel to each margin, brown. Short brown median line on scutellum. Elytra white, nervures and costal margin brown.

Genitalia: Last ventral segment of female twice as long as preceding, rounded posteriorly. Male plates broad, rather short at base, triangular, apices produced.

Taken in abundance from grass (*Muhlenbergia diffusa*) at Clarksville, July and August; Nashville, September 11, and Knoxville, September 15. Most of the specimens were taken in low pasture land, at Knoxville along the Tennessee River, and at Nashville along the Cumberland River.

GENUS

Helochara

(Fitch.)

Head wider than thorax, considerably broader than long, conically, obtusely angled, reflexed portion of front elevated, face well rounded. Pronotum large, six-angular, lateral margins short, humeral margins long. Scutellum very short, partially covered by pronotum. Elytra coriaceous, veins distinct. Male antennae with apical third forming a flat plate.

One species of the genus occurs in the State.

Helochara communis

(Fitch.)

Helochara communis, Fitch, Homop. N. Y. State Cab., p. 56, 1851.

Helochara communis, Ball, Proc. Ia. Acad. Sci., VIII, p. 28, 1901.

Small, robust, green, outer margin of clavus usually darker. Length, female 6 to 7 mm., male 4 to 5.5 mm.

Vertex obtusely angled, short, broad, twice broader than long, slightly less than two-thirds the length of pronotum. Pronotum very long, deeply angled behind; scutellum very short. Elytra coriaceous except at apex.

Color: Green, often light, stripes along claval suture always dark. Eyes, ocelli, margins and arcs on reflexed portions of front, dark, face pale

in female with nine dark arcs, dark in male. Apex of elytra smoky subhyaline.

Genitalia: Last ventral segment of female slightly longer than preceding, broad, posterior margin slightly produced in center. Male valve short and broad, plates slender, triangular.

Four specimens taken at Paris, June 26, and Tullahoma, August 10 and 11, are the only records which could be found in the State. These were swept from swamp grass in low, marshy places. The species is apparently not abundant in the State, for numerous attempts were made in suitable places in different parts of the State before any specimens were found.

GENUS

Diedrocephala (Spin.)

Head narrower than pronotum, vertex roundly angulate, almost flat, apex obtusely rounded, margins sharp. Front broad, flat above. Pronotum strongly curved in front, broadest across lateral angles. Elytra rather long, coriaceous, venation somewhat obscure, apical cells longer than in *Tettigoniella*.

Two species of the genus are known to occur in the State.

Key to Species

- A—Size, large, 8 mm. or more, robust, disc of vertex unmarked... *coccinea*
AA—Size, smaller, not over 6 mm., disc of vertex marked with black lines *versuta*

Diedrocephala coccinea (Forst.)

Cicada coccinea, Forst, Nov. Spp. Ins., p. 96, 1781.

Diedrocephala coccinea, Ball, Proc. Ia. Acad. Sci., VIII, p. 29, 1901.

Red, marked with green stripes, vertex orange, disc unmarked. Length 8 to 9 mm.

Vertex almost flat, two-thirds the length of pronotum, apex roundly acutely angled, face convex in profile. Elytra long, narrow at apex.

Color: Face and vertex yellow orange, latter with margin and two short lines from margin on disc, before the eye, black. Pronotum red, outer and sutural margins, claval suture, and median stripe on corium, green; apex dark.

Genitalia: Last ventral segment of female almost twice as long as preceding, posterior margin rounding. Male plates long, triangular, concavely tapering.

Specimens were swept from small shrubs and weeds at Covington, June 18; Memphis, June 19; Lexington, June 25; Clarksville, July and August, and at Knoxville, September 13 to 15. The species is common throughout the State.

Diedrocephala versuta, var. *versuta* (Say.)

Tettigonia versuta, Say, Jour. Acad. Nat. Sci., Phila., p. 311, 1831.

Tettigonia redacta, Fowl, Bio. Homop., II, p. 276, 1900.

Diedrocephala versuta, var. *versuta*, Ball, Proc. Ia. Acad. Sci., VIII, p. 31, 1901.

Smaller than *coccinea*, but very similarly colored, vertex and scutellum marked with black. Length 5 to 6 mm.

Vertex, apex blunt, almost right-angled, flat, a little shorter than pronotum, face feebly convex. Elytra moderately long.

Color: Vertex yellow, a black stripe just below the margin, a pair of slender median lines joined at their anterior ends to a pair of broken lines which run backward almost parallel to margin, black, enclosing red spots. Pronotum with anterior portion yellow or red, dark green posteriorly. Scutellum red with black markings. Elytra greenish blue, either side of which is a broad red band, apical margin pale or smoky. Face yellow.

Genitalia: Last ventral segment of female twice as long as preceding, posterior margin produced, obtusely angled. Male plates concavely pointed, tips black, a little longer than last ventral segment.

One of the very abundant species found throughout the State. It was taken in great numbers while sweeping small shrubs and weeds at Dyersburg, June 17; Memphis, June 19; Lexington, June 25; Clarksville, July and August; Nashville, September 11, and Knoxville, September 13 to 15.

GENUS

Draeculacephala

(Ball.)

Vertex long, acutely angled; face as seen from the side straight, or slightly concave to middle of clypeus. Pronotum with lateral margins parallel, narrower than, or equal in width to the eyes. Elytra long, narrowing apically, green, apical and antiapical cells irregularly reticulate veined. The species of the genus are large in size.

Key to Species

- A—Vertex long, acutely angled, front in profile straight.
- B—Anterior portion of pronotum with vermiculate black markings*inscripta*
- BB—Anterior portion of pronotum unmarked.
- C—Size, large, vertex longer than pronotum*mollipes*
- CC—Size, smaller, not exceeding 6.7 mm., vertex as long as or shorter than pronotum*Var. minor*
- AA—Vertex shorter than pronotum, bluntly conical, elytra finely reticulated, front and vertex washed with reddish orange, front in profile convex*reticulata*

Draeculacephala inscripta

(V. D.)

Draeculacephala inscripta, V. D., Ent. News, XXVI, p. 180, 1915.

Vertex and anterior portion of pronotum rather heavily marked with black. Length 7 mm.

Vertex almost as long as pronotum, acutely angled, length about half the width across the eyes, not strongly depressed behind the apex.

Color: Dark green, vertex, anterior portion of pronotum, scutellum and costal margin yellowish. Vertex heavily marked with black; four arcs on reflexed portion of front, uniting in a point either side of apex, a curved line behind this, angled at ocellus, and running along margin to eye, another curved line on disc running behind ocellus, a black spot just before eye encircled by black lines, and a median line, black. Anterior portion of pronotum marked with vermiculate lines. Scutellum with transverse impressed line and two spots in front on disc, black. Face with ten dark arcs, beneath pale.

Genitalia: Last ventral segment of female produced at middle, rounded and slightly angled. Pygofer long.

Three specimens, all females, were caught in a trap-light at the laboratory at Clarksville, July 14. These agree exactly with the description of *inscripta* V. D., and are the only ones from which records for the State were obtained.

Draeculacephala mollipes

(Say.)

Tettigonia mollipes, Say, Jour. Acad. Nat. Sci., Phila., VI, p. 312, 1831.

Tettigonia innotata, Walk., Homop., III, p. 770, 1851.

Draeculacephala mollipes, Osb. & Ball, Ia. Acad. Sci., IV, p. 176, 1897.

Draeculacephala mollipes, Osb., Maine Agr. Exper. Sta. Bull. 238, p. 103, 1915.

Bright green, head long, yellow, acutely angled, marked with black lines. Length 6 to 7.5 mm.

Vertex produced, acutely angled, sides straight, disc flat, longer than pronotum in female, as long in male. Face long, very acutely angled with vertex, in profile. Elytra long, apical portion reticulate, nervures raised.

Color: Vertex yellow, eyes, ocelli, two dots at apex, three arcs on reflexed portion of front, median line and two lines on disc diverging posteriorly, brown. Front yellow to fuscous, with nine pairs of black arcs. Anterior portion of pronotum, and scutellum yellow; disc of pronotum and elytra bright green, nervures pale green, costal and apical areas narrowly light. Legs yellow to fuscous.

Genitalia: Last ventral segment of female with posterior margin truncated, obtusely, angularly produced at middle, pygofer large. Male valve rounded, short and broad; plates large, margined with hairs, acutely pointed.

This is a very common species on many of the grasses and occurs throughout the State. It is especially abundant in low, swampy places, but was taken also at much higher elevations. Occurs from Memphis in the southwest, June 21, to Knoxville in the east, September 15. Also taken at Clarksville, in the north, during July and August. This is undoubtedly one of the greatest Jassid pests which occurs on grasses.

Draeculacephala mollipes*, var. *minor

(Walk.)

Tettigonia minor, Walk., Homop., III, p. 772, 1851.

Draeculacephala mollipes, var. *minor*, Ball, Proc. Ia. Acad. Sci., VIII, p. 135, 1901.

Form and structure of typical *mollipes*, shorter and more robust, vertex shorter, in male shorter than pronotum. Length 5 to 6.7 mm.

Color: Vertex, anterior portion of pronotum, and scutellum yellow to green; vertex, with ocelli, frontal sutures, and apex, black, and often with fainter markings. Disc of scutellum and elytra bright green. Face dark brown to black.

Found in great numbers in company with typical *mollipes*. It apparently feeds on the same plants, and was collected abundantly throughout the State. Memphis, June 21; Clarksville, July and August, and Knoxville, September 13 to 15.

Draeculacephala reticulata

(Sign.)

Tettigonia reticulata, Sign, An. Ent. Soc. Fr., p. 22, 1854.

Draeculacephala reticulata, Ball, Proc. Ia. Acad. Sci., VIII, p. 39, 1901.

Small, stout, vertex blunt and shorter than pronotum, green, head reddish. Length 4.5 to 5.5 mm.

Vertex bluntly conical, two-thirds the length of pronotum. Face convex in profile, front broad. Pronotum rather long, strongly curved anteriorly, posteriorly emarginate on median third. Apical portion of elytra very finely reticulated.

Color: Face and vertex yellowish, washed with red. Spot at apex and one inside either ocellus creamy, ocelli black, anterior of pronotum and scutellum dull yellow; posterior portion of disc of pronotum and elytra, dull green, nervures and margin light.

Genitalia: Last ventral segment of female one-half longer than preceding, truncated and roundly produced at middle of posterior margin. Male valve short, plates long, wider at base, acutely angled.

Swept from grasses and taken at lights. It is found quite abundantly on Bermuda grass, and occurs in the western and southern parts of the State. Taken at Memphis, June 21; Lexington, June 25, and Tullahoma, August 1 to 14. It was also collected in great numbers on the northern border of the State at Clarksville during July and August.

Key to Genera of Gyponinae

- A—Head flat, margin broadly thin and sharp, elytra angularly pointed and perpendicular at tips *Xerophloea*
 AA—Head more or less flattened, but not thin, often with margin very narrowly sharp, elytra not perpendicular at tips.
 B—Very short and broad, clavus broadly truncate at apex... *Penthimia*
 BB—Broad, rather elongate, clavus not truncate at apex..... *Gypona*

GENUS

Xerophloea (Germ.)

The species belonging to the genus have a wedge-shaped appearance. Head broad, well rounded in front, vertex flat, anterior margin thin. Elytra long, angularly pointed and perpendicular at tips. The entire dorsal surface, but pronotum and elytra especially, coarsely, rather densely pitted.

Two species of the genus have been collected in the State.

Key to Species

- A—Size, small, not exceeding 7 mm. in length, vertex well rounded in front *viridis*
 AA—Size, large, more than 7 mm., vertex more angulate..... *major*

Xerophloea viridis (Fab.)

Cercopis viridis, Fab., Ent. Syst., IV, 50, 13, 1794.

Xerophloea viridis, Fab., Stal. Hemiptera Fabriciana, II, p. 59.

Xerophloea viridis, O. & B., Proc. Ia. Acad. Sci., IV, p. 178, 1897.

Small, wedge-shaped green species with head rounded, flattened and produced. Length 6 to 7 mm.

Head slightly narrower than pronotum, eyes small, vertex flat, broadly angularly produced in front, anterior margin thin. Scutellum rather long, very narrow; elytra long, angularly pointed and perpendicular at tips. Entire dorsal surface coarsely pitted.

Color: Female bright green, tips of elytra lighter. Male often more yellowish in color, a broad, median smoky line on vertex extending to an irregular, transverse dark band on pronotum, black; spot on claval suture just before apex of clavus. Often with irregular brownish markings on vertex and pronotum. Ocelli red.

Genitalia: Last ventral segment of female incised to base, forming two long, roundly pointed lobes. Male valve broadly, obtusely rounded, plates long and narrow, spatulate.

Several specimens were swept from small grasses in pastures, and from swamp grass, at Lexington, June 25, and Clarksville during July and the latter part of August. The species occurs in abundance on *Aristida gracilis*.

Xerophloea major
(Baker.)

Xerophloea major, Baker, Psyche, 3; 285.

Xerophloea major, Osb., 20th Rept. State Ent. N. Y., p. 512, 1905.

Resembling *viridis* in form, but larger, with a much longer and more angulate vertex. Length 7 to 8 mm.

Vertex distinctly narrower than pronotum, flat with a rather broad furrow on the disc, longer and more angulate than in the preceding, about as long as basal width, with anterior margin thin. Eyes set in rather deep notches of the vertex. Pronotum rather long, elytra as in *viridis*.

Color: Female, green, tips of elytra often sub-hyaline. Male often yellowish or whitish, longitudinal stripe on vertex brown. Anterior margin of pronotum greenish, disc and transverse band on posterior margin brown. Elytra pale, markings on apex of clavus, and apex of elytra brown.

Genitalia: Last ventral segment of female twice longer than preceding, posterior margin incised to base, forming two long, well-rounded lobes. Male broadly rounded, plates long, narrow spatulate, tips rounded.

Several specimens were swept from grasses on low, marshy ground. Taken at Colliersville, June 22, and Clarksville, July 9 and 29.

GENUS

Penthimia
(Germ.)

Short, broad, ovate, well rounded in front and behind; vertex broad, short, broadly rounded, inclined, head including eyes narrower than pronotum. Pronotum rather long, distinctly, transversely striate. Elytra broad, very short, but exceeding abdomen in length. Slightly more than twice as long as wide, apex of clavus truncate; appendix broad.

One species of the genus is known to occur in the State.

Penthimia americana
(Fitch.)

Penthimia americana, Fitch, Homop. N. Y. State Cab., 1851, p. 57, reprinted in Lintner's 9th Rept., p. 397, 1893.

Penthimia americana, Osb., Maine Agr. Exper. Sta. Bull. 238, p. 100, 1915.

Resembling a *Cercopidae* in size and shape, bluntly rounded both anteriorly and posteriorly, red to black in color. Length 5 to 6 mm.

Short, broadly oval, head including eyes, narrower than pronotum; vertex rather short, broad, convex, well rounded. Pronotum long and broad; elytra short and broad, appendix large.

Genitalia: Male valve narrow, triangular, half as long as last ventral segment, plates broad, thickly clothed with reddish hairs. Last ventral segment of female long, slightly notched either side, forming a median lobe; pygofers short, very broad.

Two specimens, both males, swept from oak shrubs, one each at Clarksville, July 25, and Tullahoma, August 2. A few specimens have also been taken by Mr. Crumb from the same food plant.

GENUS

Gypona (Germ.)

The genus is characterized by a broad, oval body, usually large. The head is broad, depressed, rather short, and, as a rule, well rounded on the anterior margin, often having a rather sharp edge. The vertex is flat or slightly convex; elytra broad, moderately long.

Key to Species

- A—Color, reddish brown, pronotum with four black, anterior, submarginal spots *puncticollis*
- AA—Color, green or yellow, without dark spots on pronotum, usually marked with red lines.
- B—Elytra with clavus reticulate veined.
- C—Elytra greatly roughened or rugose *rugosa*
- CC—Elytra finely reticulate veined but not rugose, eight red stripes across vertex and pronotum *octo-lineata*
- BB—Elytra with no reticulate veins on clavus *flavilineata*

Gypona puncticollis (Spang.)

Gypona puncticollis, Spang, Spec. Gyponae, p. 54, 1877.

Reddish brown in color, vertex and scutellum lighter, elytra marked with dark spots, anteriorly. Length 9 mm.

Head obtusely rounded, vertex transversely, finely, striate, one-half longer at middle than next the eye. Ocelli twice as far from each other as from the eyes. Pronotum about one-half longer than vertex, elytra rather long.

Color: Vertex, pronotum and scutellum yellowish tinged with brown. A spot behind each ocellus, brown. Pronotum with four brown anterior submarginal spots, one behind each eye and each ocellus. Basal angles of scutellum dark. Elytra reddish brown, the cross nervures between apical and antiapical cells, and irregular spots on clavus and corium, brown.

Genitalia: Last ventral segment of female one-half longer than preceding, posterior margin distinctly notched at center. Male plates rather long, parallel margined, rounded at tips and greatly separated throughout their length.

Six specimens were swept from weeds and grasses among patches of canebrake at Clarksville, July 6, 16, 23 and 28. Two specimens were swept from wild rye (*Elymus virginicus*). Others have been taken by Mr. Crumb at the same place.

Gypona rugosa (Spang.)

Gypona rugosa, Spang, Spec. Gyponae, p. 6.

Gypona rugosa, Osb., 20th Rept. State Ent. N. Y., p. 513, 1905.

The nervures of the elytra cause it to have a very much roughened appearance, greenish yellow in color. Length 10 to 11 mm.

Head depressed, vertex broad, flattened, anterior margin well rounded one-half longer at the middle than next the eye. Ocelli distinctly closer to each other than to the eye. Pronotum considerably longer than vertex, transversely striate; elytra long, coarsely rugose.

Color: Greenish yellow, vertex, pronotum and elytra washed with orange, showing more distinctly in spots or blotches, not evenly colored. Often with faint stripes on vertex and pronotum.

Genitalia: Last ventral segment of female longer than preceding, posterior margin incised half way to base either side of center, forming two rather long, lateral lobes, and a shorter, rounded, median lobe. Male valve obscure, plates rather long, overlapping at apex.

One specimen taken by Mr. Crumb while sweeping shrubs at Clarksville, July 22, 1915, is the only known record for the State.

Gypona octo-lineata

(Say.)

Tettigonia octo-lineata, Say, Comp. Writ, II, 257.

Gypona octo-lineata, Osb., Proc. Ia. Acad. Sci., IV, p. 179, 1897.

Large green species, often with veins reddish, clavus strongly reticulate veined. Length female, 10 mm.; male, 7 to 8 mm.

Vertex roundly produced, front margin thin, length two-thirds the basal width. Elytra long and narrowed to a blunt point behind, the whole elytra including clavus densely, reticulate veined.

Color: Variable, usually rather dark green. Vertex with eight red to fulvous stripes which also cross the pronotum, the central ones extending on to the scutellum. Elytral nervures varying from light yellow to bright red; ocelli red.

Genitalia: Last ventral segment of female with posterior margin nearly truncated, apparently emarginate due to the middle which curved down. Male valve concealed by truncated ventral segment, plates long, narrow, quite widely separated at base, broadly overlapping at apex.

Two specimens, a male and female, were swept from grass at Clarksville, June 29 and July 24.

Gypona flavilineata

(Fitch.)

Gypona flavilineata, Fitch, Homop. N. Y. State Cab., p. 57, 1851.

Gypona flavilineata, Osb., Maine Agr. Exper. Sta. Bull. 238, p. 105, 1915.

Very closely resembling *octo-lineata*, usually lighter in color and without reticulations on the clavus. Length 8 to 11 mm.

Vertex almost twice as long at middle as next the eye, apex semi-circularly rounded, head depressed. Pronotum considerably longer than vertex. Elytra without reticulations on the clavus.

Color: Usually lighter than preceding, elytra often yellowish or milky white; vertex and pronotum marked with eight yellow or reddish stripes, the central ones extending on to the scutellum. Elytra often tinged with red, veins usually green. Beneath pale.

Genitalia: Last ventral segment of female moderately long, truncated posteriorly. Male valve covered by last ventral segment, plates rather long and narrow, separated at base and overlapping at the tips.

This species is very common on weeds and grasses in pastures, and was taken in abundance from swamp grass. Occurs throughout the State. Collected at Memphis, June 21; Moscow, June 23; Clarksville during June and July, and at Tullahoma, August 10.

Gypona cana
(Burm.)

Gypona cana, Burm., Gen. Ins., p. 16, No. 10.

Gypona cana, Osb., Maine Agr. Exper. Sta. Bull. 238, p. 106, 1915.

Light, yellowish green, elytra long, slightly reticulated at tip. Length 8 to 9 mm.

One specimen taken by Mr. Crumb has been placed here by his determination. The specimen is not at hand, without which I am unable to separate it from *octo-lineata*, to which it is closely allied. Of the numerous specimens of this group which I have collected in the State, although varying considerably, all have been placed in *flavilineata*, or *octo-lineata*.

FAMILY

Jassidae

The members of this family are easily recognized by having the ocelli located on the margin of the vertex, or if not a distinct margin, on the portion of the head between vertex and front.

Key to Genera

- A—Ocelli near margin or between vertex and front, and remote from the eyes.
 - B—Head very short, anterior portion of pronotum strongly curved, produced beyond the anterior margin of the eyes, ocelli just below margin near frontal suture *Goniagnathus*
 - BB—Head moderately long, anterior margin of pronotum gently curved, not produced to anterior margin of the eyes *Xestocephalus*
- AA—Ocelli on margin between vertex and front.
 - B—Inner sector of elytra twice forked, elytra with three antiapical cells.
 - C—Anterior edge of head thin, sharp, often flattened.
 - D—Elytra with one claval vein, vertex long, rather sharply angled, convergent red lines on vertex and pronotum *Spangbergiella*
 - DD—Elytra with two claval veins, vertex shorter, more obtusely angled, without red markings. *Parabolocratus*
 - CC—Anterior edge of head not sharp, often acutely angled or rounded.
 - D—Vertex not greatly wider than long, disc flattened, distinct from front by anteriorly produced margin.
 - E—Two cross veins between the sectors of elytra.
 - F—Vertex greatly produced and acutely angled, front long and narrow *Platymetopius*
 - FF—Vertex moderately long, front broader, clypeus narrowed at tip *Daltocephalus*
 - EE—One cross vein between sectors of elytra. *Scaphoideus*
 - DD—Vertex greatly wider than long, usually with disc sloping and margin rounding to front.
 - E—Inner branch of first sector forking on disc of corium.
 - F—Head broad with blunt margin, rounding to front.
 - G—Elytra short, not exceeding abdomen, often very short.
 - H—Head broad, ovipositor short, elytra usually extending to ovipositor *Athysanus*
 - HH—Head narrower, ovipositor exceeding pygofers, elytra often extending only to second abdomi-

- nal segment *Driotura*
 GG—Elytra longer, usually distinctly exceeding abdomen.
 H—Elytra marked with fine ramose pigment lines.
 I—Ramoses lines on elytra in the form of a saddle or cross band *Eutettix*
 II—Ramoses lines brown, not restricted to cross bands *Phlepsius*
 HH—Elytra not marked with ramose pigment lines.
 I—Vertex usually much longer on middle than next the eye, sides of pronotum very short; usually with color markings ... *Thamnotettix*
 II—Vertex usually not greatly longer on middle than next the eye, nearly as long at side as at middle; color usually green... *Chlorotettix*
 FF—Vertex more or less produced and angled with the front.
 G—Apex of elytra acutely pointed..... *Acinopterus*
 GG—Elytra with apex rounded, not pointed... *Phlepsius*
 EE—Inner branch of first sector not forked on disc of corium.
 F—Head quadrate, not produced, scutellum very large...
 *Jassus*
 FF—Vertex well produced, scutellum smaller.
 G—Eyes small, very remote *Neocoelidia*
 GG—Eyes large, located very close to each other
 *Tinobregmus*
 BB—Inner sector not forked, two anteapical cells in elytra.
 C—Body short, vertex distinctly angulate, elytra often only extending to second abdominal segment... *Lonatura*
 CC—Body longer, vertex not sharply angled, elytra always long.
 D—Head slightly produced, wing with three apical areoles
 *Cicadula*
 DD—Head blunt, not produced, wing with two apical areoles....
 *Balclutha*

GENUS

Goniagnathus

(Fieb.)

Head slightly wider than pronotum, vertex short, apex obtusely angled, slightly longer at apex than next the eye. Ocelli distant from the eye on anterior margin; posterior margin greatly produced beyond anterior margin of the eyes. Face convex, pronotum long, strongly rounded anteriorly, forming a semicircle, coarsely punctured. Elytra moderately long, slightly exceeding abdomen, punctured, oblique at tip. Abdomen stout.

Only one species of the genus taken in the State.

Goniagnathus palmeri

(V. D.)

Goniagnathus palmeri, V. D., Can. Ent. 23, p. 171, 1891.

Goniagnathus palmeri, Osb., 20th Rept. N. Y. State Ent., p. 529, 1905.

Resembles *Pediopsis* very closely in general appearance. Short, robust, shining black. Length, 4 mm.

Head wider than long, vertex obtusely angled, very short, slightly longer on the middle than next the eye; posterior margin greatly produced before anterior margin of the eyes, by the strongly curved margin of the pronotum which is long and almost semicircular in outline, surface coarsely

punctured. Elytra moderately short, areoles circumscribed with single row of punctures.

Color: Uniform shining black, apical nervure of elytra, margin of eye beneath, and antennae reddish.

Genitalia: Female last ventral segment twice the length of preceding, posterior margin slightly produced at center. Pygofer short and broad, obtusely triangular. Male valve concealed, plates triangular, acutely angled at apex.

Five specimens were taken while sweeping at Memphis, June 21; Lexington, June 25, and Knoxville, September 15.

GENUS

Xestocephalus

(V. D.)

General form ovate, head subconical, narrower than pronotum, vertex sloping, convex. Ocelli on anterior edge, above and distant from eyes. Front broad above, rapidly tapering to clypeus, cheeks wide; antennae close to eyes. Elytra somewhat rugose, without appendix, five apical areoles. All the species of the genus are small.

Four species were taken in the State.

Key to Species

- A—Color almost black, face distinctly black, apex of vertex lighter.....*nigrifrons*
- AA—Color lighter, usually brown.....
- BB—Vertex brown with distinct yellow markings in the form of lines or spots.....*pulicarius*
- BB—Vertex not marked with definite lines or spots.....
- C—Vertex almost uniform yellow, ocelli not conspicuous.....*fulvocapitatus*
- CC—Vertex testaceous, irrorate, ocelli located on small white spots.....*tesselatus*

Xestocephalus nigrifrons

(Osborn.)

Xestocephalus nigrifrons, Osb., Maine Agr. Exper. Sta. Bull. 238, p. 109, 1915.

Resembles *fulvocapitatus* very closely in size and shape, but is black in color, with a black face. Length, 3 to 3.5 mm.

Head narrower than pronotum, ocelli close together on rounded front margin, pronotum convex, posterior margin slightly curved, emarginate posteriorly.

Color: Dark brown to black with light spots. Vertex black at base, fading to reddish brown at apex, face brown above, black below, ocelli white. Pronotum and scutellum black, the latter with white marking. Elytra with basal portions black, apex smoky, two spots on clavus, two on costal margin, and a number on apical half light; beneath black.

Genitalia: Last ventral segment of female about as long as preceding, posterior margin distinctly notched at center, forming a rounded lobe at either side.

Two specimens, both females, were taken while sweeping at Clarksville, Tenn., August 22. Professor Osborn described the species from a single specimen recently collected in Maine. The specimens from Tennessee were compared with the type and agree exactly; this tends to prove its specific rank and at the same time gives a wide range to the species.

Xestocephalus pulicarius

(V. D.)

Xestocephalus pulicarius, V. D., Buf. Soc. Nat. Sc. Bul., 5, 1894.*Xestocephalus pulicarius*, Osb., Maine Agr. Exper. Sta. Bull. 238, 1915.

Small brown species with yellow markings. Length, 2.5 to 3 mm.

Vertex distinctly rounded, twice as long on middle as next the eye. Pronotum as long as vertex, broad, anterior margin slightly curved, truncated posteriorly. Elytra broad.

Color: Brown, vertex with apex fulvous, a spot next either eye extending toward apex, a line along posterior margin sending forward two lines which curve on disc, yellow. Pronotum with four dots on anterior margin, outer angles, scattered spots on disc, and two spots on base of scutellum, yellow. Elytra marked with numerous white spots.

Genitalia: Last ventral segment of female emarginate, with a feeble lobe either side. Male valve almost covered by last ventral segment, slightly arcuated, plates tapered beyond middle to obtuse apices.

It is a very abundant species, occurring on numerous grasses, and occurs throughout the State. Taken at Paris, June 19; Lexington, June 25; Clarksville during July and August, and at Knoxville, September 13 and 15.

Xestocephalus fulvocapitatus

(V. D.)

Xestocephalus fulvocapitatus, V. D., Buf. Soc. Nat. Hist. Bull., V, 25, 1894.Slightly larger than *pulicarius*, and with the head a yellow or fulvous color, with distinct markings. Length, 3.5 mm.

Vertex with anterior margin not so strongly curved, sutural characters otherwise very similar to the preceding.

Color: Vertex yellow or fulvous, maculate, median longitudinal line lighter. Pronotum light brown with numerous white points. Scutellum same as pronotum with basal angles darker. Elytra light brown, with spots on apical and costal areas darker. Two light spots on claval suture.

The genital characters are very similar to those of *pulicarius*.

Specimens were taken with those of the preceding species while sweeping in a shady open woods at Clarksville, August 13 and 21, and at Tullahoma, August 3.

Xestocephalus tessellatus

(Van Duzee.)

Xestocephalus tessellatus, V. D., Buf. Soc. Nat. Hist. Bull., V, 1894.

This is the largest of the species in Tennessee, and is a pale testaceous color. Length, 4 mm.

Head slightly broader and anterior margin of pronotum more strongly curved than in any of the other species of the genus.

Color: Pale testaceous, vertex irrorate with brown, leaving apex, and a longitudinal line across the middle, lighter. Pronotum brown irrorate, a black spot behind either eye. Scutellum pale brown, basal angles black, apex light. Elytra testaceous, apex lighter, nervures marked alternately with brown and white. Spots on claval and costal areas white.

Genitalia: Last ventral segment of female with posterior margin shallowly emarginate, and slightly notched at center. Pygofer proportionately shorter than in *pulicarius*. Male valve covered by last ventral segment; plates strongly narrowed from base to a slender point.

Specimens were taken at Lexington, June 25; Clarksville, July and August, and at Knoxville, September 14 and 15.

GENUS

Spangbergiella
(Sign.)

The genus is closely allied to *Parabolocratus*. Head much produced before the eyes, triangular, ocelli on the sharp margin near the eyes. Front rather broad, convex, cheeks with oblique angles rounded. Clypeus one and one-half times longer than wide. Pronotum twice wider than long, slightly rounded in front, emarginate behind. Scutellum short; elytra opaque, with four apical cells, apex rounded, nervures almost indistinct.

One species belonging to the genus was collected in the State.

Spangbergiella vulnerata
(Uhl.)

Glossocratus vulnerata, Uhl, U. S. Geol. & Geog. Sur. Bull., III, p. 464.
Spangbergiella vulnerata, Sign, An. Soc. Ent. Fr. Ser. V, 9, 274.

The species can easily be distinguished from *P. flavidus*, which it closely resembles, by the red lines on the head and pronotum, and oblique lines on elytra. Length, 6 to 6.5 mm.

Head produced, margin sharp, a fifth longer than basal width, rounding angulate. Front longer than broad, flattened next the vertex. Clypeus largest at base, lorae rounding on the sides. Pronotum posterior angles rounded, emarginate posteriorly. Scutellum wider than long. Elytra moderately broad, shorter than ovipositor in female.

Color: Green to greenish yellow, vertex and pronotum marked with two oblique, divergent red stripes, extending from near the apex of the former, to basal angles of scutellum. Pronotum with short, median red stripe on posterior half, elytra with four parallel, oblique, red bands extending from costal area almost to suture. Beneath green.

Genitalia: Last ventral segment of female longer than preceding, truncated posteriorly; pygofer long and broad. Male valve almost obscure, rounded posteriorly, plates broad at base, abruptly narrowed and produced into long points.

Occurs in great numbers on short grasses. Taken at Memphis, June 19; Clarksville during July and August; Nashville, September 11, and Knoxville, September 14 and 15. They were found largely in shady open woods.

GENUS

Parabolocratus
(Fieb.)

The generic characters, according to Signoret, are very close to those of *Hecalus*. Head more or less prolonged before the eyes, margin sharp edged, not furrowed, ocelli close the eyes. Face broad, cheeks well rounded. Elytra well rounded at apex, with three or four discal cells. The third sector reunited with the bifurcation of the second sector, by a small transverse nervure.

Two species of the genus are known to occur in the State.

Key to Species

A—Vertex broadly rounded on anterior margin, scarcely angulate... *viridis*
AA—Vertex roundly angulate, apex of elytra smoky *flavidus*

Parabolocratus viridis

(Uhl.)

Glossocratus viridis, Uhler, U. S. Geol. & Geog. Sur. Bul. 3, p. 462, 1877.*Parabolocratus viridis*, Uhler, Stand. Nat. Hist. II, p. 247, 1884.

Green species of moderate size with head flattened and well rounded. Length, 6 mm.

Vertex well rounded in front, produced between the eyes, shorter than the pronotum, concave before apex. Front as long as broad. Pronotum two and one-half times as long as broad, anterior margin almost straight, slightly emarginate posteriorly. Elytra rather short, exceeded by ovipositor in female.

Color: Yellowish green, vertex with anterior margin slightly reddish. Apex of scutellum and anterior costal veins, bright green. Tip of ovipositor red. Nervures of elytra darker, greenish.

Genitalia: Last ventral segment of female longer than preceding, posterior margin rounded; pygofer short, exceeded by ovipositor.

One specimen, female, taken at Memphis, June 21, was swept from tall grass along the Mississippi River at Riverside Park.

Parabolocratus flavidus

(Sign.)

Parabolocratus flavidus, Sign., Essai le Jassides, p. 276, 1878.*Parabolocratus flavidus*, Osb., Proc. Ia. Acad. Sci., V, p. 234, 1897.

Differs from *viridis* in having shorter elytra, which are smoky at tip, and a more angulate vertex. Length, 6 mm.

Head angularly produced, three-fourths as long as width between the eyes, concave, sharp on edge. Front wider than long, clypeus widest at apex. Pronotum two and one-half times as wide as long, anterior margin almost straight, slightly convex posteriorly.

Color: Yellowish green, apex of vertex tinged with brown. Face brownish, median line green. Elytra with greenish nervures, and apex of elytra brownish. Tip of ovipositor red in female.

Genitalia: Last ventral segment of female twice as long as preceding, posterior margin convex, pygofer short and broad. Male valve small, almost obscure; plates broad at base, narrowed to form long antennuate tips.

Taken in abundance from swamp grass, and other large grasses, growing in low moist regions. Specimens were collected at Memphis, June 21; Collierville, June 22; Clarksville during July and August, and at Tullahoma, August 3.

GENUS**Platymetopius**

(Burm.)

The genus is distinguished from the others of the family by the characteristic long-pointed vertex with sharp edge, narrow front, and definite elytral venation. The elytra are marked with fine brown pigment lines, are almost constant in the five apical and three antiapical cells, and many of the areoles contain white oval spots. Two cross veinlets connect the second sector and branches of the first; costal areole with several oblique veinlets. Genital characters very similar in most species.

Key to Species*

- A—Face pale or yellowish, often darker at the sides.
 - B—Vertex uniform yellowish white, unmarked.....*bicolor*
 - BB—Vertex dark with light markings.
 - C—Markings on vertex in the form of lineations, usually a pale median line, a slightly divergent one either side.
 - D—Size, small, not over 4 mm. in length, face very slightly infuscated at margin.
 - E—Greenish cinereous, face a bright yellow.....*cinereus*
 - EE—Darker in color, brownish without yellow tint.....*abbreviatus*
 - DD—Size, larger, 5 mm. or more in length.
 - E—Face distinctly infuscated at sides and base, coloration distinct.....*acutus*
 - EE—Face faintly infuscated at base and sides.
 - F—Almost uniform copper color, few and small areolar spots before antiapical ones, face yellowish, male plates short and broad.....*cuprescens*
 - FF—Areolar spots larger, more distinct, face uniform fuscous, male plates long and narrow.....*acutus var. dubius*
 - CC—Markings on the vertex taking form of transverse vittae.....*frontalis*
 - AA—Face entirely brown or fuscous.
 - B—Male plates short, transverse, and rounded at apex, female segment short, sinuated posteriorly.....*fusifrons*
 - BB—Male plates triangular, apices acute, female ventral segment long.
 - C—Size, large, 5 mm., white markings on vertex scarcely forming a transverse vitta.....*magdalensis*
 - CC—Size, smaller, not over 4.5 mm., blackish, resembling *frontalis*, but with very dark face.....*scriptus*

Platymetopius bicolor n. sp.

Very closely resembling *frontalis* in size and shape, but differs in having face and vertex uniform creamy white, unmarked. Length, 4 mm.

Vertex slightly broader and more obtuse than in *frontalis*, a little longer on the middle than width between the eyes, exceeding pronotum in length. Front rather long and narrow, clypeus broadened and rounded at apex. Pronotum well rounded on anterior margin, posterior margin truncated, slightly emarginate at the middle. Elytra rather broad, well rounded at the apex.

Color: Vertex, front and clypeus creamy white, vertex with a faint median line on the basal two-thirds, reddish. Eyes dark, the anterior half lighter. Pronotum and scutellum black, the latter with lateral margins of apical half, margined with white. Elytra black, apical third smoky, and with apex white margined. White spots on the areoles missing, except in a few apical and antiapical cells, where they are rather obscure. Beneath thorax, yellow-white, abdomen black, legs yellow.

Genitalia: Male valve twice as long as last ventral segment, obtusely angled posteriorly. Plates long, greatly exceeding valve, triangular, lateral margins armed with long, stout spines.

Described from one specimen, male, taken by the author while sweeping grasses at Memphis, Tennessee, June 19, 1915. The species seems to be distinct from anything else belonging to the genus.

*Modified from key by Van Duzee. *Ann. Ent. Soc. Amer.*, III, p. 215, 1910.

Platymetopius cinereus

(O. & B.)

Platymetopius cinereus, O. & B., Proc. Ia. Acad. Sci., IV, p. 193, 1897.*Platymetopius cinereus*, V. D., Ann. Ent. Soc. Amer., III, p. 223, 1910.Small light colored species, form of *acutus*. Length, 3.5 to 4 mm.

Vertex half longer than width between the eyes in male specimens, and often almost twice as long as wide in the female. Pronotum short, lateral margins short, posterior border slightly emarginate, scutellum large. Elytra rather broad.

Color: Vertex light yellowish, finely irrorate with brown, a median line on apical third broadest at apex, and a curved line on either side, light; clypeus and front light yellow. Pronotum fulvous brown, with traces of light longitudinal lines. Scutellum yellow, apical portion darker. Elytra light, marked with brown irrorations, forming whitish hyaline spots in numerous cells; tip with apical and costal veinlets dark.

Genitalia: Last ventral segment of female long, posterior margin narrowly notched in middle, slightly lobed either side; pygofer rather long, narrowed at base. Male valve large, rounding, tip light, plates long, bluntly angulate.

Specimens were swept from various grasses at Paris, June 16; Covington, June 18; Memphis, June 21; Moscow, June 23, and Tullahoma, August 2. All specimens except one were taken in the extreme southern part of the State, where it seems to occur quite abundantly.

Platymetopius abbreviatus

(n. sp.)

Resembling *cinereus* in size and shape of head, but broader and darker in color. Brown, with pale yellow face, darker above, and with vertex rather short. Length 4 mm.

Vertex flat, one-half longer than basal width, front long and narrow, sides almost parallel, slightly narrowed to clypeus, which is much enlarged at apex. Pronotum a little shorter than vertex, strongly rounded in front, side margins very short, truncated, posteriorly. Elytra broad, well rounded at apex, appendix distinct, four apical cells present.

Color: Vertex dark brownish testaceous, a median line widest at apex, a narrow line either side and two spots on median line at base, yellow. Face and clypeus yellow, irrorated with light brown, darker above, with a white suture a little below the margin. Pronotum brown, marked with five faint light stripes, scutellum yellowish. Elytra light, veins brown; reflexed veins along costal margin and veins surrounding apical cells broadly colored. Areoles large and white, and distributed thus: five on clavus, five on corium, and one on the base of each apical, and apex of each antiapical cell; costal margin white, marked only by the broad reflexed veins. Beneath yellowish, legs white, with brown spots at base of spines.

Genitalia: Last ventral segment of female more than twice as long as preceding, rounded posteriorly, margin slightly notched at middle, a black spot either side; pygofer broad, exceeded by ovipositor.

Described from two specimens, both females, taken at Tullahoma, Tenn., August 2, 1915, by the author. These are swept from grasses in a low, swampy field.

Platymetopius acutus

(Say.)

Jassus acutus, Say, Acad. Nat. Sci., Phila., Jour. VI, p. 306, 1831.*Platymetopius acutus*, V. D., Anns. Ent. Soc. Amer., III, p. 219, 1901.

The common brown *platymetopius* having a yellow face bordered with brown. Length 4.5 to 5 mm.

Vertex varying with the sex, in males slightly longer and in females distinctly longer than width between the eyes. Pronotum truncated posteriorly, elytra rather short.

Color: Vertex brown, irrorate with testaceous, a line on apical third, one either side on the disc, and four spots on basal margin, white, bordered with black. Pronotum fulvous brown, anterior margin lighter and marked with five longitudinal white stripes. Scutellum fulvous, spot in each angle white. Elytra whitish, nervures and ramose lines brown. Face light yellow, bordered on base of front and outer portion of cheeks with fuscous.

Genitalia: Last ventral segment of female long, slightly emarginate posteriorly; male valve large, obtusely, roundly angled; plates long triangular, apex obtuse, pygofer long, exceeding plates.

Taken throughout the State; common from June 15 to September 15. Swept from grasses and weeds at Paris, June 16; Memphis, June 21; Clarksville, July and August; Tullahoma, August 1 to 15, and Knoxville, September 15.

var. dubius

(V. D.)

Platymetopius acutus var. *dubius*, Anns. Ent. Soc. Amer., III, p. 220, 1910.

Differs from typical *acutus* by a longer vertex and a unicolorous face. Length, 5 mm.

Vertex at least one and one-half times as long as width between the eyes.

Color: General color same as *acutus* but often lighter, face dirty yellow, usually without darker border.

Three specimens, one each taken at Memphis, June 21; Covington, June 18, and Clarksville, August 21, are certain to belong to this variety.

Platymetopius cuprescens

(Osborn.)

Platymetopius cuprescens, Osb., 20th Rept. N. Y. State Ent., p. 517, 1905.

Platymetopius cuprescens, V. D., Anns. Ent. Soc. Amer., III, p. 221, 1910.

Closely related to *acutus*, but has a longer and sharper vertex, face entirely yellow. Length 4.5 to 5 mm.

Vertex almost twice as long as width between the eyes, acutely angled; front long. Pronotum slightly emarginate posteriorly, elytra flaring at tips.

Color: Vertex brown with line on apical half white, extending almost to pronotum, and bordered with dark brown. Face yellow, eyes red. Pronotum coppery brown with five distinct, longitudinal stripes, light. Disc brown, apical half light, with three white points arranged triangularly. Elytra coppery, veinlets and other markings fuscous; costal area and spots on apex yellowish hyaline.

Genitalia: Last ventral segment of female long, posterior margin rounded; pygofer large, elongate. Male valve large, rounded, plates rather short and broad, triangular, margins thickly clothed with hairs.

Specimens were taken at Memphis, June 19; Clarksville, June and August; Tullahoma, August 3, and Knoxville, September 14.

Platymetopius frontalis

(V. D.)

Platymetopius frontalis, V. D., Can. Ent. XXII, p. 112, 1890.

Platymetopius frontalis, V. D., Ent. Soc. Amer., III, p. 225, 1910.

Distinguished from others of the group by the black color above, and a pale yellow face. Length 3.5 to 4 mm.

Vertex one-fourth longer than width between the eyes, apex obtuse, cheeks broad, clypeus short and broad, pronotum transversely wrinkled.

Color: Dark brown to black, slightly irrorate; vertex with apex and irregular markings on either side of central line, light. Face yellow, base of front with faint dark lines. Pronotum black, five longitudinal lines, faint. Elytra with whitish spots on areoles; apical areoles fuscous, edges pale, costal area whitish hyaline, veinlets black.

Genitalia: Female last ventral segment broad, middle keeled, posterior margin slightly notched at center; pygofers short and broad. Male valve large, rounded plates as long as valve, triangular, subacute.

This species is one of the very common ones throughout the State, and is of considerable economic importance, occurring on many of the grass crops. Taken at Paris, June 16; Dyersburg, June 17; Memphis, June 19 and 21; Lexington, June 25; Clarksville, July, August and September; Tullahoma, August 5 and 11, and Knoxville, September 14 and 15.

Platymetopius fusifrons?

(V. D.)

Platymetopius fusifrons, V. D., Bul. Buf. Soc. Nat. Sci., V, p. 206, 1894.

Platymetopius abruptus, Ball, Ent. News, XX, p. 165, 1909.

Platymetopius fusifrons, V. D., Ent. Soc. Amer., III, p. 230, 1910.

About the size of male *frontalis*, brown with a dark face. Length 4 to 4.25 mm.

Vertex broader and shorter than in *frontalis*, almost right angled. Elytra broad and rather short.

Color: Light brown, heavily irrorate with dark. Vertex with a line on apical third and one either side, before the eye, white. Face light brown irrorate. Pronotum dark, light longitudinal lines distinct. Scutellum orange, brown at apex. Elytra dark, cells with a large number of white spots.

Genitalia: Male valve small, rounding, light spot at center; plates rather long, acutely angled, lateral margins with a row of stout spines.

Two specimens, both males, taken at Tullahoma, August 3, have been placed here, although not having all the characteristic markings of the species. They are not thought to vary enough from the description to be classed as a new species.

Platymetopius magdalensis

(Prov.)

Platymetopius magdalensis, Prov., Faun. Ent. Can., p. 275.

Platymetopius obscurus, Osborn, Ohio Nat., V, p. 274, 1905.

Very similar to *acutus* in size and shape of vertex, but with a distinctly brown face. Length, 4 to 4.75 mm.

Vertex acutely angled, about one and one-half times as long as broad. Front broad, clypeus longer than broad; pronotum rather long, posterior margin truncated. Elytra rather broad and short.

Color: Dark brown, vertex with a testaceous tint next each eye, and with a median line on anterior portion and lines posterior and lateral to this one, yellow. Front fuscous, irrorate with yellow. Pronotum and scutellum with the usual light longitudinal lines. Elytra fuscous, ramose lines and reflexed veinlets dark, white spots on numerous cells.

Genitalia: Last ventral segment of female long, posterior margin rounded. Male valve obtusely angled, nearly as long as broad, plates elongate triangular.

Specimens were taken at Paris, June 16; Tullahoma, August 3, and Sewanee, August 6.

Platymetopius scriptus
(Ball.)

Platymetopius scriptus, Ball, Ent. News, XX, p. 165, 1909.

Platymetopius scriptus, V. D., Ent. Soc. Amer., III, p. 228, 1910.

Resembling *frontalis* in appearance, but with shorter vertex and a dark face. Length, 3.5 to 4.5 mm.

Vertex one-third longer on middle than against the eye, margin not produced. Elytra rather short and broad.

Color: Vertex brown, line at apex, dash either side, two spots on anterior of disc and two at base, separated by two white lines, light. Face irrorate with brown. Pronotum brown, five faint longitudinal stripes light. Scutellum orange, an apical and two lateral points, light. Elytra brownish irrorate, nervures dark, narrowly light margined, numerous cells with white spots.

Genitalia: Last ventral segment of female long, slightly keeled, posterior margin roundly produced, pygofers constricted near base, broad and rather short.

Two specimens swept from weeds in the Experiment Station orchard at Knoxville are the only known records for the State.

GENUS

Deltocephalus
(Burm.)

The members of the genus vary greatly in structural characters, consequently it is hard to make definite limitations. Body elongate, head as long as pronotum, vertex flattened or convex, ocelli somewhat distant from the eyes. Clypeus narrowed at tip, front rather broad. Elytra either long or short, usually with five antiapical areas, and two cross veins between the sectors. The species belonging to the genus are usually small.

Key to Species*

- A—Vertex less than twice as long as basal width, front broader, markings of front normal.
- B—Vertex rather angularly produced, disc flat or concave, a definite margin between vertex and front.
- C—Pronotum short, more than twice broader than long, elytra without a distinct appendix.
- D—Elytra moderately long, two outer apical veinlets strongly reflexed.
- E—Face pale with a definite darker border above.
 - F—Border brownish with pale arcs.....*imputans*
 - FF—The border much darker, black with pale arcs.
 - G—Small, all the elytral veins margined with brown.....*pictus*
 - GG—Larger, reflexed and apical veins margined with brown.....*reflexus*
 - EE—Face without definite border above.
 - F—Face almost uniform black.....*stylatus*

*Modified from Osborn and Ball. Proc. Sa. Acad. Sci., IV, p. 198, 1897.

- FF—Face lighter, gradually becoming darker above *sandersi*
- DD—Elytra shorter, broadly obtusely rounded, veinlets not reflexed, brownish, vertex marked with orange red *sayi*
- CC—Pronotum longer, not twice broader than long, elytra long with appendix.
- D—Margin of vertex marked with four black spots.
- E—Greenish, nervures of elytra pale *signatiformis*
- EE—Gray marked with fuscous, a cruciate mark on apical half of elytra, fuscous spots on base of pronotum and scutellum *aurundineus*
- DD—Margin of vertex pale, unmarked.
- E—Small not exceeding 3 mm. in length.
- F—Female segment notched and black tipped medially *minimus*
- FF—Female segment depressed at middle not marked with black *melscheimeri*
- EE—Larger, 3.5 mm. or more in length.
- F—Uniform yellowish unmarked *oculatus*
- FF—Green or greenish brown.
- G—Large, 4 mm., distinctly green in color, vertex light, without definite lines *debilis*
- GG—Smaller, 3.5 mm., vertex with a black line, greenish marked with fuscous *sylvestris*
- BB—Vertex short, tip bluntly produced, disc convex or sloping, more or less rounding to front without well defined margin.
- C—Brown to black with pale markings.
- D—Black marked with white points on the vertex, and costa yellow *flavocostatus*
- DD—Reddish brown, vertex and tip of elytra pale yellow... *apicatus*
- CC—Light marked with black, elytral nervures light.
- D—Greenish or yellowish, vertex marked with black spots.
- E—Four to six large black spots on anterior margin of vertex, face heavily marked with black arcs *nigrifrons*
- EE—Vertex with two large round black spots, and two minute points between them, face not marked with black *colonus*
- DD—Pale gray to fuscous, marked with black.
- E—Large, 4.5 mm. or more, a pair of round black spots on anterior margin of vertex, pronotum and scutellum *inimicus*
- EE—Smaller, not exceeding 4 mm. in length.
- F—Vertex acutely produced in the middle.
- G—Cells of elytra almost uniform brown, nervures white, length 3.5 mm. *interruptus*
- GG—Cells dark margined, usually lighter in the middle, length 3 mm. *weedi*
- FF—Vertex more obtusely rounding.
- G—Small, 2.75 mm. in length, elytra usually not exceeding abdomen in length *compactus*
- GG—Larger, exceeding 3 mm., elytra longer... *oblectus*
- AA—Vertex twice as long as basal width, front very long, convex, markings in the form of dark bands at the sides... *pyrops*

Deltocephalus imputans

(O. & B.)

Deltocephalus imputans, Osb. & Ball., Proc. Dav. Acad. Sci., V, p. 75, 1898.

Resembling *reflexus* in structural characters, creamy yellow with reflexed veinlets margined with black. Length, 3.5 mm.

Vertex acutely angled, margin sharp, about half longer than wide, twice longer at middle than next the eye. Front with side margins nearly straight and continuous with those of clypeus. Pronotum more than twice as wide as long, posterior margin slightly emarginate. Elytra short, flaring, appendix wanting.

Color: Creamy yellow with dark markings. Vertex, tip white, with spot either side, a median line reaching almost to tip and a line from apex to red ocelli, reddish brown. Pronotum with faint dark longitudinal lines. Elytra with reflexed veins broadly white, margined in front with black which extends along the costa, third apical cell broadly black on outer margin.

Genitalia: Last ventral segment of female one-half longer than preceding, posteriorly emarginate near lateral angles, produced at middle with a notch, and black spot either side; pygofers broad. Male valve triangular, rather long, plates long, gradually narrowed from base to rounded tips which are strongly divergent.

Specimens were swept from grasses at Memphis, June 21, and Lexington, June 25. Five specimens, three females and two males, are the only records for the State, and have been compared with type specimens in the collection of Prof. Osborn.

Deltocephalus pictus

(Osborn.)

Deltocephalus pictus, Osborn, Proc. Dav. Acad. Sci., X, p. 165, 1907.

Deltocephalus funabulus, Crumb, Anns. Ent. Soc. Amer., VIII, p. 189, 1915.

Face colored as in *reflexus*, smaller in size and with all the veins margined with brown. Length, 3.5 to 4 mm.

Vertex twice as long on middle as next the eye, one-half longer than basal width, flat, bluntly angled. Pronotum twice as broad as long, emarginate posteriorly. Elytra narrow.

Color: White, vertex yellowish, apex white with a small black spot either side and a large one behind. Red ocelli close to eyes, and connected to apex by a red marginal line. Median line, a pair of transverse spots on disc and a basal pair fuscous. Pronotum with four broad longitudinal fuscous stripes. Scutellum with angles and two points on disc fuscous. Elytra with nervures white, narrowly margined with dark brown. Beneath black.

Genitalia: Last ventral segment of female twice longer than preceding, slightly posteriorly emarginate, either side of a rounded median lobe which is keeled and slightly notched at center. Male valve broad, rounded, plates broad and rather short, blunt at apex.

A large number of specimens were collected by Mr. Crumb and by the author at Clarksville during the summer, where it is abundant on *Aristida gracilis*. Specimens were also taken at Moscow, June 23, on the southern border of the State, and at Lexington, June 25.

Deltocephalus reflexus

(O. & B.)

Deltocephalus reflexus, O. & B., Proc. Ia. Acad. Sci., IV, p. 203, 1897.

Color, light cinereous, face with upper half black. Length, 4 to 4.5 mm.

Vertex acutely angled, almost twice as long as basal width. Pronotum short, truncated on posterior margin. Elytra flaring, without appendix, costal veinlets strongly flexed.

Color: Light yellowish brown, vertex with tip white, encircled with a black margin. A longitudinal line on vertex, an oblique spot either side at base, and a transverse dash on either side of disc reddish brown. Face

with upper half black with light arcs, lower half white. Pronotum yellowish, marked with faint longitudinal lines. Elytra yellowish white, spot on clavus and corium brown; reflexed and apical veinlets broadly white margined, and bordered before with brown.

Genitalia: Last ventral segment of female half as long as wide, posterior margin produced in center, which portion is blackened and notched. Male valve broad, obtusely angled, plates three times as long as valve, narrowed from broad base to form long points.

Specimens were swept from grasses at Moscow, June 23; Paris, June 26; Tullahoma, August 4, and Clarksville, July 9 and August 27.

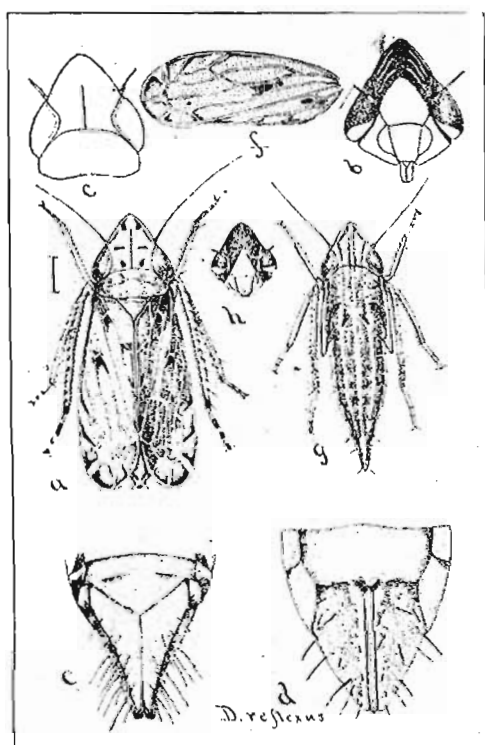


FIG. 4.—*Deltocephalus reflexus*: a, dorsal view; b, face; c, vertex and pronotum; d, female genitalia; e, wing; f, larva; g, face of larva; h, male genitalia. (After Osborn and Ball.)

Deltocephalus stylatus?

(Ball.)

Deltocephalus stylatus, Ball, Can. Ent., XXXI, p. 190, 1899.

Face colored and elytra flaring, as in *reflexus*, but broader. Length, 4.5 mm.

Vertex one-third longer than pronotum, little longer than basal width, width across the eyes equal to combined length of pronotum and vertex. Claval nervures separate.

Color: Pale cinereous, vertex greenish, margin and tip whitish, orange line around margin, and a fuscous circle around tip; transverse band either

side before the eye, and a spot at the base on either side fuscous. Pronotum with submarginal row of fuscous spots, elytra light, nervures white, fuscous margined.

Genitalia: Last ventral segment of female two and one-half times as long as preceding, posterior margin produced on middle third into an obliquely triangular tooth which is bifid at apex. Male valve equilaterally triangular, plates narrow, roundly divergent at apex.

Although not agreeing exactly with the original description, seven specimens collected at Memphis, June 21; Moscow, June 23; Clarksville, July 3, and Lexington, June 25, have been referred to this species. The genital characters are a little different.

Deltocephalus sandersi

(Osb.)

Deltocephalus sandersi, Osb., Proc. Dav. Acad. Sci., X, p. 164, 1907.

Close to *reflexus*, but with yellowish gray color, marked with black on apex of vertex, reflex veins, and spots on elytra. Length, 3 to 3.5 mm.

Vertex one-half longer than broad, flattened, acutely produced, front broad; pronotum truncated posteriorly.

Color: Gray tinged with yellow. Vertex with spot on apex black, including white spot, faint transverse line on disc before eye red. Pronotum with disc often tinted red. Elytra with spot on disc of clavus, one at base of discal cell, border of reflexed veins and of central apical cell, black. Face darker with arcs pale.

Genitalia: Last ventral segment twice as long as preceding, posterior margin slightly emarginate with median lobe, black margined. Pygofers short and broad. Male valve triangular, plates broad at base, produced apices divergent, greatly exceeded by pygofers.

Specimens were taken at Memphis, June 21; Moscow, June 23; Clarksville, June 30, and July 3, and at Tullahoma, August 4. They occur on the grasses in meadows and pastures.

Deltocephalus sayi

(Fitch.)

Amblycephalus sayi, Fitch, Homop. N. Y. State Cab., p. 61.

Jassus sayi, Walk. Homop., V, p. 1158, 1852.

Deltocephalus sayi, Osb., Proc. Ia. Acad. Sci., LV, p. 207, 1897.

Short, robust species, with vertex and elytra marked with transverse bands. Length, 3.5 mm.

Vertex roundly pointed, one-half longer on the middle than next the eye, longer than basal width. Pronotum shorter with anterior margin strongly rounded and lateral margins very short. Elytra short and broad, almost truncated, exceeded by tip of abdomen.

Color: Brown, vertex often with a red tint, tip, margin and two concentric lines light, median longitudinal line brown, light margined. Pronotum with median line and anterior margin lighter, the latter with dark spots. Elytra with light nervures, and crossed by two rather broad light bands, one at the base and the other just back of the middle, leaving the apex dark brown. Face brown, marked with dark arcs. Beneath dark brown, last ventral segment and base of pygofers light.

Genitalia: Last ventral segment of female emarginate posteriorly, pygofers rather broad, exceeded by ovipositor. Male valve long, roundly angulate, plates broad at base, rather suddenly narrowed and produced with side margins almost parallel, armed with long hairs.

Two specimens were swept from grasses and weeds at Knoxville, September 15. These are the only specimens from which records for the State could be obtained.

Deltocephalus signatifrons

(V. D.)

Deltocephalus signatifrons, V. D., Trans. Ent. Soc. Amer., XLX, p. 305, 1892.

Deltocephalus sexmaculatus, G. & B., Hemip. Colo., p. 88.

Deltocephalus signatifrons, Osb., Proc. Ia. Acad. Sci., IV, p. 215, 1897.

Resembles *inimicus* in form and color, but much smaller. Length, 3 to 3.5 mm.

Vertex almost flat, one-third longer on the middle than next the eye, anterior edge rounded, front broad, clypeus long and narrow.

Color: Gray tinged with brown; vertex with four black quadrate spots on disc and two very small ones at the apex, median line brown. Front black with numerous dots and broken arcs. Pronotum marked with brown, and with five pale longitudinal lines. Black spots in basal angles of scutellum. Elytra whitish, areoles margined with fuscous, nervures white.

Genitalia: Last ventral segment of female triangularly notched posteriorly, half way to the base, excavated either side of a median blunt tooth, lateral angles rounded and prominent. Male valve short and broad, plates twice as long, together semicircular.

One specimen, male, taken at Clarksville, June 29.

Deltocephalus aurundineus

(Crumb.)

Deltocephalus aurundineus, Crumb, Anns. Ent. Soc. Amer., VIII, p. 191, 1915.

Resembling *inimicus*, with vertex narrower and more strongly produced, close to *Scaphoideus* in structural characters. Length, 3.3 to 3.7 mm.

Vertex one-half longer than basal width, almost flat. Pronotum slightly longer than vertex and twice as wide, anterior margin strongly curved, emarginate posteriorly. Elytra exceeding abdomen in length, appendix broad.

Color: Vertex creamy white, ocelli white, four spots on anterior margin and two on anterior portion of disc enclosed in fuscous spots, black. A pair of oblique spots on base, fuscous brown. Elytra with white veins margined with fuscous, spot on costa and third apical cell, black, forming the ends of a fuscous cruciate mark on the apical area; apical two-thirds of clavus with cells fuscous, a darker spot either side before the middle. Pygofers of female black, with a white spot either side at middle of black ovipositor.

Genitalia: Last ventral segment of female twice as long as preceding, lateral angles roundly produced, posterior margin bisinuate, forming three distinct lobes. Male valve broad, roundly angulate, plates long, concavely narrowed to attenuated tips.

This is one of the very abundant species occurring on Cane-brake (*Arundinaria tecta*), and is apparently limited to this as a food plant. The specimens from which it was described were collected from Cane-brake at Clarksville during the summer of 1914, and were taken from the same plant during the past summer, both at Clarksville and Nashville.

Deltocephalus minimus

(O. & B.)

Deltocephalus minimus, O. & B., Proc. Ia. Acad. Sci., IV, p. 211, 1897.

Very small, greenish, with a rather broad bluntly angled head. Length, 2.5 to 3 mm.

Vertex somewhat variable, rounding in the male, rather acutely pointed in the female, equaling pronotum in the male, and slightly longer than pronotum in the female. Elytra long and narrow, greatly exceeding abdomen.

Color: Dull green. Vertex, anterior and lateral margins of pronotum, and scutellum yellowish green. Elytra at base dark green, apical portion yellowish subhyaline. Front greenish fuscous, marked with light arcs. Venter yellowish green, marked with black.

Genitalia: Last ventral segment of female broad, posterior margin roundly produced, notched and black tipped medially. Pygofer long, equaling ovipositor. Male valve large, triangular, plates broad, three times the length of valve.

Two specimens swept from grasses at Clarksville, July 3, quite certainly belong to this species.

Deltocephalus melscheimeri
(Fitch.)

Amblycephalus melscheimeri, Fitch, Homop. N. Y. State Cab., p. 61.

Deltocephalus melscheimeri, Osb., Rept. N. Y. Ent., p. 521, 1904.

Deltocephalus melscheimeri, Osb., Maine Agr. Exper. Sta. Bul. 238, p. 119, 1915.

Small greenish species, closely resembling *sylvestris*, but much smaller and more pallid. Length, 2.75 mm.

Vertex one-half longer at apex than next the eye, longer than basal width, sharply pointed. Pronotum shorter than vertex, posterior margin almost straight.

Color: Dull green or pallid, vertex yellowish, median longitudinal line and marginal line from apex to each eye, black. Anterior margin of pronotum and scutellum pale. Elytra darker, subhyaline, nervures light. Venter yellowish with central black band.

Genitalia: Last ventral segment of female truncated posteriorly, depressed at middle. Male valve broad, well rounded, as long as last ventral segment, plates separated at base, tips rather broad, well rounded and thickly set with bristles, exceeded by pygofer.

One specimen taken at Clarksville, August 31, has been compared with specimens in Prof. Osborn's collection, and agrees exactly. It was swept from short grass.

Deltocephalus oculus
(O. & B.)

Deltocephalus oculus, O. & B., Proc. Ia. Acad. Sci., IV, p. 212, 1897.

Small yellow species, very close in size and shape to *sylvestris*. Length, 3.5 mm.

Vertex pointed, at least one-third longer than broad, and about one and one-half times as long at apex as next the eye; front broad, elytra long and narrow.

Color: Light yellow, male often with a more greenish tint, front with fuscous arcs. Eyes and margin of last ventral segment of female black.

Genitalia: Last ventral segment of female short, posterior margin with central portion slightly produced, dark brown; pygofer long and broad. Male valve triangular, shorter than broad, tips produced and pointed, black in color.

Taken in great abundance from *Aristida gracilis* and other small grasses at Clarksville, July 3 and 9.

Deltocephalus debilis

(Uhl.)

Deltocephalus debilis, Uhl., Bull. U. S. Geol. & Geog. Sur., II, p. 360, 1876.
Deltocephalus debilis, Osb., Proc. Ia. Acad. Sci., IV, p. 210, 1897.

Green, robust, vertex slightly acutely angled. Length, 4 mm.

Vertex rather distinctly acutely angled, sometimes variable, length usually exceeding width at base; front broad. Pronotum shorter than vertex, posteriorly emarginate, elytra slightly longer than abdomen, veins distinct.

Color: Green, with vertex, anterior portion of pronotum and scutellum yellowish, ocelli and longitudinal line on vertex black. Elytra subhyaline, greenish, veins lighter. Beneath with variable black markings. Front brownish fuscous with a median line and arcs, pale.

Genitalia: Last ventral segment of female truncated or notched, a lobe either side; pygofers distinctly broader at the middle. Male valve obtuse, plates broad at base, tips bluntly, obtusely pointed; black spot on either plate.

One specimen, female, was taken by Mr. Crumb at Clarksville, Tenn., during the summer of 1915. This is the only known record for the State.

Deltocephalus sylvestris

(O. & B.)

Deltocephalus sylvestris, O. & B., Proc. Ia. Acad. Sci., IV, p. 213, 1897.
Deltocephalus sylvestris, Osb., 20th Rept. State Ent. N. Y., p. 520, 1905.

Green with a long, sharp vertex, resembling *minimus* in shape, but larger. Length, 3.5 mm.

Vertex about twice as long at apex as next the eye, acutely pointed; front long and narrow. Pronotum more than half as long as wide. Elytra long and narrow, nervures distinct.

Color: Green, vertex yellowish green with two curved lines from apex toward each eye, reddish, median longitudinal line black. Front fuscous with light arcs. Pronotum light margined, fuscous posteriorly, scutellum pale. Elytra dull green, nervures pale, partially fuscous margined.

Genitalia: Last ventral segment of female long, middle third produced, blackened and notched. Male valve broad, definitely triangularly pointed; plates broad at base, lateral margins concave, tips divergent.

The species is abundant throughout the State, being taken at practically every locality where collecting was done from June 16 at Paris to September 15 at Knoxville. They were very abundant on many of the pasture grasses.

Deltocephalus flavocostatus

(V. D.)

Deltocephalus flavocostatus, V. D., Can. Ent., XXIV, p. 116, 1892.
Deltocephalus flavocostatus, Osb., Proc. Ia. Acad. Sci., IV, p. 217, 1897.

Small brown species with the costal margin of the elytra distinctly yellow. Length, 3 to 3.5 mm.

Head rather short, anterior edge somewhat rounded, vertex convex. Pronotum with anterior margin thickened, posterior margin somewhat concave.

Color: Dark brown to black. Vertex with four spots on apex arranged in a square, two on ocelli, two against eye and two at middle on posterior margin, yellow. Face black with frontal arcs often yellow. Pronotum with five points on anterior margin, and five faint longitudinal lines, yellow. Elytra brown, nervures pale, anterior two-thirds of costal area yellow, two white spots on posterior third. Beneath black.

Genitalia: Last ventral segment of female with posterior margin slightly rounding. Male valve broad, obtuse, plates longer than valve, narrowed at apical third.

Abundant throughout the State, taken at Memphis, June 21; Lexington, June 25; Clarksville during July; Tullahoma, August 10, and at Knoxville, September 14 and 15.

Deltocephalus apicatus

(Osb.)

Deltocephalus apicatus, Osb., Can. Ent. XXXII, p. 285, 1900.

Deltocephalus apicatus, Maine Agr. Exper. Sta. Bull. 238, p. 120, 1915.

Distinguished from the others of the genus by a dark brown color, with head and apex of elytra yellowish. Length, 2.5 to 3 mm.

Vertex almost as long as basal width, apex angulate, rather conical, margin rounded. Pronotum slightly longer than vertex, more than twice as wide with posterior margin truncated. Elytra usually long, often only extending to tip of abdomen.

Color: Vertex and face yellow, ocelli black, and often faint arcs on the front brown. Pronotum yellow, with posterior margin darker, and three faint longitudinal lines white; scutellum and elytra reddish brown, the latter with nervures pale and apical portion hyaline. Beneath yellow.

Genitalia: Last ventral segment of female with posterior margin apparently three lobed, sinuated either side of a central lobe; pygofer rather long, clothed with spines on posterior half. Male valve short, well rounded posteriorly; plates long, broad at base, suddenly narrowed, and produced to narrow tips. Pygofer set with many bristles.

Specimens were swept from lawn grass and larger grasses at Memphis, June 19 and 21; Moscow, June 23; Lexington, June 25; Tullahoma, August 2, and Clarksville, August 22 and September 3.

Deltocephalus nigrifrons

(Forbes.)

Cicadula nigrifrons, Forbes, 14th Rept. Ill. State Ent., p. 67, 1884.

Deltocephalus nigrifrons, O. & B., Proc. Ia. Acad. Sci., IV, p. 218, 1897.

Yellowish green in color and very variable in size and markings. The face is usually black, due to the coalescing of the broad arcs. Length, 2.5 to 4 mm.

Vertex with anterior margin obtusely rounded, one-third longer on the middle than next the eye. Pronotum longer than vertex, lateral margins short, truncated posteriorly. Elytra long and narrow.

Color: Dull yellowish green, vertex lighter with a row of black spots on anterior margin, extending before the eyes on to the front and a narrow longitudinal line, black. Face almost black by arcs coalescing, and marked with irregular yellow spots. Anterior portion of pronotum and scutellum lighter. Elytra with nervures light, often bordered with fuscous. Beneath black, last ventral segment and pygofer of female white, ovipositor black.

Genitalia: Last ventral segment of female short, emarginate posteriorly; pygofer long, slightly broader at middle, armed with long white spines. Male valve short and narrow, rounded; plates short, broad at base and narrowed to acute apex.

Taken in great abundance throughout the State. It occurs on grasses and weeds, and was taken from wheat and rye. Collected at Memphis, June 21; Clarksville during June, July and August, and Tullahoma, August 10 and 11. This species is undoubtedly of great economic importance, feeding in abundance upon many important crops.

Deltocephalus colonus
(Uhler.)

Deltocephalus colonus, Uhler, Proc. Zool. Soc. Lond., p. 80, 1895.

Athysanus villicus, Crumb, Anns. Ent. Soc. Amer., VIII, p. 194, 1915.

Yellowish with two large round black spots on anterior margin of vertex. Length, 2.5 to 3 mm.

Vertex as long as basal width, slightly longer on the middle than next the eye, bluntly angled. Pronotum slightly longer than vertex, posterior margin truncated. Elytra exceeding abdomen in length.

Color: Vertex yellow with two large spots on anterior margin and two points on apex, black. Front yellow tinged with orange, a black point beneath each ocellus. Pronotum yellow, a transverse band on the anterior margin and a broad one on the posterior margin, orange. Elytra yellowish hyaline; abdomen above orange, venter pale.

Genitalia: Last ventral segment of female longer than preceding, emarginate posteriorly with a small median tooth. Male valve broad, subangulate; plates almost as long as broad, gradually narrowed to acute tips.

Mr. Crumb reports that species as occurring on *Aristida gracilis*. It has also been taken from other small grasses, and seems to be well distributed over the larger part of the State. Collected at Colliersville, June 22; Clarksville, July 9, and Tullahoma, August 4.

Deltocephalus inimicus
(Say.)

Jassus inimicus, Say, Jour. Acad. Nat. Sci., IV, p. 305, 1831.

Deltocephalus inimicus, Osb., Proc. Ia. Acad. Sci., IV, p. 215, 1897.

Deltocephalus inimicus, Osb., Maine Agr. Exper. Sta., Bul. 238, p. 123, 1915.

Light brown, marked with a pair of large black spots on the anterior margin of vertex, pronotum and scutellum. Length, 4.5 to 5 mm.

Vertex short, roundly angulate, a little longer on the middle than next the eye, wider between eyes than long. Pronotum slightly longer than vertex; elytra elongate exceeding abdomen.

Color: Fuscous maculate, a large black spot before either eye on anterior margin of vertex, two spots posterior and between these, and two on the base black; a median line and two points at apex, red. Pronotum with two spots on anterior margin, black and three faint longitudinal lines pale. Basal angles of scutellum black. Elytra with nervures white, costal margin light and the other cells margined or clouded with fuscous.

Genitalia: Last ventral segment of female longer than preceding, posterior margin notched either side of center, forming a narrow median lobe, lateral angles rounded. Male valve short, obtusely angled, plates narrow, rather long, tips acutely pointed.

This is one of the most abundant species in the State, and was taken from a number of food plants. It occurs on several grasses, and was especially abundant on blue grass. Dates and localities show it to occur as far southwest as Memphis, June 21, in the north at Clarksville throughout July and August, and it was collected at Knoxville, September 15.

Deltocephalus interruptus
(M. Ap.)

Closely resembling *weedi* in general appearance, longer, vertex slightly sharper and genitalia distinct. Length, 3.5 to 3.7 mm.

Vertex rather sharply angled, one-half longer on the middle than next the eye, slightly longer than basal width. Pronotum longer than vertex, side margins very short, anterior margin strongly curved, posterior margin truncated. Elytra rather broad, distinctly exceeding abdomen, central anti-apical cell divided.

Color: Light brownish testaceous, markings very similar to *weedi*. Vertex yellowish, two large black spots at apex and a smaller one between each of these and eye, a transverse band at anterior margin of eyes broadest at the middle and a spot either side of center behind this, brown; black reflexed portion of the front extending on to vertex. Face black, traces of a median line and six pairs of arcs, light. Pronotum with an interior row of spots brown, crossed by five pale longitudinal lines. Scutellum pale, with three large brown spots. Elytra with nervures white, cells bordered or uniformly tinged with fuscous.

Genitalia: Last ventral segment of female with lateral lobes produced beyond preceding segment which is broadly, shallowly excavated in the middle, lateral margins covered by the preceding segment; pygofer longer and narrower than in *weedi*. Male valve short, narrow, almost transverse, plates long, strongly, concavely narrowed to long acute tips; a black spot at the center of each at the base.

Described from three specimens, one female and two males, swept from small grasses at Colliersville, Tenn., June 22, 1915.

Deltocephalus weedi

(V. D.)

Deltocephalus weedi, Trans. Amer. Ent. Soc., XIX, p. 306, 1892.

Small brown species with sharp vertex. Length, 3 mm.

Vertex rather flat, distinctly angled, one-half longer on vertex than next the eye, slightly longer than broad. Pronotum a little shorter than vertex, sides obsolete, posterior margin rounded. Elytra exceeding abdomen in length.

Color: Brown, vertex with a spot above each ocellus black, two triangular points at apex a transverse band on disc, median line and a faint spot either side at base, fuscous. Face black with white arcs. Pronotum yellowish brown, an irregular row of spots just back of anterior margin, brown, five longitudinal lines white. Scutellum with basal angles black. Nervures of elytra broadly white, areolea bordered, often uniformly colored, fuscous.

Genitalia: Last ventral segment of female longer than preceding, broadly, roundly excavated. Male valve short, very obtusely angled, plates short and broad, triangular, obtusely angled.

One of the very common species occurring throughout the State, swept in great numbers from small grasses and weeds. Taken at Memphis in the southwest, June 21, as far north as Clarksville during July and August, and at Knoxville in the east, September 15. This is one of the Jassid pests of most abundance, and of greatest economic importance.

Deltocephalus compactus

(O. & B.)

Deltocephalus compactus, O. & B., Proc. Ia. Acad. Sci., IV, p. 217, 1897.

Deltocephalus compactus, Osb., 20th Rept. N. Y. State Ent., p. 521, 1905.

Very short, compact, vertex short, blunt, elytra short. Length, 2.75 mm.

Vertex broad, one-half longer on the middle than next the eye, apex bluntly, roundly pointed. Pronotum as long as vertex. Elytra rather short, convex, almost reaching tip of abdomen.

Color: Brown, vertex light yellow, ocelli, a pair of spots just inside these, a pair at apex, an irregular crescentiform band between anterior mar-

gin of eyes and a median impressed line, dark brown to black. Pronotum dark brown with two white lines across the disc. Scutellum with two dark spots on disc. Elytra brownish, maculate with dark brown, nervures broadly white.

Genitalia: Last ventral segment of female deeply emarginate, almost concealed by a membrane arising from its base, pygofers rather long. Male valve small, inflated, rounding; plates broad at base, tips long, attenuated.

Very abundant throughout the State; taken from small grasses at Memphis, June 21; Colliersville, June 22; Lexington, June 25, and at Clarksville during July and August. It was found abundantly on *Aristida gracilis* with other members of the genus.

Deltocephalus obtectus

(O. & B.)

Deltocephalus obtectus, O. & B., Proc. Dav. Acad. Sci., VII, p. 78, 1898.

Deltocephalus obtectus, Osb., Maine Agr. Exper. Sta. Bul., 238, p. 118, 1915.

This species closely resembles *compactus*, but is longer, with a longer vertex. Length, 3 to 3.5 mm.

Vertex as long as basal width, convex, anterior margin concave either side of apex. Pronotum as long as vertex, and twice as wide. Elytra rather narrow, exceeding abdomen in length.

Color: Light gray, vertex yellowish, a transverse crescent on the disc interrupted at middle, a median line and one either side extending backward, black; a curved line either side of apex, a pair of spots back of apex and a pair inside the ocelli, brown. Face brown, arcs on face lighter. Pronotum with a dark spot behind either eye and a row of points on anterior margin. Scutellum with basal angles and a pair of spots on disc, black. Nervures of elytra edged with white, cells margined with fuscous and three spots on costal margin.

Genitalia: Last ventral segment of female with outer membrane extending over pygofers, truncated at apex, lateral margins rounded. The outer angles of the under membrane distinct. Male valve large, triangular; plates small, broad at base, tips attenuate.

Specimens were swept from small grass at Memphis, June 21; Paris, June 16; Lexington, June 25, and Clarksville, July 16 and September 3.

Deltocephalus pyrops

(Crumb.)

Deltocephalus pyrops, Anns. Ent. Soc. Amer., VIII, p. 191, 1915.

Rather small, with a very long pointed vertex. Length, 3.5 to 4 mm.

Vertex flat, acutely angled, twice as long as basal width, three times as long on middle as next the eye; face long, convex. Pronotum rather short, two and one-half times as wide as long. Elytra flaring, exceeded in length by abdomen.

Color: Vertex, pronotum and scutellum brownish yellow, apex black with a black mark either side, a spot posteriorly and two pairs of transverse marks on disc, fuscous; eyes and ocelli bright red. Face yellow, margined above with brown. Pronotum with a fuscous band behind each eye. Elytra light, nervures margined with fuscous, costal area yellowish.

Genitalia: Last ventral segment of female twice as long as preceding, posterior margin truncated, marked with black and inclined at middle with a tooth at the apex. Male valve subangulate, plates broader than long, sides strongly rounded, tips blunt and divergent.

This species was described by Mr. Crumb from specimens taken from short grass (*Aristida gracilis*), in September, 1914. It is very abundant

on this plant, and a large number of specimens were taken at Clarksville during the summer. It was also taken on the southern border of the State at Moscow, June 23.

Deltocephalus vinnulus

(Crumb.)

Deltocephalus vinnulus, Crumb., Anns. Ent. Soc. Amer., VIII, p. 192, 1915.

According to the original description it resembles *compactus*, but is paler, and is characterized as follows. Length, 2 to 2.6 mm.

Vertex convex, slightly longer than width between the eyes, nearly one-half longer on middle than next the eye, margin thin, tip blunt, clypeus parallel margined, pronotum twice as long as wide, elytra hyaline, venation pale.

Color: Vertex and ocelli white, anterior half black with T-shaped figure, the base of which is formed by a white dot on apex; fuscous cloud on disc, upper half of face black, and the remainder of the entire insect yellowish brown.

Genitalia: Last ventral segment of female two and one-half times as long as preceding, twice as broad as long, with an outer membrane as in *compactus* which is emarginate laterally and exposes a rounded lobe of the inner membrane. Posterior margin gently convex with a pair of fuscous spots at the middle. Male valve with posterior margins convex, plates twice as long as valve, broad at base, concavely narrowed to acute tips.

The species was described from specimens collected at Clarksville, Tenn., on *Andropogon virginicus*, September, 1914. These are the only known records for the State.

Deltocephalus vicilinus

(Crumb.)

Deltocephalus vicilinus, Crumb., Anns. Ent. Soc. Amer., VIII, p. 193, 1915.

It is characterized thus in the original description. Resembling *sylvestris*, but smaller. Length, 2.4 to 2.6 mm.

Vertex flat as long as basal width, one-half longer on middle than next the eye, strongly angulate, front convex, clypeus tapering. Elytra exceeding abdomen, venation as in *sylvestris*.

Color: Vertex pale green, a pair of brownish longitudinal stripes, apex, front margin and a median stripe, white, a curved line between ocelli and apex, fuscous. Pronotum green, pale in front marked with fuscous stripes. Elytra pale olive green, veins pale, infuscated apically.

Genitalia: Last ventral segment one-half longer than preceding, strongly convex anteriorly, posterior margin emarginate, slightly subtruncately excavated at middle. Male valve rounded posteriorly, plates broader than valve, nearly as long as broad and almost straight margined, tips roundly truncated, exceeded by pygofer.

Nine females and three males were collected at Clarksville, October 8, 1914, by Mr. Crumb, from small grasses, and from these the species was described. These are the only specimens I have seen.

GENUS

Scaphoideus

(Uhler.)

Head triangular, vertex flat, usually as long as width between eyes, base sinuated; front longer than wide, cheeks broad. Antennae long and

slender. Pronotum strongly curved on anterior margin, less sinuate posteriorly. Elytra rather narrow, exceeding abdomen in length. Abdomen moderately long and narrow. The genus is related to *Deltocephalus*.

Key to Species.*

- A—Common cross on elytra, claval vein straight, meeting suture at an acute angle *sanctus*
- AA—Elytra without cross, outer claval vein curved or hooked at distal end.
 - B—Post nodal cell scarcely widened distally.
 - C—Nodal vein arising from distal cell, broad, transverse band on vertex, and a black one just before *auronitens*
 - CC—Nodal vein arising from antiapical cell.
 - D—Vertex flat with transverse impressed line, golden elytra with white spots *jucundus*
 - DD—Vertex convex, no impressed line, edges rounded.
 - E—Vertex as long or longer than wide, acute *scalvris*
 - EE—Vertex wider than long, obtuse or rounded, uniform dark brown in color *unicolor*
 - BB—Post nodal cell much widened distally.
 - C—Outer claval not strongly hooked at distal end, cross nervures to claval suture indistinct or wanting.
 - D—Outer claval sinuate, approaching inner near middle, bright ochreous in color *ochraceous*
 - DD—Outer claval nearly straight and parallel to inner.
 - E—Head and pronotum ivory white or yellowish *intricatus*
 - EE—Head and pronotum with darker areas luteous *luteolus*
 - CC—Outer claval strongly hooked at distal end, usually with distinct cross nervures.
 - D—Without distinct cross vein between claval veins.
 - E—Face light with dark markings *immitus*
 - EE—Face black with white arcs, vertex darker *nigricans*
 - DD—Distinct cross vein between clavals, face black *melanotus*

Scaphoideus sanctus

(Say.)

Jassus sanctus, Say, Jour. Acad. Nat. Sci., Phila., VI, p. 306, 1831.

Scaphoideus picturatus, Osb., Proc. Ia. Acad. Sci., V, p. 243, 1898.

Milky white, with brown cruciate mark on elytra. Length, 4 to 5 mm.

Vertex as long as wide between the eyes, distinctly angulate; pronotum with posterior margin truncated, lateral margins very short.

Color: Vertex, pronotum face and scutellum, yellowish, two minute points next each eye, two at apex, a faint median line, an undulated line on margin of vertex, arcs on front and posterior half of pronotum, fuscous. Elytra milky white, a large cruciform mark on middle brown, edged with black, enclosing a white spot, the arcs extending backward and forward to costal margin; tip with numerous large brown spots.

Genitalia: Last ventral segment of female truncated, posterior margin blackened and slightly notched at middle. Male valve small, plates tapering to obtuse tips.

Three specimens were taken at Paris, June 26; Clarksville, July 16, and Knoxville, September 15, all being swept from wild rose. Mr. Crumb has also taken a few specimens from the same plant.

*Taken from key by Osborn, Jour. Cinc. Soc. Nat. Hist., XIX, 1900.

Scaphoideus auronitens

(Prov.)

Scaphoideus auronitens, Prov. Pet. Faun. Can., III, p. 277, 1889.*Scaphoideus auronitens*, Osb., Jour. Cinc. Soc. Nat. Hist., XIX, p. 194, 1900.

May be distinguished by the broad, transverse orange red band on vertex. Length, 4.5 mm.

Vertex slightly wider than long; pronotum slightly emarginate posteriorly. Elytra rather long, nodal vein arising well in front of outer anti-apical cell, from discal cell.

Color: Vertex yellow white with a short transverse line and a broader one in front parallel to anterior margin, black; a broad transverse band across middle, orange red. Pronotum with a band on anterior margin, and one on posterior half parallel to posterior margin, orange red. Scutellum pale, two spots on disc black, basal angles red. Elytra yellowish, nervures brown, cells often lighter. Three points on each side of suture black.

Genitalia: Last ventral segment of female cleft almost to base, lateral lobes rounding. Male valve short plates triangular, with an impressed line parallel to outer margin.

Specimens were taken at Clarksville during July and August, and at Knoxville, September 14 and 15. Several of these were swept from cane-brake along the Cumberland River at the former locality.

Scaphoideus jucundus

(Uhler.)

Scaphoideus jucundus, Uhler, Trans. Md. Acad. Sci., I, p. 34, 1889.*Scaphoideus jucundus*, Osborn, Jour. Cinc. Soc. Nat. Hist., XIX, p. 195, 1900.

Fulvous, elytra marked with oval milky white spots. Length, 5 to 6 mm.

Vertex as long on middle as basal width, flat, acutely angled. Elytra moderately long, claval veins slightly curved at apex and cross veins of clavus indistinct.

Color: Orange yellow, narrow line on margin and median line on vertex, six irregular spots on anterior of pronotum, two spots on base and three on apex of scutellum, and several oval spots on elytra, milky white. Disc of vertex distinctly reddish, line on under margin black. Elytra with nervures on apical half fuscous, others indistinct.

Genitalia: Last ventral segment of female long, posterior margin slightly rounded, darker on each side of small median tooth. Male valve narrow, triangular, plates rather long and slender, exceeded by pygofers, tips with long prolongations.

Four specimens were taken by the author, and were swept from oak. They were collected at Clarksville, July 16 and 27, and at Tullahoma, August 3. A few specimens have been collected at Clarksville by Mr. Crumb.

Scaphoideus scalaris

(V. D.)

Scaphoideus scalaris, V. D., Entomologica Americana, VI, p. 51, 1890.*Scaphoideus scalaris*, Osborn, Jour. Cinc. Soc. Nat. Hist., XIX, p. 198, 1900.

Distinguished from the others included in this paper by a light mark on suture, formed by three light spots on sutural margin. Length, 5 mm.

Vertex as long as wide, often slightly longer, front with sides nearly straight and parallel, lorae long. Pronotum half as long as wide, posterior margin slightly concave.

Color: Vertex light, a marginal line, a pair just behind the margin, curved, 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; a spot next each eye fulvous. Pronotum testaceous, anteriorly fulvous, a few irregular spots and median longitudinal stripe milky white. Scutellum pale, basal angles fuscous. Elytra testaceous, nervures fuscous, three cells of clavus on each side of suture, milky white.

Genitalia: Last ventral segment of female truncated, lateral angles rounded; pygofers rather long and broad. Male valve small, plates reaching to middle of pygofers, triangular, slender.

One of the abundant species occurring throughout the State. Taken at Covington, June 18; Memphis, June 19; Colliersville, June 22; Lexington, June 25; Clarksville during July, August and September; Tullahoma, August 4, and Knoxville, September 14.

Scaphoideus unicolor

(Osborn.)

Scaphoideus consors var. *unicolor*, Osb., Jour. Cinc. Soc. Nat. Hist., XIX, p. 196, 1900.

Scaphoideus unicolor, Osborn, Ohio Nat., XI, p. 255, 1911.

Almost uniform brown in color, more robust than other species of the genus. Length, 5 to 5.5 mm.

Vertex slightly broader between eyes than middle length, bluntly angled, pronotum and elytra rather short and broad.

Color: Almost uniform brown, unmarked. Vertex light fuscous, ocelli bright red. Pronotum dark, anterior margin light as in vertex. Elytra light fuscous, nervures and narrow apical band dark brown.

Genitalia: Last ventral segment of female moderately long, truncate; pygofers rather short and broad. Male valve large, rounded, plates broad, triangular, tips floccid, red, and exceeding abdomen in length.

Swept from weeds at Memphis, June 19, and Clarksville, June 30 and August 22.

Scaphoideus ochraceus

(Osb.)

Scaphoideus ochraceus, Osb., Proc. Ia. Acad. Sci., V, p. 242, 1898.

Scaphoideus ochraceus, Osb., Cinc. Soc. Nat. Hist., XIX, p. 199, 1900.

Color tawny ochraceous, elytra nervures fuscous, size and color of *jucundus*. Length, 5 to 6 mm.

Vertex as long as width between the eyes, angularly rounded on margin, front narrow. Clypeus twice as long as basal width, apex broadened and truncate, genae broad. Pronotum slightly longer than vertex.

Color: Vertex yellow, broad, transverse band across disc with median projection extending forward, ochraceous, broad fuscous band on anterior margin, broken at middle. Pronotum with two spots on anterior half, posterior half ochraceous, marked with light spots and stripes. Elytra with cells whitish hyaline, border of nervures and apex of elytra ochraceous, spots on clavus and disc fuscous.

Genitalia: Last ventral segment of female truncated posteriorly, margin of pygofers clothed with spines. Male valve short, transverse, plates broad, roundly narrowed, apices obtuse; pygofers long, exceeding plates.

One specimen, female, taken at Magnolia, September 21, by Mr. Crumb. This is the only record thus far obtained for the State.

Scaphoideus intricatus

(Uhler.)

Scaphoideus intricatus, Uhler, Trans. Md. Acad. Nat. Sci., I, p. 34, 1889.
Scaphoideus intricatus, Osborn, Jour. Soc. Nat. Hist., XIX, p. 202, 1900.

General form of *immistus*, but head, pronotum and scutellum white, with a few faint markings. Length, 5.5 to 6.5 mm.

Vertex slightly longer than broad between the eyes, flat, obtusely angled. Pronotum broad, elytra moderately long.

Color: Vertex, pronotum and scutellum dirty white, a marginal line, transverse band on vertex, a median spot, one behind each eye on anterior margin and two on posterior half of pronotum, and three basal spots on scutellum, fuscous. Elytra light, marked with irregular spots, yellow and testaceous, nervures brown, three distinct spots along claval suture milky white. Posterior margin of last ventral segment black.

Genitalia: Last ventral segment of female truncate, slightly produced on median line; pygofer broad, with brown patches near tips, either side. Male valve short, triangular, plates elongate, strongly convex on outer margin, subangulate.

Six specimens were swept from weeds at Clarksville, July 23 and 28, and August 22.

Scaphoideus luteolus

(V. D.)

Scaphoideus luteolus, V. D., Bul. Buf. Soc. Nat. Hist., V, p. 210.
Scaphoideus luteolus, O. & B., Proc. Ia. Acad. Sci., LV, p. 232.

Very close to *auronitens* in size and shape. Length, 4 mm.

Vertex wider at base than long, apex subangulate.

Color: Fulvous brown, vertex and scutellum often brighter, apex and base of vertex fulvous in females, lighter in males; anterior edge of head with three concentric black lines. Face fulvous, frontal arcs pale. Elytra pale, nervures and apex fuscous.

Genitalia: Last ventral segment of female long, lateral angles retreating, pygofer rather long and slender. Male valve long, obtusely angled; plates large, oval, tapering to slender points.

Four specimens were taken by Mr. Crumb at Clarksville, June 29.

Scaphoideus immistus

(Say.)

Jassus immistus, Say, Jour. Acad. Nat. Sci., Phila., VI, p. 306, 1831.
Scaphoideus immistus, Osb., Cinc. Soc. Nat. Hist., XIX, p. 204, 1900.

The most abundant species of the genus, brown, marked with fuscous. Length, 4.75 to 6 mm.

Vertex about as long as width between the eyes. Pronotum twice wider than long. Elytra with two to four oblique veins from outer antiapical cells to discal cell.

Color: Vertex light, a narrow black line on margin, and a transverse band between the eyes, brown, with slightly produced tooth at the middle. Face light, two lines below margin of vertex, black. Pronotum brown, transverse band on anterior half white. Scutellum fuscous, apical half light. Elytra light brown, nervures dark, costal area, two spots along suture and scattered spots white.

Genitalia: Last ventral segment of female slightly produced, margined with black, pygofer long. Male valve small, short, plates short, convex.

One of the most abundant species throughout the State. Specimens are at hand from practically every locality where I collected. Taken as far southwest as Memphis, June 21; in the north central part during July and August, and in the eastern portion of the State, at Knoxville, September 14 and 15.

var. *minor*
(Osb.)

var. *minor*, Osb., Cinc. Soc. Nat. Hist., XIX, p. 204, 1900.

Differs from *immistus* in size and genital characters. Length, 4.5 to 5 mm.

Smaller and with vertex more obtuse than *immistus*. Last ventral segment of female usually produced and carinate. Male plates longer than in the preceding.

Two specimens taken at Clarksville agree with Prof. Osborn's type specimens.

var. *major*
(Osb.)

var. *major*, Osb., Cinc. Soc. Nat. Hist., XIX, p. 204, 1900.

Distinguished from typical *immistus* by the more intense coloring on vertex and larger size.

Transverse band on vertex fuscous, a medium protection running forward almost to margin; black marginal line broken on the apex, face infuscated.

Genitalia: Last ventral segment of female slightly produced. Male plates broad, slightly reflexed at sides, almost truncated at tips.

One specimen from Paris, collected June 26, is quite different from *immistus*, and agrees well with the characters stated above.

Scaphoideus nigricans
(Osb.)

Scaphoideus nigricans, Osb., Ohio Nat., XI, p. 258, 1911.

Very closely resembling *immistus*, but with darker markings and black face. Length, 5.5 mm.

Vertex one-half longer on middle than width between the eyes, obtusely angled; front narrow, clypeus widened apically. Pronotum rather short, emarginate behind. Elytra moderately long, claval cross veins indistinct.

Color: Black to dark brown, vertex brown, spot next anterior margin, and two small ones on posterior half, white. Face black, arcs on front, white. Pronotum dark, spots on anterior half white. Scutellum with spots on base and white area at apex. Elytra dark with markings as in *immistus*. Beneath mostly black, basal part of last ventral segment white.

Genitalia: Last ventral segment of female long, posterior margin notched, bordered with black; pygofers long, dark, white band and distinct black lateral spots near tip.

One specimen, female, was swept from canebrake at Clarksville, July 20. The specimen agrees exactly with the type of Prof. Osborn's.

Scaphoideus melanotus
(Osb.)

Scaphoideus melanotus, Osb., Jour. Cinc. Soc. Nat. Hist., XIX, p. 206, 1900.

Very similar to *immistus* in size and appearance, but can usually be distinguished by the black face. Length, 5 mm.

Vertex distinctly wider than long, obtuse, front narrow. Pronotum with anterior margin strongly rounded, posterior margin slightly emarginate. Post nodal cell of elytra wide behind.

Color: Vertex dirty white, transverse line back of margin, black, and transverse band on disc orange. Face black. Pronotum yellowish, fuscous spots, two irregular spots on anterior portion and broken band on posterior part, fulvous. Scutellum white, basal angles brown. Elytra brown, lobes along suture and several other spots, white.

Genitalia: Last ventral segment of female long, posterior half with a median notch, and black in color.

Two specimens, both females, were taken at Covington, June 18, and Clarksville, July 5. These agree very closely with the type specimens in the collection of Prof. Osborn, with which they have been compared.

GENUS

Athysanus

(Burm.)

Body robust, rounding somewhat at sides, head together with eyes, slightly wider than pronotum, obtuse. Vertex convex, obtusely produced. Ocelli close to eyes, front and clypeus wide, cheeks wide, reaching to apex of clypeus. Pronotum short, transverse. Elytra usually shorter than abdomen, sides slightly rounded, not overlapping at tip, appendix usually wanting.

Key to Species

- A—Vertex much wider than long, in profile, anterior margin obtusely rounding to front *exitiosus*
- AA—Vertex usually produced and angulate, in profile, anterior margin meeting front in an angle.
 - B—Vertex wider than its length on middle.
 - C—Color uniform black *anthracinus*
 - CC—Color light with dark markings.
 - D—Vertex and front obtusely, conically pointed, marked with spots and stripes, size large 4.5 mm. *extrusus*
 - DD—Vertex and front angled, broad black band on disc, size small 3.5 mm. *estacodus*
 - BB—Vertex as long or longer on middle than basal width.
 - C—Face light with brown "Y" on clypeus and face. *curtisii*
 - CC—Without the characteristic "Y" on the face.
 - D—Black band on anterior margin of pronotum. *bicolor*
 - DD—Row of submarginal spots on anterior half of pronotum. *obtus*

Athysanus exitiosus

(Uhler.)

Cicadula exitiosa, Uhler, Amer. Ent., III, p. 72, 1880.

Athysanus exitiosus, O. & B., Ohio Nat., II, p. 234, 1902.

Variable in size and coloration. Usually with a pair of large spots on margin, and a pair of oblique dashes on basal angles of vertex, black. Length, 3.5 to 5 mm.

Vertex rounding to front, half as long as basal width, margin rounding, front wedge-shaped. Elytra exceeding abdomen in length with broad ap-

pendix extending around entire end of wing, apical cells long and narrow.

Color: Vertex pale with orange yellow tinge, two round black spots on margin, and two oblique dashes on basal angles black; brownish crescent on disc between eyes, and parallel to anterior margin. Face pale with brown arcs. Pronotum brownish, with four black spots arranged transversely behind anterior margin. Scutellum pale, triangles in basal angles, and a median posterior divided line brown. Elytra milky hyaline, nervures dark.

Genitalia: Last ventral segment of female long, truncate, pygofers rather long and narrow, greatly exceeded by ovipositor. Male valve triangular, plates long, narrow, apex acute, divergent and clothed with stout hairs.

One of the very common species in Tennessee, and taken in great abundance throughout the State. Swept from weeds and grasses at every locality where I collected. Memphis, June 21; Clarksville, July and August; Tullahoma, August 5 to 15, and Knoxville, September 14.

Athysanus anthracinus

(V. D.)

Athysanus anthracinus, Van Duzee, Can. Ent., XXVI, p. 136, 1894.

Athysanus anthracinus, O. & B., Ohio Nat., II, p. 241, 1902.

May be distinguished from other members of the group by its shiny black color. Length, 3.5 to 4 mm.

Vertex subangulate, broadly obtusely conical, slightly longer on the middle than against the eyes, front rounding. Pronotum, anterior margin broadly rounding. Elytra short and broad, truncated posteriorly, slightly exceeding abdomen.

Color: Black shining, two spots on posterior margin of vertex farther from each other than from the eye, and faint arcs on front, yellow.

Genitalia: Last ventral segment of female slightly longer than preceding, posterior margin slightly, roundly produced, lateral angles subacute. Male valve half the length of last ventral segment, semicircular, plates triangular, blunt at apex.

Six specimens were taken during the summer at Paris, June 16; Memphis, June 21; Clarksville, June 30 and July 25.

Athysanus extrusus

(Van Duzee.)

Athysanus extrusus, V. D., Can. Ent., XXV, p. 283, 1893.

Athysanus extrusus, Osb. & Ball, Ohio Nat., II, p. 237, 1902.

Large, stout, vertex with four, dark, triangular spots. Length, 4.2 to 5.2 mm.

Vertex bluntly, obtusely angled, posterior margin nearly straight, twice as long on middle as next the eye. Pronotum the length of vertex, posterior margin concave. Elytra broad, broadly rounded posteriorly, often exposing pygofers in female and plates in male. Apical and antiapical cells broad and short.

Color: Vertex pale yellow, an angular spot at apex, and broad transverse band black, each divided by a pale longitudinal line. Face pale, sutures and frontal arcs dark. Pronotum dusky, with fine very pale longitudinal lines. Elytra pale, nervures light, areoles margined with fuscous.

Genitalia: Last ventral segment of female twice the length of preceding, truncated, lateral angles produced around pygofers. Male valve obtusely

angled, plates wide, three times the length of valve, divergent, lateral margins parallel.

Several specimens were taken by Mr. Crumb while sweeping grasses, June 21, 22 and 23.

Athysanus estacadus
(Ball.)

Athysanus estacadus, Ball, Can. Ent., XXXIII, p. 200, 1911.

In general appearance resembling *curtisii*, but broader and with a flatter vertex. Length, 3.5 mm.

Vertex flattened, slightly shorter than its basal width. Anterior margin broadly, obtusely angled. Pronotum with side margins very short, humeral margins long and straight. Elytra short and broad, slightly longer than abdomen.

Color: Straw yellow, vertex with margin yellow, and a broad band just back of, and parallel to anterior margin, black. Pronotum with a transverse, median, band light. Front fuscous, median stripe and seven pairs of arcs pale. Elytra slightly darker, margins and nervures light.

Genitalia: Last ventral segment of female short, posterior margin slightly, broadly emarginate, pygofer as long as ovipositor. Male valve as long as last ventral segment, triangular, apex rounded; pygofer with outer margins slightly concave, apex bluntly angled.

This species is abundant on short grasses in Tennessee. Taken at Clarksville at different dates from June 30 to August 31, and at Nashville, September 11.

Athysanus curtisii
(Fitch.)

Amblycephalus curtisii, Fitch, Homop. N. Y. State Cab., p. 61, 1851.

Jassus nervatus, Prov. Nat. Can., IV, p. 373, 1872.

Athysanus curtisii, Osb. & Ball, Proc. Ia. Acad. Sci., IV, p. 221, 1897.

Small, light green, two large black spots on vertex. Length, 3.5 mm.

Vertex almost twice as long in middle as against the eye, almost right angled, front broad, elytra broad and short.

Color: Vertex yellowish green, with two large black spots on anterior half; face pale, an irregular spot on apex, median stripe on clypeus, and margins of front below eyes brownish. Anterior half of pronotum black, posterior half yellow. Scutellum yellow, two minute spots on disc, darker. Elytra dark fuscous, margins and nervures yellow.

Genitalia: Last ventral segment of female longer than preceding; posterior margin slightly emarginate, a small median lobe either side. Male valve triangular, rounding, plates triangular, with acute apices, margins sparsely clothed with hairs.

Specimens were swept from short grasses at Nashville, September 11, and Knoxville, September 14 and 15. At the latter locality it was taken in great abundance along the Tennessee River.

Athysanus bicolor
(V. D.)

Athysanus bicolor, V. D., Can. Ent., XXIV, p. 114, 1892.

Deltoccephalus virgulatus, Uhl., Proc. Zoo. Soc., London, p. 78, 1895.

Athysanus bicolor, Osb. & Ball, Proc. Ia. Acad. Sci., IV, p. 222, 1897.

Very close to *curtisii*, but separated from it by the fewer black markings on the elytra. Length, 3 to 3.5 mm.

Vertex as long as width at base, almost twice as long on middle as next the eye, acutely, conically pointed. Pronotum strongly rounding on anterior margin. Elytra short and broad, rounded apically.

Color: Vertex yellowish, a pair of black spots before the middle, often forming a black band covering anterior half, in the male. Upper half of face varying from fuscous to black. Pronotum greenish yellow, a broad black band on anterior margin, and a narrow one on posterior margin covering basal portion of scutellum. Elytra yellowish green, with claval suture, sutural margin, and a band on apical area black. These markings vary considerable in both sexes.

Genitalia: Last ventral segment of female short, posterior margin slightly emarginate; pygofers long, exceeded by ovipositor. Male valve short, triangular, one-third as wide as last ventral segment; plates short, rather semicircular, and thickly clothed on the margin with long hairs.

Very common species occurring throughout Tennessee on a large number of different plants. Specimens show different localities from Memphis to Knoxville, and numerous dates from June 15 to September 15.

Athysanus obtutus

(Van Duzee.)

Athysanus obtutus, V. D., Can. Ent., XXIV, pp. 115 and 156, 1892.

Athysanus obtutus, Osb. & Ball, Proc. Ia. Acad. Sc., IV, p. 222, 1897.

Resembling *bicolor* in form and size, but distinguished readily by the four black spots on vertex. Length, 3 to 3.5 mm.

Vertex slightly longer than in *bicolor*, length exceeding basal width. Eyes extending back along sides of pronotum. Elytra exceeded by ovipositor in female.

Color: Testaceous, vertex with a pair of large black spots just before the middle and a small lighter pair behind them. Face varying in dark markings. Pronotum with irregular spots and dark markings just behind anterior margin; basal angles of scutellum black. Elytra with apical areas subhyaline, nervures around apical cells fuscous.

Genitalia: Last ventral segment of female short, posterior margin slightly emarginate, pygofers rather long, greatly exceeded by ovipositor. Male valve small, triangular, plates short, rounding, margins clothed with hairs.

Occurs abundantly throughout the State. Taken while sweeping grasses and weeds at Memphis, June 21; Moscow, June 23; Lexington, June 25; Clarksville, August 23, and Knoxville, September 15.

GENUS

Driotura

(Osb. & Ball.)

Head short, transverse, almost parallel margined, obtusely conical. Eyes large, face broad and short, clypeus almost parallel margined. Pronotum short, slightly exceeding length of vertex, posterior portion transversely striate, posterior margin truncate. Elytra coarsely rugose, often short, extending only to second abdominal segment, or may be long, reaching almost to tip of ovipositor. Abdomen of male short, legs stout.

Two species and a variety have been taken in the State.

Key to Species

- A—Color glossy black, without markings *gammaroidea*
 AA—Color gray, vertex and pronotum marked with white..... *robusta*

Driotura gammaroidea

(V. D.)

Athysanus gammaroidea, V. D., Buf. Soc. Nat. Hist., V, p. 209, 1894.*Driotura gammaroidea*, O. & B., Proc. Dav. Acad. Nat. Sci., VII, p. 89, 1898.

Short, black, robust, may be either long or short winged. Length, 3 to 4 mm.

Vertex bluntly conical, anterior margin slightly more convex than posterior margin, twice wider than long, ocelli dorsal. Pronotum short, truncated posteriorly, eyes extending over anterior part of lateral margins. Elytra broad, coarsely rugose; in the short winged form the elytra are broader than long, reaching to second abdominal segment, while the long winged form has lateral margins of pronotum shorter, and elytra fully developed.

Color: Usually glossy black, often with scattered reddish brown markings. Legs and spines often reddish brown.

Genitalia: Last ventral segment of female rather short and broad, pygofer long. Male valve broad, rounded, plates with outer margins convex, pointed at apex, outer margin impressed at middle.

Specimens were swept from short grass at Paris, June 16; Memphis, June 19 and 21; Lexington, June 25, and Tullahoma, August 2.

Driotura gammaroidea var. fulvo

(Ball.)

Driotura gammaroidea var. fulvo, Ball, Can. Ent., p. 23, 1903.

Size and shape of preceding, but differs in color markings. The structural and genital characters are just as in *gammaroidea*.

Color: Vertex, pronotum, last two dorsal segments of abdomen, pygofer and ventral surface, reddish brown. Front, elytra and the remainder of the abdominal segments, distinctly darker, almost a uniform dark brown, face shining. Eyes and ocelli black.

One specimen taken at Paris, June 25, is the only known record in the State.

Driotura robusta

(O. & B.)

Driotura robusta, O. & B., Proc. Dav. Acad. Sci., VII, p. 87, 1898.

Slightly smaller than *gammaroidea*, gray, with light bands on pronotum. Length, 2.75 to 3.5 mm.

Vertex short, transverse, almost parallel margined, twice as wide as long, eyes triangular, face broad, rounding. Pronotum, short, more than three times wider than long, posterior margin slightly emarginate. Scutellum small. Elytra coriaceous, short, rugose, about as long as wide. Abdomen broad, convex.

Color: Vertex with a stripe on base with lines extending forward from it along the eyes, a median longitudinal line, two spots on disc, and a band between vertex and front, white. The coloring varies and may be almost white in light colored specimens. Face with a black band below, above white with dark arcs. Pronotum, anterior third black, posterior white, often bordered with black on lateral margins. Elytra black with nervures and ramose lines connecting them, light. Abdomen maculate.

Genitalia: Female last ventral segment twice longer than preceding, posterior margin slightly emarginate, pygofer long. Male valve short,

rounding, plates with inner margins rounded, outer edge emarginate, tips obtuse, widely separated.

Specimens were swept from small grass at Lexington, June 25; Clarks-ville, July 10 and August 25, and Knoxville, September 14.

GENUS

Eutettix

(Van Duzee.)

Head moderately long, nearly flat, slightly conical, often a transverse depression behind narrow margin of vertex, especially in short-headed forms. Face nearly flat, front broad, narrowed to clypeus, apex broad. Elytra rather narrow, and moderately long. The genus is closely allied to *Phlepsius*, but differs in having the ramose pigmentation forming definite bands or wanting.

Key to Species

- A—Elytra with one cross nervure between the sectors.
 - B—Elytra without transverse band, but often with commissural spot.
 - C—Vertex and pronotum with black transverse bands....*var. picta*
 - CC—Vertex and pronotum without black markings.
 - D—Vertex and pronotum yellowish, elytra brown....*var. subaenea*
 - DD—Vertex, pronotum and elytra light with brown markings.*var. marmoratu*
 - BB—Elytra with distinct dark transverse band.
 - C—Vertex and pronotum white or yellowish*seminuda*
 - CC—Vertex and pronotum fulvo testaceous.....*strobi*
- AA—Elytra with two cross nervures between sectors.
 - B—Vertex pale, without dark markings, body broad.....*cincta*
 - BB—Vertex black or with black spots.
 - C—Elytra orange fulvous with white spots, six spots on margin of vertex black*johnsoni*
 - CC—Elytra white with black saddle*nigridorsum*

Eutettix subaenea var. *picta*

(V. D.)

Eutettix pictus, V. D., Trans. Amer. Ent. Soc., XIX, p. 301, 1892.

Eutettix magnus, Osb., Ent. News, XI, p. 305, 1900.

Color pattern similar to *T. clitellarius*, but form stouter and differing in structural characters. Length, female, 6.7 mm.; male, 5 mm.

Structural characters very similar to *var. subaenea*, pronotum shorter and broader.

Color: Vertex, pronotum and scutellum bright yellow, large spot almost covering the entire margin of vertex, sometimes bisected in middle, large band on posterior half of pronotum not quite extending to posterior margin, black. Face in males, black, white in females. Elytra black, shining, an oval spot on suture before clavus, often absent in male, and the anterior two-thirds of costal margin broadly yellow. Beneath pale, last ventral segment, pygofer and ovipositor black.

Genitalia: Last ventral segment of female slightly shallowly emarginate, on each side of short median lobe; pygofer long. Male valve short, broad and evenly rounded; pygofer broad, moderately long, slightly convex, tips bluntly pointed, margins thickly clothed with white hairs.

Swept from oak shrubs at Clarksville, July 22 and 25; Tullahoma, August 2 and 3, and Sewanee, August 6.

Eutettix subaenea var. *subaenea*
(V. D.)

Thamnot ettix subaenea, V. D., Ent. Am., VI, p. 77, 1890.

Eutettix subaenea, V. D., Trans. Am. Ent. Soc., XIX, p. 303, 1892.

Eutettix subaenea var. *subaenea*, Ball, Proc. Dav. Acad. Soc., XII, p. 37, 1907.

Moderately long, brown; vertex, pronotum, and scutellum, creamy. Length, 5.5 mm.

Vertex short, broad, more than twice as broad as middle length, almost parallel margined; definite transverse depression back of margin. Scutellum large; elytra rather short and broad, venation simple with one cross nervure.

Color: Vertex creamy yellow, transverse depression, median line, four spots at base, testaceous. Pronotum same as vertex, two faint testaceous stripes; scutellum light, basal angles dark. Elytra subhyaline, sutural margin testaceous, interrupted before apex of clavus by a yellow spot; nervures and irregular spot on disc of corium, orange.

Genitalia: Last ventral segment of female slightly rounded, excavated either side of median fifth, which is produced, forming a rather broad tooth, slightly notched in middle; pygofers rather short and broad, equaling length of ovipositor.

One specimen taken while sweeping small shrubs in an open woods at Clarksville, July 25. This is the only known record for the State.

Eutettix subaenea var. *marmorata*
(V. D.)

Eutettix marmorata, V. D., Trans. A. Ent. Soc., XIX, p. 302.

Eutettix incerta, Gill & Baker, Hemip. Colo., p. 100, 1895.

Yellow in color, mottled with brown. Length, 5 mm.

Color: Vertex, pronotum and scutellum, pale yellow, washed with brown. Vertex with two spots at apex, four at base, and a median longitudinal line, testaceous. Face with arcs testaceous. Pronotum with a few irregular spots behind the eye. Scutellum marked with testaceous lines and spots. Elytra pale subhyaline, blotched with brown.

Genitalia: Last ventral segment of female with posterior margin excavated one-third the way to base, and with a broad, blunt, median tooth produced, slightly exceeding the lateral angles; pygofers moderately broad, exceeded by ovipositor.

One specimen, female, taken by Mr. Crumb at Clarksville, November 5, is the only record which has been obtained for the State.

Eutettix seminuda
(Say.)

Jassus seminudus, Say, Jour. Acad. Nat. Soc. Phila., VI, p. 307, 1831.

Bythoscopus seminudus, Fitch, Homop. N. Y. St. Cab., p. 58, 1851.

Eutettix seminudus, V. D., Psyche, VI, p. 307, 1892.

Milky white, with a broad, brown band across middle of elytra, and the tips brownish. Length, 4.5 to 5 mm.

Vertex convex, slightly longer on the middle than against eye, margin rounding. Elytra moderately long, nervures indistinct.

Color: Vertex, face and ventral surface cream color, pronotum creamy white, often marked with brown on posterior half. Scutellum with apex and basal angles brown. Elytra milky white, a broad saddle across posterior half of clavus, and an irregular spot on apex testaceous brown.

Genitalia: Last ventral segment of female truncate with a median, wedge-shaped tooth, slightly notched. Male valve triangular, rounding, plates long, triangular, apices truncated.

The species is quite abundant, and occurs throughout the State. Taken at Clarksville during June, July, and August; Paris, June 16; Dyersburg, June 17; Tullahoma, August 3 and 10; Nashville, September 11, and Knoxville, September 15.

Eutettix strobi
(Fitch.)

Bythoscopus strobi, Fitch, Homop. N. Y. St. Cab., p. 58, 1851.

Phlepsius strobi, V. D., Psyche, V, p. 390, 1890.

Eutettix strobi Baker, Psyche, VII, Supp., p. 24, 1896.

Size and shape of *seminuda*, but with fulvo testaceous color. Length, 4.5 to 5.25 mm.

Vertex slightly produced on middle, distinctly longer on middle than next the eye. Pronotum long, strongly rounded on anterior margin; face convex, elytra moderately long.

Color: Vertex, pronotum and scutellum fulvo testaceous, vertex with an orange tint, eyes and face distinctly reddish. Elytra milky white, a band at base of elytra, another at apex, and a median saddle as in *seminuda*, all more or less fused along sutural margin, brown testaceous.

Genitalia: Last ventral segment of female almost truncated, with two small median lobes, slightly produced. Male valve obtusely angled; plates broad at base, triangular, rounding to pointed apices, clothed with long hairs.

A number of the specimens at hand were swept from wild rose and were taken at Clarksville, July 5 and 17. Other records are Covington, June 18, and Nashville, September 11.

Eutettix cincta
(O. & B.)

Eutettix cincta, Osb. & Ball, Dav. Acad. Sci., VII, p. 97, 1898.

Eutettix jucunda, V. D., Psyche, VI, p. 307, 1890.

Broad and stout, with oblique lines on clavus black. Length, 5.3 to 6 mm.

Vertex nearly one-half longer on middle than next the eye, sloping, apex bluntly conical. Scutellum large; elytra moderately long, broad.

Color: Vertex dirty yellow, apex tinged with red; pronotum yellowish brown irrorate. Scutellum light, a pair of spots on disc and a pair on each lateral margin, black. Elytra greenish yellow, nervures reddish brown, an oblique spot on clavus of each elytron, extending back from lateral margin of scutellum, black. A broad brownish band crossing posterior half of the clavus and extending obliquely back to costa; costal nervures broadly black.

Genitalia: Last ventral segment of female with posterior margin slightly rounded, sinuate, and produced on middle. Male valve short, rounding, plates long, concavely narrowed to upturned apices, margins clothed with hairs.

Specimens were collected at Clarksville, July 14, 25, and August 31; also at Knoxville, September 15. They were all found in pasture fields on short grasses.

Eutettix johnsoni
(V. D.)

Eutettix johnsoni, V. D., Can. Ent., XXVI, p. 137, 1894.

Eutettix johnsoni, Osb., 20th Rept. State Ent. N. Y., p. 531, 1905.

Similar in color to *vittelina*, orange fulvous with white spots. Length, 4.8 to 5.2 mm.

Vertex short, one-third longer on middle than against the eye, slightly, acutely angled with the face. Elytra slightly flaring, antiapical cells short, apical cells large.

Color: Orange fulvous, margin of vertex with an interrupted line beneath and six spots above black. Broken line on posterior margin of vertex, three longitudinal stripes on pronotum and scattered oval spots on elytra, milky white. Elytra subhyaline.

Genitalia: Female, last ventral segment narrowed and rounded to posterior margin, which is slightly excavated and distinctly notched at the middle. Male valve large, triangular, plates suddenly narrowed beyond the middle and produced in rather long, acute points.

Taken at Covington, June 18, and Clarksville, July 22 and August 22.

Eutettix nigradorsum
(Ball.)

Eutettix nigradorsum, Ball, Proc. Dav. Acad. Sci., XII, p. 60, 1907.

Milky white with a definite black saddle on elytra. Length, 4 to 5 mm.

Vertex one-third longer on middle than next the eye, obtusely rounded, anterior margin elevated and acutely angled with front. Elytra long, flaring, parallel margined.

Color: Vertex, disc brown, anterior margin joined by median spot and one next each eye, posterior margin white. On either side of the median white spot a black spot extends toward the eyes. Face black; pronotum brown, an irregular row of spots back of anterior margin. Scutellum brown, irrorate, a white spot at apex and one on each lateral margin. Elytra milky white, nervures brown, saddle on posterior of claevus black, narrow band on base and apex brown, costal veinlets broadly black.

Genitalia: Last ventral segment of female long, posterior margin angularly excavated, having broad median lobe, lateral lobes angulate; pygofers short and stout. Male valve obtusely angulate, plates concavely narrowed to acute apices, thickly clothed with spines.

Two specimens have been taken in the State; one, female, at Paris, June 16; the other, male, at Tullahoma, August 3.

GENUS

Phlepsius
(Fieb.)

Robust, vertex usually obtusely angled, longer on middle than next the eye, closely allied to *Athysanus* and *Eutettix*, but distinguished easily by the coloration, consisting of brownish irrorations and elytral areoles, more or less densely reticulated with slender ramose, pigment lines. Inner branch of first sector of the elytra forked on the corium.

Key to Species*

A—Head as wide or wider than pronotum.

B—Vertex short, sloping, anterior edge rounded, front broad... *latifrons*

BB—Vertex horizontal or nearly so, usually distinctly longer on the middle than next the eye, definite edge separating vertex and front.

C—Vertex but little longer on the middle than next the eye.

*Adapted from key by Van Duzee, Trans. Amer. Ent. Soc., XIX, p. 65, 1892.

- D—General color white, elytra sparsely inscribed.
 E—Robust, head rounded, whitish cinereous, length 7 mm. *cinereus*
 EE—Smaller, 6 mm., head more angulate, a large black blotch on suture at middle of clavus. *oplatus*
 DD—Color yellowish or brown, elytra closely inscribed.
 E—Color fuscous, one or two distinct spots on costa. *fuscipennis*
 EE—Usually darker, fulvous or testaceous, elytra white inscribed with brown.
 F—Dark brown, rather uniformly irrorate and inscribed.
 G—Broad, robust, elytra not narrowed apically. *incisus*
 GG—Not so broad, tapering behind by apical narrowing of elytra.
 H—Uniformly irrorate, last ventral segment of female excavated, with median tooth. *irroratus*
 HH—Slightly smaller, last ventral segment of female, and male valve, truncated. *truncatus*
 FF—Head pronotum and scutellum yellow, elytra dark brown, closely inscribed.
 G—Elytra almost uniformly inscribed. *fulvidorsum*
 GG—Elytra heavily inscribed, but with two cross bands white. *collitus*
 CC—Vertex, distinctly longer on the middle than next the eye, angulate.
 DD—Small, 6 mm. in length, anterior half of elytra light in color. *tullahomi*
 DD—Larger, 7 mm. or more in length.
 E—Elytra without reticulations but with dots closely arranged in rows. *punctiscriptus*
 EE—Elytra with definite reticulations.
 F—Head broad, elytra with three rather indefinite transverse bands. *humidus*
 FF—Head narrower, elytra without transverse bands.
 G—Uniform brownish, closely and evenly irrorate and inscribed. *brunneus*
 GG—Not uniform in color, vertex and scutellum yellowish, elytra unevenly inscribed, leaving white blotches. *tennessu*
 AA—Head distinctly narrower than the pronotum.
 B—Small, not exceeding 6 mm., broad, ovate.
 C—Elytra rather sparsely inscribed, forming numerous white spots, costal margin and three rather large spots along suture, white. *ovatus*
 CC—A little larger, elytra more densely inscribed, broader and more flaring at the tips. *decorus*
 BB—Large, exceeding 6.5 mm., broad, more elongate.
 C—Very large, 9 to 10 mm., resembling a *Gypona* in shape, color reddish brown. *majestus*
 CC—Smaller, not exceeding 7 mm. in length, yellowish brown or fulvous.
 D—Head, pronotum and scutellum fulvous, scarcely irrorate, elytra with white trilobate commissural line. *excultus*
 DD—Rather uniformly irrorate, lobate commissural line on elytra wanting. *superbus*

Phlepsius latifrons

(V. D.)

Phlepsius latifrons, V. D., Trans. Amer. Ent. Soc., XIX, p. 66, 1892.

Resembling *incisus* in size and form, with short, rounded vertex, and a paler color. Length, 7 mm.

Head as wide as pronotum, very slightly longer on middle than next the eye, anterior edge obtuse. Front broad, convex, cheeks broad. Pronotum almost four times as long as vertex, elytra rather broad, narrowed at tips.

Color: Light, vertex and pronotum irregularly irrorate, face brown, rather finely irrorate with pale, faint median line and seven arcs on front. Elytra light, rather sparsely inscribed with fine lines, apex darker.

Genitalia: Last ventral segment of female with lateral angles produced in a blunt black tooth, apex of included notch acute. Male valve short and broad, apex obtuse; plates broad and short, sutural margins distinctly excavated, spines on middle of submargin.

One specimen taken at Clarksville, June 29, and specimens taken by Mr. Crumb at Clarksville, are quite certain to belong to this species.

Phlepsius cinereus

(V. D.)

Phlepsius cinereus, V. D., Trans. Amer. Ent. Soc., XIX, p. 68, 1892.

Whitish cinereous, with short, feebly angled vertex. Length, 7 mm.

Head as wide as pronotum, vertex a little longer at middle than next the eye, apex almost rounded, face longer than broad, pronotum more than twice as long as vertex, emarginate posteriorly. Elytra broad with narrow appendix.

Color: Light cinereous, head with fulvous tint, irrorations pale, but well distributed over vertex, pronotum and base of front. Apex of front almost unmarked, base irrorate so as to form rather definite large, white spots. Scutellum with two spots on disc and marginal spots dark. Elytra white with few and pale reticulations.

Genitalia: Last ventral segment of female long, bisinuate, with two short triangular teeth, between which is a shallow median notch. Male valve as long as last ventral segment; broad, triangular, apex truncated, plates broad, truncated.

Three specimens were taken at Bells, June 16, and Lexington, June 25. The genital characters vary somewhat from the original description, but the structural characters and coloration fit so well that it is thought best to refer them to this species.

Phlepsius optatus

(Crumb.)

Phlepsius optatus, Crumb, Anns. Ent. Soc. Amer., VIII, p. 194, 1915.

Resembling *coillitus* in size and form, but lighter in color. Length, 5 to 6 mm.

Vertex one-fifth longer at apex than next the eye, about three and one-half times as broad as middle length. Pronotum three times as long as vertex, slightly emarginate posteriorly. Elytra rather long, appendix narrow.

Color: Pale yellowish to white, marked with fuscous, median line on vertex, two spots at base, a spot behind either eye on pronotum, two spots at apex and two points on disc of scutellum, black. Elytra white, rather sparsely inscribed, a spot at middle and apex of clavus either side, and

spots on costa, black. A rather faint irregular transverse band across middle of clavus.

Genitalia: Last ventral segment of female twice as long as preceding, lateral lobes rounded, posteriorly emarginate, notched at middle, and a lobe either side with black margins; pygofer long and narrow. Male valve subangulate, plates longer than broad, concavely narrowed, tips broad and somewhat rounded.

Numerous specimens were swept from grass and weeds, and taken at lights, at Bells, June 16; Covington, June 18, and Clarksville, July 6 and 7. The species was described from Tennessee by Mr. Crumb, who also has a large number of specimens from Clarksville.

Phlepsius fuscipennis

(V. D.)

Phlepsius fuscipennis, V. D., Trans. Am. Ent. Soc., XIX, p. 70, 1892.

Closely resembling *incisus* in form and size, fulvous brown, vertex short. Length, 6 to 7 mm.

Head as wide as pronotum, vertex short, length one-third the width, almost parallel margined. Pronotum three times as long as vertex, posterior disc strongly wrinkled. Elytra rather long, slightly narrowed apically.

Color: Head, pronotum and scutellum finely irrorate with yellow; vertex with a pale spot each side of middle before posterior margin, ocelli located on pale spots. Elytra fulvous brown, whitish toward inner margin, two white spots on clavus and four to six on apical and antiapical areoles on corium. Female paler than male, whitish marked with brown.

Genitalia: Last ventral segment of female rather long, posterior margin incised, very shallowly excavated either side and with lateral angles broadly rounded. Male valve triangular, apex obtuse; plates broad, feebly arcuated at sides and clothed with stout spines, apex obtuse.

One specimen taken at Clarksville, August 24, is the only known record for the State.

Phlepsius incisus

(V. D.)

Phlepsius incisus, V. D., Trans. Amer. Ent. Soc., XIX, p. 73, 1892.

Robust, dark brown, about the shape of *humidus*, but smaller, heavily irrorate. Length, 6 to 6.5 mm.

Head slightly wider than pronotum, vertex short, apex obtusely rounded, a little longer on the middle than next the eye. Pronotum almost three times as long as vertex, posterior margin slightly concave. Elytra broad with a broad appendix.

Color: Testaceous brown, irrorate with yellow, vertex with a white spot at tip, a brown spot just above it and two white spots at the base. Pronotum darker on disc, scutellum pale. Elytra white with very coarse reticulations, causing the insect to appear dark in color. Venter fulvous with median line and lateral margins pale. Clypeus and a spot above white, face light irrorate with brown.

Genitalia: Last ventral segment of female twice the length of preceding, posterior margin obtusely produced, broadly deeply notched at apex. Male valve long, black, triangular and obtuse; plates broad, feebly concave in middle, separated at base, apices broad and rounded.

Two specimens collected at Clarksville, June 29 and August 22, are the only known records for the State.

Phlepsius irroratus

(Say.)

Jassus irroratus, Say, Jour. Acad. Nat. Sci., Phila., IV, p. 308, 1831.*Phlepsius irroratus*, V. D., Trans. Amer. Ent. Soc., XIX, p. 71, 1892.

Brown, slender species, narrowed posteriorly, closely and evenly inscribed. Length, 6 to 7 mm.

Head about the same width as pronotum, one-fifth longer on the middle than next the eye, apex obtuse, anterior edge well rounded. Pronotum two and one-half times as long as vertex, anterior margin strongly rounded. Elytra rather long, narrowed apically.

Color: Pale fulvous, vertex brown, irrorate, a median line and spots on posterior margin white, disc of pronotum whitish closely irrorate with brown. Face dark brown, irrorate with white. Elytra white, nervures fuscous, closely and regularly inscribed with brown.

Genitalia: Last ventral segment of female twice as long as preceding, excavated each side of a broad triangular median tooth, a longer, almost square lobe either side. Male valve large, apex rounded, plates narrow, tips obtusely pointed.

This is a very common species in the State, and is found on many food plants. Very abundant in pastures and grasses, and is no doubt one of the most injurious insects in the group. Records show it to occur in abundance throughout the State at every locality where collecting was done during June, July, August and September.

Phlepsius truncatus

(V. D.)

Phlepsius truncatus, V. D., Trans. Amer. Ent. Soc., XIX, p. 73, 1892.

Very similar to *irroratus*, distinguished by wider elytra, darker color, and distinct genitalia. Length, 6 mm.

Head slightly wider than pronotum, vertex obtuse, one-fifth longer on middle than next the eye. Pronotum more than twice the length of vertex, posteriorly emarginate. Elytra broad, narrowed toward apex.

Color: Very close to *irroratus*, pale fulvous irrorate with brown. Vertex with spots on posterior margin white. Pronotum with disc darker; elytra white, very closely and finely reticulated, causing it to appear as a dark brown color. Venter brown, last ventral segment paler.

Genitalia: Last ventral segment of female twice as long as preceding, truncated posteriorly, apical angles rounded. Male valve short, truncated, plates narrow, tips more obtuse than in *irroratus*.

Specimens were taken at Paris, June 16, and Clarksville, July, August and September. They occur in grasses with *irroratus*, and seem to be closely allied in habit as well as resembling each other structurally.

Phlepsius fulvidorsum

(Fitch.)

Jassus fulvidorsum, Fitch, Homop. N. Y. State Cab., p. 62, 1852.*Phlepsius fulvidorsum*, V. D., Trans. Am. Ent. Soc., XIX, p. 75, 1892.

Larger and differing in color from *collitus*, which it most closely resembles, head, pronotum and scutellum yellow, elytra rather uniformly darker. Length, 6 to 7 mm.

Vertex nearly flat, almost twice as long on middle as next the eye. Pronotum about twice as long as vertex, emarginate on posterior margin, front a little longer than broad. Elytra rather long and narrow.

Color: Head, pronotum, scutellum and beneath yellowish; vertex and pronotum with fulvous brown irrorations; face light brown irrorate with pale yellow. Elytra ivory white to fulvous brown, reticulations brown and coarse. Last ventral segment of female pale, lateral sinuses black margined.

Genitalia: Last ventral segment of female long, lateral angles produced, posterior margin with a median tooth, and excavated at either side. Male valve short and broad, triangular, apex rounded; plates rather long, tips obtuse, margins concave, with eight stout spines.

Specimens were swept from grasses in pasture land at Clarksville, August, 1915, by Mr. Crumb. These are the only known records for the State.

Phlepsius collitus

(Ball.)

Phlepsius collitus, Ball, Can. Ent., XXXV, p. 227, 1903.

Phlepsius collitus, Osb., Maine Agr. Exper. Sta., Bull. 238, p. 142, 1915.

Similar in appearance to *fulvidorsum*, but smaller and with light bands on the elytra. Length, 6 to 7 mm.

Vertex short, obtusely rounded, very slightly longer on the middle than next the eye, three times wider than long. Pronotum twice as long as vertex, anterior margin produced and strongly rounded, distinctly emarginate posteriorly. Elytra rather long and narrow.

Color: Vertex and pronotum fulvous, mottled with brown, face dull brown with lighter irrorations. Scutellum fulvous, two points and spots on lateral margins, black. Elytra pale, very heavily marked with dark brown, and with two rather irregular oblique bands and three spots on sutural margin, milky white.

Genitalia: Last ventral segment of female twice as long as preceding. posterior margin with the median third roundly produced and notched at middle, roundly excavated and black margined either side. Male valve broad, triangular, plates short and broad, convex, tips bluntly angulate.

Swept from grasses and weeds throughout the summer, and abundant in all parts of the State. Taken at Lexington, June 25; Paris, June 26; Clarksville, during July and August, and at Tullahoma, August 10.

Phlepsius tullahomi

(n. sp.)

Small, anterior half of elytra light, posterior half darker brown. Length, 6 mm.

Head slightly wider than pronotum, vertex distinctly angulate, a little longer at middle than next the eye. Front gradually narrowed to clypeus, which is parallel margined and almost twice as long as broad; lorae broadly rounded, extending almost to apex of clypeus. Pronotum about two and one-half times as long as vertex, broadly, shallowly emarginate posteriorly. Elytra rather short and broad.

Color: Vertex and pronotum white, irrorate with brown, margin of vertex irregularly white, darker behind, eyes white, front and clypeus dirty white irrorate with brown. Scutellum brownish irrorate, a dark spot just before apex. Elytra white, nervures and irrorations brown; the latter scattered sparsely on the anterior portion, but very densely on the posterior half, giving the appearance of the posterior half much darker, and separated from the other by a rather definite line across the middle of clavus. Beneath brownish, legs pale.

Genitalia: Male valve triangular, short, narrower than the last ventral segment; plates about two and one-half times as long, and broader than

valve, triangular, and constricted at base. Outer margins white clothed with hairs; pygofer exceeding plates.

Described from a single specimen, male, taken at Tullahoma, August 3, 1915.

Phlepsius punctiscriptus

(V. D.)

Phlepsius punctiscriptus, V. D., Trans. Amer. Ent. Soc., XIX, p. 75, 1892.

Resembling *humidus*, with a more pointed vertex, soiled white marked with fuscous. Length, 7 mm.

Vertex twice as long on middle as next the eye, apex obtusely pointed, disc depressed; front longer than broad. Pronotum twice as long as vertex. Elytra rather long and broad.

Color: Soiled white almost uniformly inscribed with fulvous brown. Vertex with tip white, an angular brown area behind, front darker with faint median line and traces of arcs pale. Scutellum tinged with fulvous. Elytra with nervures slender, brown, middle and apex clouded with fuscous.

Genitalia: Last ventral segment of female almost twice as long as preceding, posterior margin medially produced beyond lateral angles, acutely notched at apex; pygofer long and stout.

I have records for two specimens, both females, which have been collected in the State. One from Mr. Geo. Ainslie, taken at Hurricane Mills, June 22, 1914, and one from Mr. S. E. Crumb, collected at Clarksville, October 30, 1912.

Phlepsius humidus

(V. D.)

Phlepsius humidus, V. D., Trans. Amer. Ent. Soc., XIX, p. 76, 1892.

Large, broad and stout, vertex produced, anterior edge thin. Length, 7 to 7.5 mm.

Vertex one-half longer at middle than next the eye, apex obtusely angled, anterior edge thin. Front longer than broad, clypeus widened toward apex. Pronotum almost twice as long as vertex. Elytra broad.

Color: Fulvous brown, vertex and anterior portion of both pronotum and scutellum paler, closely irrorate with pale yellow, dots often coalescing. Front marked with four pale arcs and a spot above on each side. Elytra brown, with whitish areas forming three rather indistinct transverse bands, nervures brown, a spot at apex of clavus and three on costa fuscous. Reticulations close, fine, often broken into dots.

Genitalia: Last ventral segment of female biarcuate, apex produced beyond lateral angles, blunt, deeply notched. Male valve broad, triangular, apex obtuse, margins armed with stout spines.

Three specimens taken at Paris, June 26, were swept from low pasture land. These are the only specimens that I have been able to find from Tennessee.

Phlepsius brunneus

(n. sp.)

Short and broad, almost uniform brown in color. Length, 7 to 7.5 mm.

Vertex one-half longer on middle than next the eye, distinctly angulate. Pronotum one-half longer than vertex, more than twice as wide as long. Elytra moderately long, broad. Front broad, rather short, lorae well rounded, extending to apex of clypeus.

Color: Almost uniform brown; vertex with rings around ocelli, spot at apex, and a dash extending from base along either eye, white, eyes red. Face brownish irrorate, irrorations coalescing to form blotches; black

point on lorae surrounded by white, brown band at base, apex and spot on middle of clypeus. Scutellum dirty yellow, finely irrorate, spot at apex pale. Elytra white, but appearing brown due to even, dense, rather fine ramose pigment lines.

Genitalia: Last ventral segment of female twice as long as preceding, median half black margined, produced, incised at middle, emarginate either side, lateral angles roundly produced. Male valve broad, slightly longer than last ventral segment, obtusely angled; plates broad, rather short, separated along median line, tips blunt, each with a dark line parallel to outer margin.

Described from eight females and four males taken at Clarksville, June 29, July 5, 6, 23 and 28, and at Knoxville, September 15.

Phlepsius tennesa

(n. sp.)

Resembling *punctiscriptus*, but with distinct genital characters. Length, 7 to 7.5 mm.

Rather robust, vertex short, obtusely angled, one-third longer at middle than next the eye, face broad, clypeus widest at apex. Pronotum twice as long as vertex, two and one-half times as broad as long. Elytra rather long and broad.

Color: Vertex and pronotum dirty white, irregularly marked with brown, posterior portion of pronotum darker. Front irrorate with brown, a median line and traces of five arcs, pale. Scutellum dirty yellow, impressed line, a spot before apex, and one on each lateral margin, black. Elytra white, irregularly, somewhat sparsely marked with ramose lines; three black spots on apical costal margin where nervures connect with margin. Legs white, marked with brown.

Genitalia: Last ventral segment of female one-half longer than preceding, slight projection on middle incised almost to base, either side shallowly excavated to form prominent lateral angles; posterior margin black. Tips of pygofers thickly clothed with hairs. Male valve broad, triangular, as long as last ventral segment; plates short, separated at base, tips bluntly rounded, outer margins clothed with stiff bristles.

Described from five females and three males taken at Bells, June 16; Colliersville, June 22; Lexington, June 25; Tullahoma, August 10; Clarksville, July 14 and August 3, and Knoxville, September 15.

Phlepsius ovatus

(V. D.)

Phlepsius ovatus, V. D., Trans. Amer. Ent. Soc., XIX, p. 79, 1892.

Small, oval, very close to *decorus*, short and broad, white, with definite markings. Length, 5 to 6 mm.

Head a little narrower than pronotum, vertex twice as broad as long, one-half longer on the middle than next the eye, apex obtuse. Front one-third longer than broad. Pronotum short, one-half longer than vertex, posterior margin almost straight. Elytra short and broad, appendix broad.

Color: Yellowish white, vertex with two spots at apex, a transverse band on disc, a curved line either side connecting band with posterior margin and a median impressed line on posterior half, brown. Front fulvous brown, median band and six arcs white. Pronotum with vermiculae brown marks; marks in basal angles of scutellum, brown. Elytra white, veins and ramose lines fuscous, costa mostly white with fuscous alternations, claval suture with three distinct white spots forming an irregular line. Legs with fuscous bands.

Genitalia: Last ventral segment of female short, posterior margin broadly excavated with median notch extending almost to base, lateral angles white; pygofer broad and short.

One specimen, female, swept from grasses in pasture at Lexington, July 25, is the only known record for the State.

Phlepsius decorus
(O. & B.)

Phlepsius decorus, O. & B., Proc. Iowa Acad. Sci., IV, p. 230, 1897.

Phlepsius decorus, Osb., Maine Agr. Exper. Sta. Bull. 238, p. 141, 1915.

Short, broad species, white, rather sparsely irrorate, with black and dark brown, narrow white margin along the suture. Length, 6 mm.

Head narrower than pronotum, vertex twice as wide as long, slightly longer on middle than next the eye, flat, margin roundly angulate. Front broad and flat. Pronotum short, a half longer than vertex, elytra short and broad, about twice as long as wide.

Color: Vertex milky white, with a transverse fuscous band between the eyes. Face creamy white irrorate with fuscous. Pronotum with two crescentiform dashes, two spots near middle and one behind either eye on anterior margin, black. Scutellum yellowish, two spots on disc, fuscous; elytra white, irrorate with dark brown to black, nervures black, scutellar and sutural margins broadly white, forming three rather definite lobes on clavus.

Genitalia: Last ventral segment of female short and broad, posterior margin with a broad deep notch half way to base. Male valve small, triangular, plates broad, short and convex, tips bluntly angulate.

Swept from weeds and grasses in pastures and in undergrowth at the edge of woodland at Paris, June 25; Clarksville, July 3, 10, 14 and 25, and at Knoxville, September 14 and 15. The species is quite abundant and is apparently well distributed throughout the State of Tennessee.

Phlepsius majestus
(O. & B.)

Phlepsius majestus, O. & B., Proc. Ia. Acad. Sci., IV, p. 229, 1897.

Broad and long, with head narrow, resembling a *Gypona* in form and size, reddish brown in color. Length, 9 to 10 mm.

Head distinctly narrower than pronotum, vertex twice wider than long, one-fourth longer on middle than next the eye. Front almost twice as long as wide. Pronotum twice as long as vertex, strongly produced anteriorly, truncated posteriorly. Elytra long and narrow, greatly exceeding abdomen in length.

Color: Reddish brown, vertex yellowish, two spots at apex and a broad band between eyes, interrupted at middle, black, two basal spots and median line reddish brown. Face light with suture and nine interrupted arcs brown. Pronotum fulvous, marked with yellow. Scutellum fulvous yellow, disc with two brown spots, white spots on margin. Elytra yellowish, nervures and irrorations fulvous brown.

Genitalia: Last ventral segment of female longer than preceding, posterior margin roundly emarginate, incised at middle half way to base, and forming two rather divergent points. Male valve roundly produced, apex broad, plates rather narrow, elongate, tips bluntly pointed.

Seven specimens were swept from weeds in an open woods at Clarksville, July 23 and 28 and August 21. Several specimens were taken at the same place by Mr. Crumb.

Phlepsius excultus
(Uhl.)

Jassus excultus, Uhler, Bull. U. S. Geol. and Geog. Surv., III, p. 467, 1877.
Phlepsius excultus, V. D., Trans. Amer. Ent. Soc., XIX, p. 80, 1892.

Oblong ovate, elytra slightly widened and recurved at tips, a trilobate mark along commissural line. Length, 7 mm.

Head narrower than pronotum, very obtuse, one-third longer on middle than next the eye. Pronotum with disc distinctly wrinkled on posterior half. Elytra widened apically, appendix rather wide.

Color: Vertex, pronotum and scutellum ferruginous yellow, irrorate with pale brown; vertex with irrorations either side of apex, and a brown point on hind edge near each eye, face brown irrorate with pale, front of pronotum with four brown points. Elytra yellowish white to fulvous, inscribed with brown; commissural margin broadly ivory white, black following claval veins and forming three white lobes.

Genitalia: Last ventral segment of female short, broadly excavated on posterior margin almost to base, exposing base of ovipositor and plates, lateral margins truncated. Male valve small and rounded, plates large, regularly triangular.

A pair was collected by Mr. Crumb at Hixon, July 3 and 6. These two specimens are the only known records for the State.

Phlepsius superbus
(Uhler.)

Phlepsius superbus, Uhler.
Phlepsius superbus, V. D., Trans. Amer. Ent. Soc., XIX, p. 81, 1892.

Resembles *excultus* in size and form, but distinguished from it by the absence of the white lobate commissural line. Length, 6.5 to 7 mm.

Head narrower than pronotum, vertex one-third longer on middle than next the eye, twice as broad as long. Pronotum twice as long as vertex, posterior margin feebly arcuated, disc strongly wrinkled. Elytra moderately long, narrowed apically, and with definite appendix.

Color: Vertex pronotum and scutellum yellow fulvous, finely irrorate with brown, two lighter lines on scutellum, front dull yellow, irrorate with brown and with eight dark brown frontal arcs. Elytra yellowish, rather evenly inscribed with fuscous, nervures brown, margins of claval suture light. Venter brown irrorate with pale.

Genitalia: Last ventral segment of female almost twice as long as preceding, broadly excavated half way to base, lateral angles produced, subacute; pygofers short, very broad. Male valve small and rounded, plates short and broad, subquadrangular, reaching about to middle of pygofers.

Numerous specimens were swept from pasture and grass land at Colliersville, June 22; Lexington, June 25; Paris, June 26; Clarksville, June 29 and 30, July 14 to 27, and at Knoxville, September 15.

GENUS

Thamnotettix

Body elongate, widest at middle, vertex somewhat convex, eyes about as wide as pronotum, distinctly produced in front; front longer than wide, pronotum obtusely rounded in front, side margins sharp, of moderate length, hind angles obliquely truncate. Elytra much longer than abdomen, widened in the middle, overlapping or even convolute at the apex; appendix simple.

Key to Species

- A—Vertex short, well rounded, almost parallel margined, apex with two large black spots.
 - B—A large yellow spot on elytra almost covering clavus.....*clitellarius*
 - BB—Elytra without spot, claval suture light.
 - C—Reddish brown, a broad light stripe on outer claval vein of elytra*kennicotti*
 - CC—Smaller, lighter in color, with outer claval vein faintly lighter than elytra*brittoni*
- AA—Vertex often long, distinctly angled, plain or variously marked.
 - B—Margin of vertex marked with definite lines or spots.
 - C—Margin marked with four black spots, elytra with one cross nervure between the sectors.
 - D—Size small, 3 to 4 mm., four black spots just above the margin, elytral nervures pale, distinct.....*fitchii*
 - DD—Larger, 5 mm., spots larger and definitely on the margin, elytral nervures indistinct.....*melanogaster*
 - CC—Margin of vertex marked with one or more black lines, elytra with two cross nervures between the sectors.
 - D—A line just above and below the margin, the one above often broken into six spots.....*shermani*
 - DD—A black waved line on margin, four quadrate spots just above*crumbi*
 - BB—Margin of vertex without definite dark markings.
 - C—Small, not exceeding 4 mm. in length, elytra milky white marked with nine black spots.....*perspicillata*
 - CC—Larger, 5 mm. or more in length.
 - D—Pale yellowish or greenish, vertex without definite markings..*inornata*
 - DD—Darker in color, orange to fulvous.
 - E—Two cross nervures between the sectors, vertex sharply angled, dull yellow washed with orange.....*flavotinctus*
 - EE—One cross nervure between the sectors, vertex more bluntly angulate, fulvous, maculate with brown, elytral nervures light*longula*

Thamnotettix clitellarius

(Say.)

Jassus clitellarius, Say, Jour. Acad. Nat. Sci., Phila., VI, 309, 1831.*Thamnotettix clitellarius*, Osb., Maine Agr. Exper. Sta. Bull. 238, p. 134, 1915.

Head broad and blunt, a yellow saddle shaped spot on the brown elytra. Length, 5 to 5.5 mm.

Vertex rather short and broad, one-fourth longer on middle than next the eye, rounding to front without a definite margin. Pronotum distinctly longer than vertex, front broad.

Color: Vertex bright yellow, with two large round black spots on apex between ocelli. Face yellow; pronotum with a broad brown band on anterior third. Scutellum and elytra dark brown, the latter with a large yellow oval spot covering the greater part of clavus, costa area yellowish hyaline. Ventral surface and legs yellow.

Genitalia: Last ventral segment of female long, posterior margin broadly excavated half way to base, with a median tooth produced beyond the lateral lobes; pygofer long and broad. Male valve broad, posterior margin rounded, plates rather short, apex bluntly rounded.

This species is abundant throughout the State, and occurs on numerous weeds and grasses; also swept from various shrubs along the edge of wood-

land or thickets. It seems to occur on a great number of different plants. Taken at Paris, June 16; Covington, June 18; Colliersville, June 22; Clarksville, during August and July, and Tullahoma, August 10.

Thamnotettix kennicotti
(Uhler.)

Thamnotettix kennicotti, Uhl., Proc. Amer. Ent. Soc., II, p. 161, 1863.

Thamnotettix kennicotti, Osb., Maine Agr. Exper. Sta. Bull. 238, p. 134, 1915.

Rather long, robust, brown, with two large black spots on margin of vertex. Length, 6 to 6.5 mm.

Vertex more angulate than in *brittoni*, at least one-half longer at apex than next the eye, twice as broad as long, rounding to front. Pronotum a little longer than vertex, posterior margin truncated. Scutellum rather large, elytra moderately long.

Color: Fulvous, vertex dirty yellow, ocelli red, two large black spots between them, pale transverse band before base, fulvous; eyes black, a yellow line across middle, face dirty yellow. Pronotum fulvous, posterior margin and a median transverse band, yellow. Scutellum with lateral margins at apex yellow. Elytra fulvous, nervures lighter, costal and apical areas yellowish hyaline, broad distinct stripe on outer claval vein yellowish. Beneath pale yellow.

Genitalia: Last ventral segment of female twice as long as preceding, truncate, slightly keeled and with a brown spot at center, lateral margins rounded. Male valve very short and broad, angled, plates long, broad at base, lateral margins slightly concave, tips produced and pointed.

Specimens were swept from shrubs at Clarksville, July 25 and 28, and two specimens were swept from oak shrubs at Tullahoma, August 3.

Thamnotettix brittoni
(Osb.)

Thamnotettix brittoni, Osb., Proc. Dav. Acad. Sci., X, p. 166, 1907.

Very closely resembling *kennicotti*, but differs in being lighter in color and having the marking less distinct. Length, 5 to 5.75 mm.

Vertex one-third longer on middle than next the eye, subangulate, rounded to front without definite margin; front twice as long as broad, narrowed to clypeus. Pronotum with posterior border almost truncated.

Color: Reddish brown, often with more of golden tint in males and yellow markings absent. Females darker; vertex and face yellowish, on the border between which are two black spots between the red ocelli, a red stripe on the margin. Pronotum with a transverse band interrupted at middle, light. Elytra fulvous brown, stripe on clavus light, veins pale, sutural line reddish. Beneath yellow.

Genitalia: Last ventral segment of female twice as long as preceding, posterior margin rounded, slightly keeled at center. Male valve short, plates with outer margins curved and tips narrowed.

Four specimens were taken by the author during the summer. Three specimens were taken from oak shrubs, one at Clarksville, July 17, and two at Tullahoma, August 3; the other specimen was taken at Paris, June 26, while sweeping miscellaneous shrubs.

Thamnotettix fitchii
(V. D.)

Thamnotettix fitchii, V. D., Ent. Am., VI, p. 133, 1890.

Thamnotettix fitchii, Osb., 20th Rept. State Ent., p. 535, 1905.

Thamnotettix fitchii, Osb. Maine Agr. Exper. Sta. Bull. 238, p. 137, 1915.

Small, light yellow species, vertex with four black spots on anterior margin. Length, 3 to 4 mm.

Head including eyes slightly wider than pronotum. Vertex triangular, obtusely angled, wider at base than long. Front rather broad, lorae and cheeks broad; pronotum one-fourth longer than vertex, anterior margin strongly curved, posterior margin slightly concave.

Color: Pale yellow, vertex with four spots on anterior margin, black, median longitudinal line and small dot on disc either side, brown. Antennal cavity and a small spot below each, black. Pronotum crossed by five pale longitudinal lines, posterior half usually darker. Scutellum pale; elytra dusky hyaline, nervures pale. Abdomen and ovipositor black.

Genitalia. Last ventral segment of female broad, posterior margin broadly, deeply excavated with a rather long, median tooth, lateral angles obtuse. Male valve rather semicircular, lying in the concavity of last ventral segment; posterior margin slightly curved, plates rather long, triangular.

Specimens were taken at Paris, June 16 and 26; Memphis, June 21; Lexington, June 25; Clarksville, during July, and Tullahoma, August 10 and 11. Swept from grasses and shrubs in swampy ground, and large numbers were swept from swamp grass at Tullahoma. The species is one which evidently is abundant and lives in moist places.

Thamnotettix melanogaster

(Prov.)

Jassus melanogaster, Prov. Nat. Can., IV, p. 378.

Thamnotettix melanogaster, Prov. Pet. Faune Can., III, p. 284, 1890.

Thamnotettix melanogaster, Osb., Maine Agr. Exper. Sta. Bull. 238, p. 136, 1915.

Yellow to orange, four large black spots on margin of vertex. Length, 5 mm.

Vertex one-third longer on middle than next the eye, a little broader at base than long, as long as pronotum. Elytra moderately long.

Color: Bright yellow, often tinged with orange, especially head and pronotum, four distinct spots on anterior margin of vertex, the two at the middle larger. Scutellum with a transverse black line at base. Elytra subhyaline at apex, last ventral segment bordered with black posteriorly.

Genitalia: Last ventral segment of female as long as preceding, shallowly emarginate posteriorly. Male valve long, roundly angulate, plates rather short and broad, tips black, acute, widely divergent.

Several specimens were taken at Clarksville during the summer by Mr. Crumb.

Thamnotettix shermani

(Ball.)

Thamnotettix shermani, Ball, Can. Ent., XXXV, p. 230, 1903.

Tawny, margin of vertex double lines, elytra with deltocephaloid venation. Length, 5 to 5.25 mm.

Vertex flat, one-third longer on middle than next the eye, half wider than long, margin obtusely angled. Pronotum a little longer than vertex. Elytra moderately long, two cross nervures between sectors, central antipical cell long, separated beyond middle by cross nervure.

Color: Pale, tawny, anterior margin white, a black line above and below, often indistinct, the line above sometimes appearing as six black dots. Vertex and pronotum usually tinged with red, the former with a median spot at base, and the latter with five distinct longitudinal stripes, pale. Face tawny, pale beneath. Elytra subhyaline, tawny, iridescent, nervures pale, distinct. Beneath pale yellow.

Genitalia: Last ventral segment of female rather long, posterior margin truncated, often slightly produced into a median lobe, lateral angles prominent. Male valve slightly longer than last ventral segment, not as broad, apex slightly obtusely angled, almost truncate; plates long, triangular, tips acute, a spot on either side at apex of valve and an impressed line on basal half, parallel to outer margins.

This species was described by Ball from a single specimen. From a complete series, which was taken during the summer, it seems advisable to add a few additional characters which are included above, but were not given in the original description; also to describe the male genitalia. The species is abundant on canebrake, and was taken at Bells, June 16; Covington, June 18; Clarksville, July and August, and Nashville, September 11.

Thamnotettix crumbi
(n. sp.)

Very closely resembling *flavotinctus* in size and shape, with a waved line on margin of vertex and four quadrate spots just above the margin. Length, 5.5 mm.

Structural characters are just about the same as in *flavotinctus*. Vertex angulate, one-fourth longer on the middle than next the eye.

Color: Orange yellow, a rather broad, waved line on anterior margin and four quadrate spots just above black, the middle two larger. Elytra yellowish, iridescent, nervures orange yellow, wings smoky. Beneath yellowish, legs pale, dark spots at base of spines.

Genitalia: Last ventral segment of female broadly, angularly excavated, lateral angles prominent, more or less angled.

Described from twelve female specimens swept from canebrake at Clarksville, July 5 and 19, 1915.

Thamnotettix perspicillata
(O. & B.)

Thamnotettix perspicillata, O. & B., Proc. Ia. Acad. Sci., IV, p. 227, 1897.

Small species, gray, with black spots on elytra. Length, 3.5 to 4 mm.

Vertex with anterior margin rounded, slightly longer on middle than next the eye and scarcely wider at base than middle length. Pronotum rather strongly curved anteriorly, slightly longer than vertex, lateral margins obsolete, posterior margin slightly emarginate.

Color: Gray, vertex creamy white tinged with orange, two faint black lines running from tip to ocelli, basal half with a large fulvous crescent either side, enclosing a white area. Pronotum gray, with broad faint longitudinal bands, and a pair of spots behind each eye, black; scutellum pale, basal angles orange. Elytra milky, subhyaline, with an iridescent tint and nine black spots. Front pale.

Genitalia: Male valve short and broad, plates long, apices produced into fine points, median black spot on each plate at base.

One specimen was taken while sweeping weeds and grasses at Clarksville, July 2. This is the only known record for the State.

Thamnotettix inornata
(V. D.)

Thamnotettix inornata, V. D., Am. Ent. Soc. Trans., XIX, p. 303, 1892.

Thamnotettix inornata, Osb., Maine Agr. Exper. Sta. Bull. 238, 1915.

Pale yellowish or greenish, close to *melanogaster*, but lacking the four spots found on the anterior margin of the vertex. Length, 5 to 5.5 mm.

Vertex flattened, anterior edge somewhat sharp, angulate, subacute, one-half longer on middle than next the eye. Front rather long, gradually narrowed to clypeus. Pronotum with posterior margin almost straight. Elytra long, greatly exceeding abdomen.

Color: Pale yellowish or greenish, vertex with ocelli and a line from each to apex along anterior margin brown, often faint or obsolete. Sutures of front black. Elytra subhyaline, tips slightly smoky, nervures pale. Beneath yellowish.

Genitalia. Last ventral segment of female slightly produced at middle of posterior margin, and brown in color; pygofers large exceeded by ovipositor. Male valve broad at base, triangular; pygofers long, triangular, outer margins armed with stout spines.

Specimens were taken in great numbers from wild rye (*Elymus virginicus*), along Cumberland River at Clarksville; also taken at Memphis, June 21, and in great numbers at Knoxville, September 14 and 15, from tall grasses along the Tennessee River.

Thamnotettix flavotinctus

(n. sp.)

Size and shape of *shermani*, almost, vertex slightly more angulate, and orange yellow, unmarked. Length, 5.5 mm.

Vertex one-third longer at the middle than next the eye, a little wider at the base than long, flat, sharply angulate, acutely angled with face. Pronotum as long as vertex. Elytra rather short and broad, one cross nervure between the sectors.

Color: Dirty yellow, tinged with orange, vertex orange yellow, margin paler, eyes dark green; face above orange, below pale. Pronotum with two dark oblique dashes on posterior half. Elytra smoky yellow, nervures pale, distinctly iridescent. Beneath pale yellow, legs pale with brown points at the base of the spines, ovipositor black.

Genitalia: Last ventral segment of female long, posterior margin broadly, angularly excavated, half way to the base, the apex of which is black; lateral angles prominent, angularly rounded. Male valve almost truncated, fitting in the concavity of the last ventral segment; plates rather short and broad, a spot near outer margin at base of each; margin densely clothed with long white hairs.

Described from four males and four females, one of which was taken at a light at Bells, June 16, and the others swept from canebrake at Clarksville, July 5, 19 and 20, 1915.

Thamnotettix longula

(G. & B.)

Thamnotettix longula, G. & B., Colo. Agr. Exper. Sta. Bull. 31, p. 97, 1895.

Rather elongate, fulvous maculate with dark brown. Length, 5 to 6 mm.

Vertex twice wider than long, distinctly longer on middle than next the eye, obtusely angled, margin rounding. Pronotum one-half longer than vertex, anterior margin concave. Elytra distinctly longer than abdomen, without appendix.

Color: Brownish yellow marked with reddish brown. Vertex light fulvous, ocelli white, close to eyes, connected by a white transverse line, median longitudinal line and spot either side at base brown; front fulvous with brown arcs. Pronotum fulvous marked with dark brown on anterior portion, depressed point at either side of disc dark. Scutellum fulvous, disc light. Elytra chestnut, nervures light.

Genitalia: Last ventral segment of female twice the length of preceding, posterior margin depressed, slightly angularly elevated; pygofer long and narrow. Male valve broad, plates concavely rounding to the almost parallel margined tips.

Specimens were taken at Monteagle, August 6; Clarksville, August 25 and 31, and were found in great abundance on small grasses on University campus and on grasses along the Tennessee River at Knoxville.

GENUS

Chlorotettix

Head broad, usually well rounded or obtusely angulate, ocelli visible from above, front wide, sides of pronotum moderately long. Elytra long, thin subhyaline, with distinct appendix, nervures indistinct. Most of the species of the genus have a uniform green color.

Key to Species

- A—Anterior margin of vertex broadly curved, almost parallel margined, or but slightly longer on middle than next the eye.
 - B—Uniform brownish green or marked with black.
 - C—Almost uniform brownish green, length 7 mm. *tergalus*
 - CC—Greenish testaceous, a transverse black band between eyes on vertex *necopina*
 - BB—Color greenish or yellowish green.
 - C—Marked with red or fuscous.
 - D—A rather broad transverse band on margin of vertex, female segment with a spatulate process *rugicollis*
 - DD—Elytral suture margined with a reddish fuscous stripe. *suturalis*
 - CC—Uniform green without distinct markings.
 - D—Yellowish green, female genitalia with a long spatulate process, length 7 mm. *spatulatus*
 - DD—Slightly smaller, apple green, without spatulate process. *viridius*
- AA—Anterior margin of vertex bluntly angled, distinctly longer on middle than next the eye.
 - B—Size large, 7 mm. or more.
 - C—Uniform brownish, iridescent, female segment deeply notched, plates exposed at base. *iridescens*
 - CC—Color greenish.
 - D—Vertex well produced, almost twice as long on middle as next the eye, length 7.5 mm. *nudata*
 - Vertex not over one-half longer on middle than next the eye, smaller, not exceeding 7 mm.
 - E—Female segment with broad spatulate process, male plates strongly narrowed behind middle. *balli*
 - EE—Female segment roundly emarginate, without spatulate process, male plates with very obtuse apex. *tunicata*
 - BB—Size smaller, not exceeding 6.5 mm. in length.
 - C—Greenish in color, unmarked.
 - D—Small, narrow, vertex distinctly angulate, green with a whitish tint *vivida*
 - DD—Larger, broader, vertex more roundly angulate, yellowish or brownish green.
 - E—Elytra brownish subhyaline, male plates long, tips subacute *vacuna*

EE—Elytra greenish hyaline, male plates convex, laterally incised*galbanata*
 CC—Female uniform white in color, male uniform orange...*nacreosa*

Chlorotettix tergatus

(Fitch.)

Bythoscopus tergatus, Fitch, N. Y. Sta. Cab., p. 58, 1851.

Athysanus tergatus, Southwick, Science, XIX, p. 288, 1892.

Chlorotettix tergatus, V. D., Psyche, VI, p. 306, 1896.

May be separated easily from the other species of the group by its dark fulvous green color. Length, 7 mm.

Vertex broadly rounding on the anterior margin, slightly longer on the middle than against the eye.

Color: Sordid green, front, pronotum and scutellum marked with yellowish green. Elytra smoky, abdomen with dorsal surface black, beneath pale yellow.

Genitalia: Last ventral segment of female broad, posterior margin with a broad V-shaped notch extending half way to the base, lateral lobes rounded; pygofer long, equalling the ovipositor. Male valve triangular, apex obtuse; plates large and broad, covering pygofer, tips broad and obtuse, margins clothed with short spines and hairs.

Specimens were swept from weeds and grasses at Paris, June 26, and Moscow, June 23.

Chlorotettix tergatus* var. *melanotus

(n. var.)

Differs from typical *tergatus* in having a slightly more rounded vertex, a distinctly blacker color, and the plates of the male are a little broader at the tip. Length, 7 mm.

The structural characters are very similar to the preceding, except that the vertex in the specimens at hand, is scarcely longer at middle than next the eye.

Color: Black in appearance, but in reality very dark green, eyes black, light margined. Pronotum with a large black spot behind each eye. Elytra with costal margins and apex smoky subhyaline.

Genitalia: Agreeing with *tergatus*, except that the male plates are a little broader and more strongly rounded.

Described from two males and one female collected at Moscow, June 23, and Paris, June 25. When compared with *tergatus* they differ distinctly in the points above noted, and was therefore made a variety of that species.

Chlorotettix necopina

(V. D.)

Chlorotettix necopina, V. D., Can. Ent., XXV, p. 282, 1893.

Chlorotettix necopina, V. D., Bull. Buf. Soc. Nat. Sci., IX, p. 228, 1908.

May be easily separated from all other *Chlorotettix* by the transverse, black band on the vertex, between the eyes. Length, 7 mm.

Vertex curved on anterior margin, slightly longer on middle than next the eye, ocelli on margin touching eyes. Pronotum with anterior margin strongly convex, side margins short, concave posteriorly. Elytra long, considerably exceeding abdomen.

Color: Greenish testaceous, vertex with a broad, transverse, blackish band on disc between the eyes. Front marked with ten faint arcs, and two

spots at base of clypeus, brown. Pronotum testaceous with pale areas. Triangular spots in basal angles of scutellum, and a median line with a spot either side, brown. Elytra fuscous brown, nervures white.

Genitalia: Last ventral segment of female deeply and rather broadly incised nearly to its base, lateral lobes somewhat angled at apex. Male valve rather long, broad and triangular, plates broad at base, suddenly constricted behind middle, then produced, tips divergent. Pygofers large, broadly notched laterally, fitting at apex to form an oval opening.

Quite abundant throughout the State. Taken while sweeping weeds and grasses at Colliersville, June 22; Clarksville, July 14 and August 31; Tullahoma, August 8; Nashville, September 11, and Knoxville, September 13.

Chlorotettix rugicollis

(Ball.)

Chlorotettix rugicollis, Ball, Can. Ent., XXXV, p. 230, 1903.

Chlorotettix rugicollis, V. D., Bull. Buf. Soc. Nat. Sci., IX, p. 228, 1908.

Distinguished from all others of the group by the red band on the margin of the vertex, between the eyes. Length, 7 mm.

Vertex broadly rounded, slightly longer on middle than next the eyes. Pronotum with anterior margin broadly rounding, elytra rather long, veins large and distinct.

Color: Pale green, vertex with a transverse red band on margin, sometimes fading to orange. Male with elytra washed with brownish.

Genitalia: Last ventral segment of female deeply triangularly excavated, with a distinct median tooth. Male valve nearly as wide as last ventral segment, and half as long, plates long, triangular, margins clothed with hairs.

Six specimens, five females and one male, were collected by the author during the summer. These are the only records for the State. Taken while sweeping at Covington, June 18; Moscow, June 23; Lexington, June 25, and one specimen at Knoxville, September 14.

Chlorotettix suturalis

(n. sp.)

Resembling *tergatus* in size and shape, with vertex slightly longer, a fuscous stripe on elytral suture, and genitalia distinct. Length, 7.5 mm.

Vertex a little longer on middle than next the eye, bluntly angulate. Face gradually, somewhat convexly narrowed to clypeus, which is broadest at apex. Pronotum with anterior margin strongly curved to half its length, side margin very short, posterior border distinctly emarginate. Elytra long, exceeding tip of abdomen.

Color: Pale green, vertex with a median brown line on posterior portion, ocelli margined with bright green, and two apparent spots, one either side of apex as seen from above, formed by the darker color of the front extending on to vertex. Pronotum with disc and posterior portion darker, basal angles of scutellum dark brown. Elytra washed with fuscous, a dark fuscous stripe composed of three rather distinct lobes, in well-marked specimens, extending along suture. In fresh specimens the color is bright with a red tint, becoming dull in preserved material. Clypeus and tarsal segments marked with fuscous.

Genitalia: Last ventral segment of female twice as long as preceding, lateral angles rounded, posterior margin broadly, deeply notched, more than half way to the base, the sides of which are dark brown. Male valve broad, almost transverse, and truncated posteriorly, plates broad and long,

convexly narrowed to rounded tips exceeded by pygofer; a groove parallel to outer margin, extending from base two-thirds the length of plate. Outer margins armed with spines.

Described from nine females and eight males, swept from canebrake (*Arundinaria tecta*), at Clarksville, Tenn., July 5, 19 and 28, 1915. The species is very abundant on the above mentioned food plant.

Chlorotettix spatulatus

(Osb. & Ball.)

Chlorotettix spatulatus, O. & B., Proc. Ia. Acad. Sci., IV, p. 225, 1896.

Very close to *rugicollis*, but distinguished from it by the absence of the red band on the margin of vertex. Length, 7 mm.

Vertex broadly rounding, margins almost parallel, slightly longer on middle than next the eye. Pronotum emarginate behind, side margins short. Elytra rather broad, subhyaline.

Color: Uniform green, often with elytra more yellowish.

Genitalia: Last ventral segment long, posterior margin deeply, broadly notched, over half way to base, apex of notch bearing a spatulate process which extends two-thirds the length of the notch; lateral angles acute. Male valve extremely short, broad; plates broad at base, acutely pointed, as long as pygofer.

Two specimens were taken while sweeping, one at Tullahoma, August 3, and one at Knoxville, September 14.

Chlorotettix viridius

(V. D.)

Chlorotettix viridius, V. D., Psyche, VI, p. 309.

Chlorotettix viridius, Osb., Rept. N. Y. Sta. Ent., XX, p. 539.

Apple green in color, and can usually be distinguished from closely allied species, which are practically always a more yellowish color. Length, 6 to 7 mm.

Vertex distinctly rounded on anterior margin, and but slightly longer on the middle than next the eye. Front broad and convex. Pronotum with anterior margin broadly curved, posterior margin slightly sinuate.

Color: Apple green, often with vertex and scutellum lighter. Elytra subhyaline, nervures green, often whitish on costal and apical areas, tips of tarsi fuscous.

Genitalia: Last ventral segment of female broadly excavated on median line almost to anterior margin, the sides of which are interrupted about the middle with a short black tooth. Male valve short and broad, posterior margin slightly arcuate; plates almost rectangular, transverse, margin with a few spines and hairs. Pygofer lingulate, longer than valve, whitish hyaline.

Occurs frequently on grasses throughout the State. Taken at Covington, June 18; Moscow, June 23; Paris, June 26, and Clarksville, July 27 to August 24.

Chlorotettix iridescens

(n. sp.)

Resembling *nudata*, with shorter vertex, greenish brown, iridescent. Length, 7 mm.

Vertex one-third longer on middle than next the eye, more than twice wider than long. Pronotum twice as long as vertex, broadly, shallowly emarginate posteriorly.

Color: Brownish, slightly tinged with green, vertex more yellowish, ocelli green, eyes black; front dirty yellow, shading to brown above. Elytra brownish, subhyaline, nervures pale, very iridescent.

Genitalia: Last ventral segment of female twice as long as preceding, broadly, deeply excavated to base, the sides of which are concave, forming long, rather sharply rounded lateral angles. Base of ovipositor and plates exposed at base of notch. Pygofer almost as long as ovipositor, posterior half clothed with brown hairs, a large tuft at tips either side of ovipositor.

Described from one specimen, female, taken at Knoxville, September 14. The genital characters differ so greatly from other species of the genus that it is apparently a new species.

Chlorotettix nudata
(Ball.)

Chlorotettix nudata, Ball, Can. Ent., XXXII, p. 340, 1900.

One of the members of the genus with a prominently angled vertex, dull green, washed with brownish. Length, 7.5 mm.

Vertex conically pointed, twice as long on middle as against the eye. Elytra long, slightly flaring in the middle.

Color: Dull green, front and vertex washed with yellowish orange, elytra, and often pronotum tinged with fulvous brown, elytra subhyaline with pale nervures.

Genitalia: Last ventral segment of female short, posterior margin with a narrow slit in the middle, and a rather broad, shallow notch about the middle of either side, forming four distinct, rounded lobes. Pygofer long, at the base of which the plates are visible. Male valve narrow, obtusely angled, plates broad at base and gradually narrowed to acutely pointed tips.

Four specimens, one male and three females, all taken at Clarksville, were swept from weeds and grasses by the author July 23 and 28.

Chlorotettix balli
(Osborn.)

Chlorotettix balli, Osb., Ia. Acad. Sci., V, p. 246, 1897.

Chlorotettix balli, Osb., Rept. N. Y. Sta. Ent., XX, p. 539, 1904.

Easily separated from *spatulatus* by the longer vertex. Length, 7 mm.

Vertex subangulate, one-half longer on middle than next the eye. Pronotum distinctly emarginate behind. Elytra hyaline, veins indistinct.

Color: Yellowish green, pronotum darker green, tip of vertex and dorsal segment of abdomen marked with yellow.

Genitalia: Last ventral segment of female long, posterior margin with a deep notch extending almost to base, from which a broad, spatulate process reaches half way to the apex of the lateral margins. Male valve large, long, plates strongly narrowed behind the middle, tips scarcely acute, a row of bristles along outer margins; pygofer long, pointed at margin.

Two specimens were swept from grasses and weeds at Clarksville July 17 and 23.

Chlorotettix tunicata
(Ball.)

Chlorotettix tunicata, Ball, Can. Ent., XXXII, p. 340, 1900.

Chlorotettix tunicata, V. D., Bull. Buf. Soc. Nat. Sci., IX, p. 228, 1908.

Closely resembling *galbanata* in general appearance and shape of head. Length, 7 mm.

Vertex one-half longer at apex than against the eye, twice wider than long, apex obtusely angled, slightly conical, disc convex.

Color: Pale, often yellowish green, elytra subhyaline. In old specimens often with a yellowish tint.

Genitalia: Last ventral segment of female longer than preceding, posterior margin broadly, roundly emarginate, one-third the depth of the segment, at the middle of which there is a brown mark, and often a median notch, lateral angles rounded. Male valve obtusely angled, plates broad at base, rounding to a very obtuse apex, fringed with coarse spines.

Six specimens were taken in the State during the summer, at Memphis, June 19 and 21; Clarksville, June 30 and July 22, and Tullahoma, August 2.

Chlorotettix vivida

(Crumb.)

Chlorotettix vivida, Crumb, Anns. Ent. Soc. Amer., VIII, p. 197, 1915.

Small, brownish green. Length, 5.5 to 6 mm.

Vertex convex, distinctly angled, slightly conical, more than one and one-half times as long on middle as next the eye. Nervures of elytra pale.

Color: Almost uniform brownish green, elytra subhyaline, with more of a green tinge and with apical portions distinctly brown. Eyes black.

Genitalia: Last ventral segment of female twice the length of preceding, posterior margin broadly, triangularly notched half way to base of segment, with an apical notch. Male valve broad, as long as last ventral segment, posteriorly convex; plates almost as broad as long, gradually, convexly narrowed three-fourths their length, then produced to length of pygofers with margins almost parallel.

In describing the species, Mr. Crumb has taken it only at Clarksville. From specimens which I collected this summer, it is found to occur as far southwest as Memphis, collected June 19; also taken at Lexington, June 25, and Tullahoma, August 10.

Chlorotettix vacuna

(Crumb.)

Chlorotettix vacuna, Crumb, Anns. Ent. Soc. Amer., VIII, p. 196, 1915.

Almost the same color as *vivida*, but larger and with vertex shorter. Length, 6 to 6.5 mm.

Vertex bluntly angulate, one-third longer on middle than next the eyes.

Color: Vertex, anterior margin of pronotum, and scutellum yellowish green, pronotum brownish, elytra brownish, subhyaline.

Genitalia: Last ventral segment of female two and one-half times as long as preceding, transversely convex from the lateral margins, membranous, angles prominent, posterior margin broadly, triangularly, excavated almost to base, sinuated, apical half straight margined. Male valve subangulate, plates three times the length of valve, margins convex, narrowing to subapical tips.

Taken while sweeping weeds and grasses at Colliersville, June 22; Moscow, June 23; Lexington, June 25; Tullahoma, August 2 and 3, and Clarksville, August 22.

Chlorotettix galbanata

(V. D.)

Chlorotettix galbanata, V. D., Psyche, VI, p. 310.

Chlorotettix galbanata, Osb., Ohio Acad. Sci., VIII, p. 68, 1900.

Yellowish green in color, size of *viridis*, but with a more angulate vertex. Length, 6 to 6.5 mm.

Vertex slightly wider than pronotum, obtusely angled, one and one-half times as long on middle as next the eye. Front long and rather narrow. Pronotum with anterior margin convex, posterior margin truncate.

Color: Uniform yellowish green, elytra hyaline, slightly iridescent, costa green, eyes and tip of tarsi black.

Genitalia: Last ventral segment of female broadly, concavely incised, reaching nearly to anterior margin, lateral lobes broadly rounding; pygofer long, apex clothed with stout bristles. Male segment short, truncate, plates convex, slightly incised laterally; pygofer as broad as long, broadly, convexly rounding at apex.

Occurs in abundance throughout the State. Taken at Dyersburg, June 17; Memphis, June 19 and 21; Lexington, June 25; Clarksville, during July and August, and at Tullahoma during the first half of August.

Chlorotettix nacreosa
(Crumb.)

Chlorotettix nacreosa, Crumb, Anns. Ent. Soc. Amer., VIII, p. 196, 1915.

Male a deep orange color, female uniform white. Length, 5 to 5.5 mm.

Vertex obtusely angulate, half longer on middle than next the eye. Pronotum with anterior margin slightly curved, posterior margin truncate. Elytra long, greatly exceeding abdomen in length.

Color: Female uniform white with iridescent tint on dorsal and ventral surfaces. Elytra subhyaline, apically marked with brown, nervures pale. Male uniform orange on dorsal and ventral surfaces, eyes green.

Genitalia: Last ventral segment of female twice as broad as long, with posterior margin excavated half way to base by a broad triangular notch, interrupted either side of middle by a pair of rounded lobes which give the appearance of three distinct notches. Male valve convex anteriorly, rounded posteriorly, two and one-half times as broad as long; plates longer than broad, tips rounding.

Occurs abundantly on canebrake (*Arundinaria tecta*), along the Cumberland River. Taken at Clarksville in great numbers during the months of July and August at various dates. It is apparently limited to the one food plant, but has been swept from it in great numbers.

GENUS

Acinopterus
(V. D.)

Head narrower than the pronotum, somewhat produced, with apex sub-acute, hind edges broadly concave. Vertex short, convex. Front rather broad at base, narrowed at tip. Pronotum broad and rather short, anterior edge arcuate, sides long. Elytra narrow, without appendix, lanceolate at apex, tip acute. Nervures strong, costa feebly convex.

One species of the genus occurs in the State.

Acinopterus acuminatus
(V. D.)

Acinopterus acuminatus, V. D., Psyche, VI, p. 308, 1892.

This species can be separated quite readily from all others by the rather sharp apex of the elytra. Length, 5 to 6.5 mm.

Vertex rather short, convex, pronotum short and broad, exceeding head in width, elytra narrow, forming a rather sharp apex, appendix wanting.

Color: Fulvous brown, marked with dull green or yellow. Face with eight arcs brown. Head pale, pronotum darker with dark markings rather variable. Basal angles of scutellum brown, often faint. Elytra fulvous, apex dark, nervures pale, often with disc of costa, and discal areoles of corium whitish hyaline, claval suture brown.

Genitalia: Last ventral segment of female moderately long, posterior margin with a shallow median notch, lateral lobes broadly rounding. Male valve wanting, plates long and narrow; pygofer twice length of plates, apex obtusely pointed and armed with spines.

This is one of the most abundant species occurring on grasses throughout the State. Taken at Paris, June 16 and 26; Lexington, June 25; Memphis, June 21; Clarksville frequently during the summer; Tullahoma, August 4 to 15, and Nashville, September 11.

GENUS

Jassus

(Fabr.)

Head narrower than pronotum, vertex blunt, quadrate, broadly curved in front, not forming a curved border at the sides of the pronotum. Transverse striae on front distinct. Pronotum very short, emarginate posteriorly, scutellum large, triangular, very wide at base. Elytra slightly coriaceous, broad, rather short, apex broadly rounded.

Two species of the genus have been taken in the State.

Key to Species

- A—Elytra dark brown without cross bands.....*melanotus*
AA—Elytra lighter with two distinct, light cross bands.....*olitorius*

Jassus melanotus

(Spang.)

Jassus melanotus, Spang, Hom. nova. vel. minus cognita, p. 19.

Almost uniform dark brown in color, with few markings. Length, female, 7.5; male, 6 mm.

Vertex slightly produced before the anterior margin of the eyes, very obtusely rounded, about as long as basal width, males with vertex slightly longer. Pronotum about as long as vertex, posterior margin truncated. Scutellum large, elytra broad, rounded at apex, exceeding abdomen in length.

Color: Vertex light greenish yellow, median longitudinal line brown, eyes black, margined with green; face greenish, with sides showing faint fuscous arcs. Pronotum, scutellum and elytra dark brown, the latter with nervures black, apex and costal margins pale. Beneath yellowish marked with black.

Genitalia: Last ventral segment of female twice as long as preceding, posterior margin bisinuate, forming three lobes, the central one larger, longer than lateral lobes and keeled at center; pygofer short and broad. Male plates long and narrow, clothed with light spines.

Three specimens were taken in the State. One swept from willow in a swamp at Tullahoma, August 10; two others at Clarksville, July 23 and August 21, swept from weeds among canebrake.

Jassus olitorius

(Say.)

Jassus olitorius, Say, Acad. Nat. Sci., Phila. Jour., VI, 310, 1831.*Jassus subbifasciatus*, Say, Acad. Nat. Sci., Phila. Jour., VI, 310, 1831.*Jassus olitorius*, Osb., Maine Agr. Exper. Sta. Bul., 238, p. 145, 1915.

Differs from *melanotus* by its lighter brown color, and two distinct light bands across elytra of female. Length, female, 7.5; male, 6 mm.

Structural characters about as in *melanotus*, but the vertex is slightly broader.

Color: Female, vertex dull yellow, ocelli, a median longitudinal line, and a spot either side on the disc reddish brown; front the same color with faint traces of the dark arcs, at the middle. Pronotum light brown, a dark stripe on either side of a lighter median stripe. Scutellum with the basal angles and two spots on disc, black. Elytra brown, nervures black, interrupted twice by light bands, one crossing a little before the middle of clavus, the other the apex of the antiapical cells. Beneath brown marked with dark spots. Male with pronotum scutellum, and elytra darker than the female.

Genitalia: Last ventral segment of female twice as long as preceding, strongly produced and keeled at middle, lateral angles slightly produced.

Specimens were taken at Memphis, June 19; Clarksville during July and August. The species is abundant in different parts of the State, and apparently lives on a number of food plants.

GENUS**Neocoelidia**

(Gill. & Baker.)

Body short and robust. Head narrower than pronotum, short, rather obtusely conical; front broad, sides almost parallel, antennae long. Pronotum short and broad, anterior and posterior margins nearly parallel. Scutellum large, elytra short and broad, appendix wanting; first sector branched once on the apical two-thirds, four apical cells.

Neocoelidia tumidifrons

(G. & B.)

Neocoelidia tumidifrons, G. & B., Bul. 31, Colo. Exper. Sta., p. 104, 1895.

Very robust, light green species, without dark markings. Length, 4 to 5 mm.

Vertex one-half longer on the middle than next the eye, tumid. Face about as wide as long; front enlarged, sides almost parallel, slightly longer than broad, obtusely rounded above. Pronotum three times as broad as long, rugose. Elytra broad and rather short, reaching just to tip of abdomen.

Color: Yellowish green, unicolorous, vertex and face washed with orange.

Genitalia: Last ventral segment of female long, posterior margin slightly, broadly excavated, having a short median tooth; lateral angles slightly rounded; pygofers moderately long, clothed with hairs.

Four specimens, all females, were taken at Memphis, June 19 and 21, and at Tullahoma, August 3.

GENUS

Tinobregmus

(V. D.)

Head narrow, short, conical, obtuse. Vertex narrow, widened anteriorly, expanded behind the eyes. Ocelli on vertex near apex. Front elongated, eyes large, cheeks long, expanded below. Pronotum short, but wider than head, scutellum very small. Elytra short, extending to middle of abdomen, with five apical areoles, the outer one much larger. Wings rudimentary. The very small scutellum and elongated face distinguish it from most other genera.

One species of the genus found in the State.

Tinobregmus viridiscens

(n. sp.)

Agreeing in size with *pallidus*, but distinguished from it by the greenish yellow elytra, which are both banded and striped with black. Length, female, 6.7 mm.; male, 4 mm.

Vertex narrow, widening to the bluntly angulate apex, and rounding to front, eyes large, front long and narrow. Cheeks long. Pronotum short but broad, slightly produced on the anterior margin between the eyes, posterior margin sinuate. Elytra short, ovate, extending a little beyond the middle of the abdomen.

Color: Greenish yellow shining, vertex and pronotum without darker markings, ocelli inserted in dark pits. Front with a rather broad, median, light stripe, bordered by a broad dark stripe on either side; cheeks and lorae pale. Clypeus black, beak red with base and tip black. Elytra shining, banded at the apex with a rather broad, distinct band, and irregular longitudinal lines running forward from the apex, black. Abdomen irregularly marked with black dorsally; ventral segments black, posteriorly bordered with white. Sides of pygofer and ovipositor black.

Male vertex black, sutures, and a triangular area between vertex and eye, and a margin of the occiput pale. Front marked as in the female, except the median light line is very narrow. Pronotum greenish yellow, fuscous at sides; elytra with a broad band at the apex, black. Abdomen above black.

Genitalia: Last ventral segment of female moderately long, slightly sinuate. Pygofer long, gradually sloping to ovipositor, which exceeds them in length. Last ventral segment of male deeply, rather narrowly concave. The valve and almost all of plates concealed in the concavity. Pygofer large, curving over the plates, so that only the basal portion is visible.

Described from four females from Clarksville, Tenn., July 17 and 22, and two males from Paris, June 16, collected by the author. As compared with type specimens of "*pallidus*" in Prof. Osborn's collection, it differs markedly in the points mentioned above.

GENUS

Lonotura

(Osborn & Ball.)

Head more than three times wider across the eyes than length on middle of vertex, conically, obtusely angled. Pronotum not quite as long as vertex, posterior margin truncated, humeral margins straight. There are two forms: in the macropteris the elytra are long and narrow, appendix

and scutellum large, venation obscure; in the brachypterus form the elytra are short, covering second abdominal segment, twice as wide as long, wings rudimentary, venation obscure. The pronotum covers base of elytra and most of scutellum in this form.

One species of the genus has been found in the State.

Lonatura catalina

(O. & B.)

Lonatura catalina, O. & B., Proc. Dav. Acad. Sci., VII, p. 83.

Very small, both long and short winged forms. Length, 1.8 to 2.25 mm. Macropterus form, 2.75 mm.

Macropterus form; vertex about as long as basal width, convex, margin rounding to front. Front broad, transversely convex. Pronotum shorter than vertex, anterior margin strongly rounded, posterior margin slightly emarginate. Scutellum large, elytra long and narrow.

Color: The specimens at hand are greenish gray, eyes black, vertex with yellow tint.

Brachypterus Form: Differs from preceding by having short elytra truncate, head more pointed, pronotum longer; abdomen in female long, in male much shorter, last dorsal segment not differing from preceding.

Color: Uniform creamy white or orange yellow, often vertex and face yellow, pronotum and elytra brown, and abdomen almost black.

Genitalia: Last ventral segment of female short and broad, emarginate posteriorly, with a bilobed process; pygofers short and broad. Male valve small, rounded, plates small, triangular, apices produced.

Taken in great numbers from poverty grass (*Aristida gracilis*) at Clarksville frequently throughout July, August and September; also taken at Lexington, June 25.

GENUS

Cicadula

(Zett.)

Body elongate, usually narrowed posteriorly, head obtuse, vertex longer on the middle than next the eye; front moderately broad. Pronotum rather short, anterior margin curved, posterior margin usually slightly emarginate, side margins short. Elytra produced beyond abdomen, overlapping at apex, appendix distinct.

Four species of the genus are known to occur in the State.

Key to Species

A—Length, exceeding 1 mm, vertex with two large spots.....*punctifrons*

AA—Length, less than 5 mm., usually about 4 mm.

B—Vertex with four large black spots.....*variata*

BB—Vertex marked with six black spots.

C—Vertex well produced, a black spot on apex next each eye, basal angles of scutellum black.....*lepidula*

CC—Vertex more bluntly angled, basal angles of scutellum without dark markings.....*6-notata*

Cicadula punctifrons var. *americana*

(V. D.)

Cicadula punctifrons var. *americana*, V. D., Can. Ent., XXIII, p. 169, 1891.
Cicadula punctifrons var. *americana*, V. D., Buf. Soc. Nat. Hist. Bul., V, p. 201.

Large, with two large, round, black spots on vertex. Length, 5 to 6 mm.

Vertex obtuse, almost parallel margined, in the female slightly longer on middle than next the eye. Pronotum a third longer than vertex, posteriorly emarginate.

Color: Vertex yellow, a large, round, black spot either side, equidistant from eye and median line. Face brown with dark arcs. Pronotum yellow, a light median line, and a dark blotch either side posteriorly. Scutellum yellow, basal angles black. Elytra whitish hyaline, with five oblique, black vittae, two on clavus and three on corium, costal margin white.

Genitalia: Last ventral segment of female short, slightly rounded posteriorly; pygofer broadest at middle, reaching to tip of black ovipositor.

Three specimens, all females, swept from willows at Paris and Bells, June 16.

Cicadula variata

(Fall.)

Cicadula variata, Fallen, Acta. Holm., XXVII, 34, 1806.

Cicadula variata, V. D., Buf. Soc. Nat. Hist. Bul., V, 200.

Cicadula variata, Osb., Maine Agr. Exper. Sta. Bull. 238, p. 145, 1915.

Vertex with two black spots near posterior margin and two at front margin. Length, 4 mm.

Vertex shorter than basal width, one-half longer on middle than next the eye, bluntly angled. Pronotum one-fourth longer than vertex. Elytra moderately long.

Color: Vertex yellowish, two large round spots near posterior margin and two between front and vertex black. Pronotum and scutellum greenish yellow, the basal angles of the latter black. Frontal sutures black. Elytra whitish hyaline varying in dark markings, often dusky, enclosing a light spot on claval suture, veins usually lighter, apex light.

Genitalia: Last ventral segment of female rather short, posterior margin truncated; pygofer rather large, apices clothed with white hairs, ovipositor black. Male valve rather long, triangularly rounded, almost covering narrow plates.

One of the most common species found in the State, swept from weeds and grasses, and taken in great numbers at lights, at Clarksville during July and August; Paris, June 16; Tullahoma, August 3 and 10, and Colliersville, June 22.

Cicadula lepida

(V. D.)

Cicadula lepida, V. D., Can. Ent., XXVI, p. 139, 1894.

Cicadula lepida, Osb., 20th Rept. State Ent. N. Y., p. 540, 1905.

Resembling *variata*, but distinguished from it by the vertex more produced on the middle, and with a black spot next each eye. Length, 3.5 to 4 mm.

Vertex bluntly angulate, slightly more than half longer on the middle than next the eye, more angulately produced than preceding.

Color: Yellow, often tinged with green; vertex with two spots near the base, two large spots on apex, a vertical mark either side, between ocellus and eye, and often short, frontal arcs, black. Elytra whitish, often tinged with yellow, smoky at apex, nervures pale.

Genitalia: Female last ventral segment rather short, slightly emarginate at middle; pygofer as long as black ovipositor, clothed with white spines. Male valve large and rounded, plates short, convexly rounding to rather blunt apices, outer margins with long white spines.

All the specimens at hand were swept from small grass in low, swampy ground. Taken at Colliersville, June 22; Paris, June 26; Clarksville, the latter part of August; Tullahoma, August 10, and Monteagle, August 6.

Cicadula 6-notata

(Fall.)

Cicadula 6-notata, Fall, Acta. Holm., XXVII, 34, 1806.

Cicadula 6-notata, Southwick, Science, XIX, 288, 1892.

Cicadula 6-notata, Osb., Maine Agr. Exper. Sta. Bull. 238, p. 147, 1915.

Easily distinguished from the others of the genus by the six black spots on the vertex. Length, 4 mm.

Differs very little in structural characters from *variata*, pronotum slightly emarginate posteriorly.

Color: Vertex yellowish, two small round spots near the posterior margin, two short dashes before these, two large spots at anterior margin, and two curved dashes from these toward eyes, black. Front yellow, arcs and median longitudinal line, black. Pronotum slightly darker than vertex, scutellum yellowish. Elytra yellowish gray, usually unmarked.

Genital characters are the same as in *variata*.

This species was swept from a number of different grasses, and occurs in great abundance throughout the State. Taken at Paris, June 16; Dyersburg, June 17; Covington, June 18; Clarksville, July and August, and Tullahoma, August 10.

GENUS

Balclutha

(Fieb.)

Body elongate, rather slender, obtuse in front, narrowed posteriorly. Vertex short, almost parallel margined, about one-third the length of pronotum, ocelli distant from the eyes. Elytra exceeding abdomen in length, with distinct appendix, overlapped at apex. Wings with two apical cells. The species of the genus are usually white, yellow or green in color, and with few exceptions are unmarked. They are very close to *Cicadula*, but more slender and slightly smaller.

Key to Species

- A—Head wider than pronotum, not produced, elytra whitish hyaline *abdominalis*
- AA—Head narrower than pronotum, slightly produced.
- B—Elytra with black markings *punctata*
- BB—Elytra without black markings, usually green or yellowish.
- C—Elytra whitish, translucent at apex, head and thorax pale green *impictus*
- CC—Elytra greenish hyaline, head, thorax and costal area distinctly green *medius*

Balclutha abdominalis

(V. D.)

Gnathodus abdominalis, V. D., Can. Ent., XXIV, p. 113, 1892.

Gnathodus abdominalis, Baker, Can. Ent., XXVIII, p. 36, 1896.

Small species, green with a distinctly white tint. Length, 3 mm.

Head slightly broader than pronotum, broadly rounded, pronotum more than twice as long as vertex, posterior margin almost straight. Elytra greatly exceeding abdomen.

Color: Greenish white, disc of pronotum and scutellum often with fuscous tint, three faint longitudinal lines on pronotum dark. Elytra whitish, subhyaline, slightly smoky at apex, nervures a little darker; beneath black.

Genitalia: Last ventral segment of female with posterior margin sinuated, pygofer exceeded by ovipositor. Male valve large, surpassed by narrow, pointed plates, pygofer long.

Taken at Dyersburg, June 17, and at Clarksville in great abundance during July and August. The species will fly to lights at night in great numbers.

Balclutha punctata

(Thunb.)

Cicadula punctata, Thunb., Act. Ups., p. 21, 1782.

Jassus punctatus, Walk., Homop., III, p. 877.

Balclutha punctata, Osb., Maine Agr. Exper. Sta. Bul. 238, 1915.

Distinguished from others of the group by the more strongly produced vertex and black markings on elytra. Length, 3.5 to 4 mm.

Head short, rounded on front and obtusely produced, not quite as wide as pronotum. Elytra long, body long and slender, distinctly narrowed at apex.

Color: Usually green, often gray, vertex and pronotum with five faint longitudinal stripes and basal angles of scutellum fuscous. Elytra marked with black, spots often arranged in two oblique bands. Beneath black, legs pale.

Genitalia: Last ventral segment of female rather long, truncated posteriorly; pygofer long, narrow, equaling ovipositor in length, outer margins almost parallel.

Two specimens, both females, taken at Clarksville, July 17 and 20. These are the only specimens from which State records could be obtained.

Balclutha impictus

(V. D.)

Gnathodus impictus, V. D., Can. Ent., XXIV, p. 113, 1892.

Balclutha impictus, Osb., Maine Agr. Exper. Sta. Bul. 238, p. 149, 1915.

Small green species, with apex of elytra whitish, long and slender. Length, 3.5 mm.

Head narrower than pronotum, vertex produced, more strongly rounded on anterior margin. Pronotum two and one-half times the length of vertex, posterior margin shallowly excavated. Elytra long, greatly exceeding abdomen.

Color: Yellowish green, vertex with median longitudinal line dark, scutellum yellowish, basal angles often with red tinge. Eyes black, elytra whitish at apex; beneath greenish.

Genitalia: Last ventral segment of female long, posterior margin truncated, pygofer narrow, slightly broader at middle. Male valve short, plates broad and short, outer edge rounded, tips as long as discs, slender.

Taken at Paris, June 16; Memphis, June 21; Colliersville, June 23; Lexington, June 25; Clarksville, during July; Knoxville, September 14 and 15. Very abundant throughout the State.

Balclutha medius

(Baker.)

Gnathodus medius, Baker, Can. Ent., XXVIII, p. 38, 1896.

Larger and with a distinct greenish color. Length, 4.25 mm.

Head narrower than pronotum, vertex slightly produced at middle, about one-third as long as pronotum. Posterior margin of pronotum concave, body more robust than *impictus*, to which it is closely related.

Color: Yellowish green, posterior portion of pronotum and basal angles of scutellum, green. Elytra hyaline, costal margins at base, nervures and sternum, green.

Genitalia: Last ventral segment of female slightly emarginate posteriorly, pygofers rather long, apical portion clothed with stout hairs. Male valve small, rounded; plates triangular, bearing small, slender processes at apex, and with outer margins bearing a single row of spines.

One specimen taken at Knoxville, September 15, is quite certain to be this species, and some other specimens taken at Clarksville, July 3 and 10, possibly are the same and have been referred to this species.

FAMILY

Typhlocybidae

The elytra contain four longitudinal veins or sectors which run to the cross nervures, and form the apical cells without branching; antiapical cells in elytra and supernumery cells in posterior wing, wanting.

The following key is taken from the one used by Gillette in Vol. XX, Proc. U. S. National Museum.

Key to Genera

- A—Under wings with the sectors ending in a marginal vein.
 - B—Elytra with appendix beyond clavus *Alebra*
 - BB—Elytra without appendix,
 - C—Posterior wing with two apical cells *Dicraneura*
 - CC—Posterior wing with one apical cell *Empoasca*
- AA—Under wings without marginal vein, sectors ending in wing margin.
 - B—Sectors one and two uniting, so that only three veins extend to the margin *Typhlocyba*
 - BB—All four sectors ending in wing margin *Eupteryx*²

GENUS

Alebra (Fieb.)

Body long, slender, head feebly curved, parallel margined, ocelli distinct. Head including eyes narrower than pronotum. Elytra greatly exceeding abdomen in length, overlapping at apex, appendix distinct. Submarginal wing nerve joining first nerve, three oblong areas in apex of wing. Genital valve in male wanting.

One species belonging to this genus has been taken in the State.

Alebra albostrigella (Fallen.)

Cicada albostrigella, Fall., Hemiptera Sueciae-Cicadariae, p. 54, 1829.

Alebra albostrigella, Fieb., Kat'd, eur. Cicad., p. 14, 1872.

Alebra albostrigella, Gill, Proc. U. S. Nat. Museum, XX, p. 713, 1898.

Rather robust, long, yellow or white in color. Length, 3.5 to 4 mm.

²No members of this genus have been taken in the State.

Head blunt, parallel margined, slightly curved anteriorly. Pronotum wider than head including eyes, elytra long, rather narrow.

Color: Male, usually bright yellow, apices of elytra of the fumose. Female, varying, usually white, pronotum with two stripes, a broad one on suture and one along costa of elytra, yellow, head and pronotum often brown.

Specimens were taken at Dyersburg, June 17, from willows and different weeds; at Covington, June 18, from grapevines; at Colliersville, June 22, from weeds, and at Clarksville, taken at a light, July 29.

GENUS

Dicraneura (Hardy.)

Body small, very slender, head obtusely produced in front. Elytra longer than abdomen, appendix wanting, nerves of membrane subparallel. Submarginal wing nerve complete, first and second wing nerves joined before apex, and joining submarginal nerve; third wing nerve forked and joined to second by a transverse nerve.

Two species of the genus have been taken in the State.

Key to Species

- A—Vertex rather long, strongly produced, angulate, two longitudinal red stripes on vertex and pronotum.....*abnormis*
AA—Vertex much shorter, rounded, apex of vertex with reddish spot, without stripes.....*fieberi*

Dicraneura abnormis (Walsh.)

Chloroneura abnormis, Walsh, Proc. Bost. Soc. Nat. Hist., LX, p. 316, 1864.
Dicraneura abnormis, Gill, Proc. U. S. Nat. Museum, XX, p. 719, 1898.

Very slender, greenish, head irregular, well produced. Length, 3.5 mm.

Vertex acutely angled, apex rounded, elytra very long and narrow.

Color: Pale, dull green, vertex and pronotum with two longitudinal reddish stripes, often yellowish and very faint, scutellum golden yellow. Elytra subopaque, dull green, hyaline at tips, often marked with sanguineous. Wings whitish, subopaque. Abdomen black, last ventral segment greenish. Pygosters of female black tipped. Face washed with yellow.

A very common species throughout the State. Taken at Dyersburg, June 17; Memphis, June 21; Clarksville, July and August; Tullahoma, August 3, and at Knoxville, September 13. Swept from canebrakes in large numbers, also from weeds, grasses and shrubs.

Dicraneura fieberi (Low.)

Dicraneura fieberi, Melichar, Cicadinen von Mittle Europe, p. 325, 1896.
Dicraneura fieberi, Gill, Proc. U. S. Nat. Museum, XX, p. 722, 1898.

Small, yellow, apex of head tinged with red. Length, 3.5 mm.

Head shorter, broader and more rounded than in the preceding species. Elytra very similar to *abnormis*, form long and slender.

Color: Light yellow, not definitely marked, vertex with a rather large, irregular spot on the apex, often extending on to the front, golden yellow

or reddish, eyes dark; pronotum with anterior margin light, disc darker. Elytra with nervures broadly darker yellow, apical portion whitish hyaline; beneath yellow.

This species was taken in great abundance around lights at Clarksville during July and August, and was swept from weeds and grasses at Memphis, June 21, and Dyersburg, June 17.

GENUS

Empoasca

(Walsh.)

Most of the species are very small and green in color, often marked with red. The head characters vary considerable, being well produced in certain species, and rounded almost parallel margined in others. Vertex crescent shaped, more or less pointed. The venation of the second pair of wings is quite constant, having a marginal vein, no appendix, one apical cell, and second apical area oblong. Genital valve wanting in male.

Key to Species

- A—Head rather broadly rounded, vertex not at all, or very slightly produced.
 - B—Elytra with distinct dark markings.
 - C—With three dark, transverse stripes, one on pronotum and two on elytra *trifasciata*
 - CC—Elytra and pronotum striped with orange and blue.... *splendida*
 - BB—Elytra greenish, slightly marked with dark coloration.
 - C—Size, large, almost 5 mm., without black point before apical cross nervures.
 - D—Sides of last ventral segment of female incised, unicolorous *aureoviridis*
 - DD—Last ventral segment of female rounded, entire, elytra often with suture narrowly black margined..... *obtusa*
 - CC—Size, small, less than 4 mm., black spot before the cross nervures at apex, gentilia notched..... *denticula*
- AA—Vertex not broadly rounded, often angulate, vertex distinctly produced.
 - B—Light green, elytra striped with orange..... *radiata*
 - BB—Green, often almost unicolorous, marked with white.
 - C—Elytral nervures rather broadly pale..... *alboneura*
 - CC—Nervures of elytra green or indistinct.
 - D—Pronotum with six or eight white spots on anterior margin.. *malis*
 - DD—Pronotum with three white spots or none on anterior margin *flavescens*

Empoasca trifasciata

(Gill.)

Empoasca trifasciata, Gill, Proc. U. S. Nat. Museum, XX, p. 726, 1898.

Green with three transverse brown bands, two across elytra and one across pronotum. Length, 4 mm.

Vertex obtusely rounded in front, slightly longer at middle than next the eye, almost parallel margined. Pronotum twice as long as vertex. Front two-thirds longer than broad.

Color: Vertex golden yellow, lighter on posterior margin, a slender median line darker, eyes black. Face golden yellow above, greenish below. Pronotum yellow anteriorly, a black band on posterior portion. Scutellum

smoky at base, tip light; elytra greenish, a broad, smoky band across middle of clavus and another on apex. Tips of pygofers and ovipositor deep green.

Two specimens were swept from cottonwood at Clarksville July 5 and 13.

Empoasca splendida
(Gill.)

Empoasca splendida, Gill, Proc. U. S. Nat. Museum, XX, p. 731, 1898.

Striped with greenish blue, orange and brown. Length, 3.5 mm.

Vertex a little longer on the middle than next the eye, slightly produced, apex obtusely, bluntly angulate. Pronotum the width of head, scarcely twice as wide as long.

Vertex reddish-orange yellow anteriorly, deep blue posteriorly. Face greenish washed with orange either side, leaving a lighter line in the center. Pronotum, anterior two-thirds reddish orange, posterior portion blue; scutellum light brown. Elytra reddish brown, hyaline at apex, a blue line extending along the claval suture, and a stripe on costal margin paler; a black spot before cross nervures of apical cell.

Genitalia: Last ventral segment of female slightly rounded posteriorly, male segment deeply notched.

Swept from alder shrubs (*Ainue incana*) in great numbers. Taken at Lexington, June 25, and Paris, June 26. They occur on the above mentioned plant very abundantly, and were found on no other plants.

Empoasca aureoviridis
(Uhler.)

Typhlocyba aureoviridis, Uhler, Bull. U. S. Geol. & Geog. Surv., 11f, p. 474, 1877.

Empoasca aureoviridis, Gill, Proc. U. S. Nat. Museum, XX, p. 730, 1898.

Long, slender species, somewhat resembling *obtusa*, but more robust. Length, 4 to 5 mm.

Head broad, well rounded, wider than pronotum, almost parallel margined. Pronotum slightly convex in front, lateral margins a little prominent; elytra narrow.

Color: Vertex and front yellowish green, the vertex with a light median line and a short one next either eye. Pronotum yellowish green, an anterior, submarginal, pale spot either side of middle. Scutellum with a pale line on middle. Elytra yellowish green, apical margin blackish.

Genitalia: Last ventral segment of female rounded posteriorly, sides sinuated.

Specimens were swept from willows and grasses at Bells, June 16; Dyersburg, June 17, and Clarksville, July 28. Only a few were taken during the entire summer.

Empoasca obtusa
(Walsh.)

Empoasca obtusa, Walsh, Proc. Bost. Soc. Nat. Hist., LX, p. 316, 1864.

Empoasca obtusa, Gill, Proc. U. S. Nat. Museum, XX, p. 733, 1898.

Smaller than *aureoviridis*, color rather pale, bright green. Length, 4 mm.

Vertex distinctly, but not strongly produced, well rounded, slightly longer at middle than next the eye.

Color: Rather pale green with yellowish tinge, vertex with eyes, and spots surrounding ocelli, fuscous. Elytra greenish subhyaline, tips slightly

smoky hyaline, often with a fine black line along the suture. Legs green, tarsal joints fuscous.

Genitalia: Last ventral segment of female rounded posteriorly, but not sinuated at sides as in *aureoviridis*.

It occurs on grasses in great abundance, and was taken at Paris, June 16; Dyersburg, June 17; Moscow, June 23; Clarksville, several times during July, and Tullahoma, August 10.

Empoasca denticula

(Gill.)

Empoasca denticula, Gill, Proc. U. S. Nat. Museum, XX, p. 734, 1898.

Pale yellowish green, vertex rounded. Length, 3.5 to 4 mm.

Vertex short, evenly rounded, not produced. Pronotum broader than head, and not quite twice as wide as long.

Color: Vertex and face yellowish, the latter shading to green below. Pronotum yellow, often with indistinct white markings. Scutellum yellowish, a longitudinal line pale. Elytra greenish yellow, subhyaline, a black spot just before the cross nervure of the antiapical cell.

Genitalia: Last ventral segment of female with the posterior margin shallowly, rectangularly notched. Male, last ventral segment with a V-shaped notch.

One specimen, male, taken at light at Clarksville, July 29, most certainly belongs under this name, being well marked.

Empoasca radiata

(Gill.)

Empoasca radiata, Gill, Proc. U. S. Nat. Museum, XX, p. 738, 1898.

Green, elytra marked with oblique reddish orange stripes. Length, 2.75 mm.

Head two and one-half times as broad as long, vertex distinctly produced. Pronotum scarcely wider than vertex, more than one-half as long as wide.

Color: Vertex pale yellowish or greenish, often with three longitudinal paler stripes. Pronotum same as vertex, usually with a median, and two lateral lines green, and two dorsal and two lateral lines reddish orange. Scutellum green, elytra greenish white, subhyaline, a line either side of claval suture, and one on the corium orange, nervures white.

Genitalia: Last ventral segment of female slightly produced and entire.

Specimens of this well-marked species were taken at Paris, June 16; Memphis, June 21, and Knoxville, September 13. It seems to have a wide distribution in the State. The specimens at hand were all swept from grasses; some found on short lawn grass.

Empoasca alboneura

(Gill.)

Empoasca alboneura, Gill, Proc. U. S. Nat. Museum, XX, p. 743, 1898.

Short, robust, greenish yellow, tips of elytra smoky, nervures pale. Length, 3 mm.

Vertex one-third longer at middle than next the eye, rather angulate in front. Elytra rather short, well rounded.

Color: Vertex greenish yellow, with a median light line, a light spot next either eye on the posterior portion, and another either side of the vertex. Pronotum yellow anteriorly, green posteriorly, with a median light

line, and a light spot on either side. Scutellum yellow, elytra greenish, subhyaline, tinged with yellow, nervures rather broadly pale, and tips smoky.

This species is easily distinguishable from others of the group, and was swept from weeds, grasses, red clover, and taken around lights at Bells, June 16; Dyersburg, June 17, and Clarksville during July, August and September.

Empoasca mali

(Le Baron.)

Tettigonia mali, Le Baron, Prairie Farmer, XIII, p. 330, 1853.

Empoasca mali, Osborn, Ia. Acad. Sci., I, p. 12, 1892.

Empoasca mali, Gill, Proc. U. S. Nat. Museum, XX, p. 744, 1898.

Small green species, with six or eight white spots on anterior margin of pronotum. Length, 3.5 mm.

Vertex a little produced, somewhat angularly rounded, anteriorly, a little longer at middle than next the eye. Pronotum rather broadly rounded in front.

Color: Yellowish green, vertex spotted with white. Pronotum with a row of from six to eight white spots along anterior margin, often with a letter "H" formed by two longitudinal, and a transverse stripe; three pale stripes on scutellum.

The distinguishing characteristics separating this from *flavescens* and *viridescens* is the row of six or eight spots on the anterior portion of pronotum.

The species is one of great economic importance, and was found to occur throughout the State on a number of important crops. At Tullahoma it was taken in abundance during the first ten days of August from beans, peas and alfalfa on the Experiment Farm of the N., C. & St. L. Ry. At Clarksville it was swept from apple trees and taken from some of the grasses during July and August, and numerous specimens from Knoxville were obtained from apple trees at the State Experiment Orchard. This may be counted as one of the species of greatest economic importance in the group.

Empoasca flavescens

(Fabr.)

Cicada flavescens, Fabr., Ent. Syst., IV, Hafn., 1794.

Chlorita flavescens, Fieb., Kat. eur. Cicad., p. 14, 1872.

Empoasca flavescens, Gill, Proc. U. S. Nat. Museum, XX, p. 745, 1898.

Distinguished from the preceding only by the absence, or reduction in number to three white spots on anterior margin of pronotum. Length, 3.5 mm.

Small and narrow, vertex produced, and angularly rounded, longer at middle than next the eye.

Color: Usually very yellowish, often greenish or pale, color varying with the season. Vertex irregularly marked with white, pronotum usually with three white spots on anterior margin, often wanting. Elytra faintly colored, tips hyaline.

This species is found in company with and is of almost as great economic importance as the preceding. It occurs on the same food plants and was taken at Clarksville, July and August; Memphis, June 21; Lexington, June 25; Paris, June 16, and Tullahoma, August 1 to 10.

GENUS

Typhlocyba
(Germ.)

Body small, cylindrical, head crescent shaped, varying, more or less pointed. Elytra exceeding abdomen, with four apical areas, the second triangular, membrane wanting. Submarginal wing nerve incomplete, first and second nerves joined before apex, and extending to the margin as one nerve, second and third wing nerves connected by a transverse nerve, prolonged almost obliquely.

Key to Species

- A—General color above yellowish or whitish.
 - B—Elytra with definite transverse bands.
 - C—One band across elytra.
 - D—Broad band on basal half.
 - E—Band bright red, otherwise unmarked.....*osborni*
 - EE—Band brownish, elytra with red spots.....*comes* var. *basilaris*
 - DD—Brown band just before cross nervures of elytra and one on pronotum*morgani*
 - CC—A band on middle and apex of elytra and one across pronotum *tricincta*
 - BB—Elytra without definite transverse bands.
 - C—Elytra more or less marked with sanguineous or reddish brown.
 - D—Two oblique lines on elytra, one on clavus and one on inner sector *obliqua*
 - DD—Elytra usually marked with spots.
 - E—Elytra finely flexed with red.
 - F—Thickly spotted with red, often coalescing, covering all elytra except apical cells.....*tunicarubra*
 - FF—Elytra finely irrorate with red, brownish interrupted band at apex of scutellum and a faint one behind middle *trifasciata*
 - EE—Spots larger and fewer, often coalescing.
 - F—Several large red spots on elytra, variable in size and shape, vertex and pronotum marked with red lines.... *comes*
 - FF—A red spot on vertex, pronotum and scutellum, and a black spot on corium of each elytron, surrounded by a red margin *illinoiensis*
 - CC—Elytra without red markings.
 - D—Transverse row of black spots before cross nervures of elytra *querci*
 - DD—Whitish or yellowish unmarked.....*rosae*
- AA—General color dark above.
 - B—Black with white spot at apex of scutellum.....*nigridorsum*
 - BB—Greenish brown, three pale lines on vertex and pronotum *vulnerata*

Typhlocyba osborni
(n. sp.)

Pale yellowish white with a broad red band across elytra just behind the apex of scutellum. Length, 2.75 mm.

Vertex produced, bluntly angulate, almost one-half longer at the middle than next the eye. Pronotum scarcely longer than vertex, two and one-half times as wide as long. Elytra moderately long.

Color: Very pale yellowish or white, vertex and face unmarked, pronotum with yellowish spot behind each eye, and an orange crescent shaped spot, posteriorly convex, on disc. Scutellum white. Elytra with a broad blood red band on basal third of elytra, evenly colored, often not reaching costa. A black spot at the middle of costal margin, another on the inner margin before the cross nervures of the apical cells and a red one before the nervures on the costal margin.

Genitalia: Last ventral segment of female with posterior margin rounded. Male, last ventral segment truncated.

Described from eight specimens, five females and three males, collected at Clarksville, Tenn., July 22 and 25, 1915. All of these were swept from oak. Some specimens which agree exactly with the ones from Tennessee are in the private collection of Prof. Herbert Osborn, for whom I name this handsome little species.

Typhlocyba morgani

(n. sp.)

Pale yellow, with a brown band across the posterior portion of pronotum and another across elytra behind the middle. Length, 3 mm.

Vertex very bluntly angulate, distinctly produced, one-half longer on the middle than next the eye. Pronotum one-half longer than vertex.

Color: Pale yellowish, eyes pale fuscous, pronotum with a rather broad brownish black band across posterior two-thirds; disc, anterior margin before it, and a point behind either eye whitish. Elytra pale, marked with slightly darker yellow spots, and a broad band before nervures of apical cells, brown. Beneath pale.

Genitalia: Last ventral segment of female with posterior margin distinctly, squarely produced at the middle, sinuated either side.

Described from three female specimens taken at Clarksville, July 22, 1915. They were swept from sycamore. The first specimen which I obtained was collected by Mr. A. C. Morgan, to whom I dedicate this species.

Typhlocyba tricineta

(Fitch.)

Erythroneura tricineta, Fitch Homop. N. Y. St. Cab. Nat. Hist., IX, p. 63, 1851.

Typhlocyba tricineta, Gill. Proc. U. S. Nat. Museum, XX, p. 753, 1898.

Yellow, marked with three dark transverse bands, one on pronotum and two on elytra. Length, 3 mm.

This form agrees very closely in structural characters to *comes*, vertex strongly produced, apex rounded, one-third longer on middle than next the eye; pronotum long.

Color: Pale yellow, pronotum and base of scutellum marked with a broad, red to black, band which almost covers the pronotum, elytra crossed by two distinct bands, the anterior one red ending in black, just before the middle of the elytra, the other dark brown, occupying the apex. Face and beneath yellowish.

Numerous specimens were swept from grapevines at Dyersburg, June 17; Colliersville, June 22, and Clarksville during June and July. It occurs in great numbers with *comes*, and is no doubt of economic importance since it feeds upon these vines.

Typhlocyba obliqua

(Say.)

Tetigonia obliqua, Say, Jour. Acad. Nat. Sci., Phila., IV, p. 342, 1825.*Typhlocyba obliqua*, Woodworth, Psyche, V, p. 213, 1889.*Typhlocyba obliqua*, Gill, Proc. U. S. Nat. Museum, XX, p. 756, 1898.Yellowish, with two *oblique* red lines on elytra. Length, 3 mm.

Structural characters very similar to preceding. Vertex produced, apex rounded, about one-third longer on middle than next the eye. Elytra moderately long.

Color: Yellowish white, vertex with two dilated sanguineous lines meeting at apex and extending across pronotum. Scutellum darker, tip sanguineous. Elytra whitish with a short subcostal line, an oblique longitudinal line on disc, an oblique line on clavus terminating behind middle of margin, and costal line, sanguineous.

Taken in great abundance from grapevines at Covington, June 18; Colliersville, June 22, and at Clarksville during July. The species is one which occurs in very great numbers on grapes, and consequently of economic importance.

var. *dorsalis*

(Gill.)

var. *dorsalis*, Gill, Proc. U. S. Nat. Museum, XX, p. 757, 1898.

Form and size of preceding, with red lines confluent in such a way as to form a continuous red or dark dorsal stripe running the length of the insect.

Taken in abundance in company with *obliqua* at Paris and Bells, June 16; Clarksville during July, and Tullahoma, August 2.var. *noevus*

(Gill.)

var. *noevus*, Gill, Proc. U. S. Nat. Museum, XX, p. 757, 1898.Has all the markings of typical *obliqua*, but with scutellum and posterior margin of pronotum black or very dark.

Abundant on grapevines at Covington, June 18, and Clarksville, July and August.

var. *fumida*

(Gill.)

var. *fumida*, Gill, Proc. U. S. Nat. Museum, XX, p. 758, 1898.

This variety is more or less dusky throughout, but is darker on claval area, having a broad, smoky band upon cross nervures of elytra.

Taken with the preceding forms at Covington, June 18, and at Clarksville.

var. *clavata*

(n. var.)

Varying from typical *obliqua* only in coloration. Vertex and pronotum red, anterior margin of each, median line on vertex, and median anterior spot on pronotum yellow. Scutellum and entire claval area, bright red, the remainder of elytra uniform yellow to apical area, which is milky white. The red and yellow areas are separated in a sharp line on the claval suture.

A single specimen was taken at Clarksville, June 29, but is so distinctly marked that it is thought best to class it as a variety.

Typhlocyba tunicarubra
(Gill.)

Typhlocyba tunicarubra, Gill, Proc. U. S. Nat. Museum, XX, p. 752, 1898.

Robust, yellowish, elytra bright red to apical third. Length, 3.75 mm.

Vertex produced, angulate, one-third longer at middle than next the eyes, one-half wider than long. Pronotum more than twice as long as vertex, truncated behind, broadest at posterior angles. The whole insect is rather broad in appearance.

Color: Yellowish, face and vertex unmarked, pronotum often with a darker longitudinal line. Elytra with basal two-thirds finely and rather densely maculate with red, forming an almost solid band across the middle of this area, epical third yellowish, subhyaline. Beneath pale. A point at apex of scutellum and one on the corium of elytra either side, black.

Six specimens taken by the author were swept from grapevines at Paris, June 16, and Clarksville from June 30 to July 25.

Typhlocyba trifasciata
(Say.)

Tettigonia trifasciata, Say, Jour. Acad. Nat. Sci., Phila., IV, p. 343, 1825.
Typhlocyba trifasciata, Gill, Proc. U. S. Nat. Museum, XX, p. 755, 1898.

Form and size of preceding, yellowish, elytra irrorate with red, and crossed by three rather definite darker bands. Vertex strongly produced. Length, 3 mm.

Color: Yellow-white, vertex often marked with sanguineous, eyes dark. Pronotum with dull reddish line on posterior portion, and on obsolete curve on anterior angle. Elytra whitish, finely irrorate with sanguineous, a brownish band just back of apex of scutellum, a rather faint interrupted band behind middle, at the costal termination of which is a red line; an oblique band near the tip black.

Specimens were taken at Tullahoma, August 3, and at Clarksville, August 13 and 21. Some were taken at lights and others swept from weeds.

Typhlocyba comes
(Say.)

Tettigonia comes, Say, Jour. Acad. Nat. Sci., Phila., IV, p. 343, 1825.
Typhlocyba comes, Woodworth, Psyche, V, p. 213, 1889.
Typhlocyba comes, Gill, Proc. U. S. Nat. Museum, XX, p. 759, 1898.

Pale yellowish, irregularly marked with sanguineous. Length, 2.7 to 3 mm.

Color: Pale yellow, vertex with a transverse sanguineous line, arcuated in the middle, and a small spot before. Pronotum with two small lateral spots and a median arcuated one red, angles of scutellum red. Elytral spots greatly varying, a small outer spot and a rather elongate inner one on base, one at middle and a small one at apex of clavus, a rather long, broken oblique line on corium composed of two elongated spots, and a transverse linear one near tip, ramose upon the nervures, sanguineous.

The above coloration may vary considerably and form one of many varieties.

Taken in great numbers from grapevines at Covington, June 18; Memphis, June 21, and Clarksville, July and August. This species, with its

varieties, is one of the Jassid pests of most economic importance. They are often so abundant upon the leaves of the food plant mentioned above that they will obtain all the nourishment from the leaves and cause them to turn brown.

var. *basilaris*

(Say.)

Tettigonia basilaris, Say, Jour. Acad. Nat. Sci., Phila., IV, p. 344, 1825.
var. *basilaris*, Gill, Proc. U. S. Nat. Museum, XX, p. 760, 1898.

Yellowish, head washed with sanguineous, pronotum with posterior margin very dark red or brown, scutellum entirely brown, elytra with a broad band across basal third dark red or brown, formed by the coalescing of the spots; two oblique sanguineous bands on posterior half and a black spot near the apex.

Taken at Dyersburg, June 17; Covington June 18, and Tullahoma, August 3.

var. *vitis*

(Harris.)

Tettigonia vitis, Harris, Encyclopedia Amer., VIII, p. 43, 1831.
var. *vitis*, Gill, Proc. U. S. Nat. Museum, XX, p. 760, 1898.

Yellowish, two sanguineous lines on the head, posterior portion of pronotum, the scutellum, base of elytra and a broad transverse band across middle, red. Tips of elytra blackish, thus forming two lighter bands separated on the costal margin by a blue or blackish spot.

Taken in great numbers, the large majority of the specimens being collected at Clarksville, July 29, where they occurred on cultivated grapevines in swarms. Cast nymph skins were densely scattered over the surface of the leaves, and nymphs and adults were abundant. Without exception these vines were worse infested than any found during the summer.

var. *octonotata*

(Walsh.)

Erythroneura octonotata, Walsh, Proc. Bost. Soc. Nat. Hist., IX, p. 318, 1864.
var. *octonotata*, Gill, Proc. U. S. Nat. Museum, XX, p. 762, 1898.

Head with two faint reddish stripes, pronotum washed with fuscous. Elytra whitish subhyaline, with a spot on inner margin not far from base, one on median costal margin and at tip of costa, black, an irregular fuscous band on cross nervures and a brownish cloud on disc.

Taken from grapevines at Clarksville, July 16, and Knoxville, September 14.

var. *ziczac*

(Walsh.)

Erythroneura ziczac, Walsh, Proc. Bost. Soc. Nat. Hist., IX, p. 317, 1864.
var. *ziczac*, Gill, Proc. U. S. Nat. Museum, XX, p. 761, 1898.

Front of head right angled, apex rounded. Pale yellow, two reddish stripes on vertex, pronotum yellowish in front, posterior margin reddish, often with a yellow stripe, which extends across red scutellum. Elytra pale, a black spot on costal tip, a large spot on median costal margin, and

one on inner margin; a blood red, irregular stripe, crossing humerus, then to costal spot, extending to spot on inner margin and ending before the apical spot.

Three specimens taken at Knoxville, September 14, from grapevines, quite certainly belong here.

var. rubra
(Gill.)

var. rubra, Gill, Proc. U. S. Nat. Museum, XX, p. 764, 1898.

Head usually entirely washed with red, pronotum almost red, with a median spot and two stripes pale. Elytra with spots and stripes so united as to give a rather dark reddish appearance, with a few spots and apical area pale.

Several specimens were taken at Paris, June 16; Dyersburg, June 17; Clarksville during July, and Knoxville, September 14.

var. coloradensis
(Gill.)

var. coloradensis, Gill, Bull. XIX, Colo. Agr. Exper. Sta., p. 16, 1892.

Close to *vitifex*, but differs in having the stripes on the pronotum usually united, and the vertex is almost entirely red, marked with light. Scutellum with a large black spot on either side at the base. Elytra about as in *vitifex*.

Two specimens taken at Clarksville, June 29 and August 2, have the distinctive markings of this variety.

var. infuscata
(Gill.)

var. infuscata, Gill, Proc. U. S. Nat. Museum, XX, p. 764, 1898.

Yellowish, marked by a broad median band extending across vertex and pronotum, including entire scutellum, and forming the dark zigzag lines as in *ziczac*, but broader, leaving a light yellow spot at the apex of clavus.

Two specimens, one each from Clarksville, July 24, and Dyersburg, June 17, are well marked and belong to this variety.

var. scutelleris
(Gill.)

var. scutelleris, Gill, Proc. U. S. Nat. Museum, XX, p. 764, 1898.

Differs from *comes* by having the scutellum and part of the pronotum black or dark brown. A few of the specimens at hand are red and otherwise marked in typical *comes*; others have the elytra pure milky white, with no red markings.

Taken at Clarksville, June 29, and Covington, June 18; beaten from grapevines and honey locust.

var. apicalis
(n. var.)

The markings are light yellow or orange and are about the same size as typical *comes* to near the apex, where they coalesce to form a rather broad, irregular red band just before the cross nervures. The band in

some specimens is not definite, but these can be distinguished from other varieties by the brighter colored coalescing spots.

Several specimens were taken at Covington, June 18, and Paris, June 16.

Typhlocyba illinoiensis
(Gill.)

Typhlocyba illinoiensis, Gill, Proc. U. S. Nat. Museum, p. 758, 1898.

Color, whitish, with three black spots on elytra and a red spot on each of vertex, pronotum and scutellum. Length, 3 mm.

Head rather long and pointed, apex rounded.

Color: Yellowish white spot on vertex, one on pronotum, one on tip of scutellum and a few points on base of elytra bright red. Some of these are often missing or pale. A spot about the middle of, and just below claval suture, one at middle of costal margin and one at base of inner apical cell, black. The anterior one is usually the largest, and surrounded by a circle of red or yellow.

Most of the specimens were swept from grapevines, but some were taken while sweeping weeds at Paris, June 16; Dyersburg, June 17; Clarksville, June and July; Tullahoma, August 3 and 4, and at Knoxville, September 14. Taken in great numbers in diverse parts of the State, and apparently a species of great economic importance.

Typhlocyba querci
(Fitch.)

Empoa querci, Fitch, Homop. N. Y. St. Cab., p. 63, 1851.

Typhlocyba querci, Gill, Proc. U. S. Nat. Museum, XX, p. 766, 1898.

Rather similar in shape and general appearance to *rosae*, whitish, with slight markings on elytra. Length, 3.5 mm.

Head rather bluntly produced, vertex a little longer at middle than next the eye, elytra long and narrow.

Color: Whitish, vertex and pronotum washed with yellow, eyes dark. Elytra white, pellucide, suture often narrowly margined with yellow, a row of three or four black spots on each elytron, forming a narrow transverse band before the apex.

One specimen belonging to this species was taken at Clarksville, July 29.

Typhlocyba rosae
(Linn.)

Cicada rosae, Linn.

Typhlocyba rosae, Fallen, Ent. Zeit., V, Stett., p. 67, 1851.

Typhlocyba rosae, Gill, Proc. U. S. Nat. Museum, XX, p. 771, 1898.

White or yellowish white, unmarked. Length, 3.5 mm.

Head not strongly produced in the *comes* group, more roundingly angulate, a little longer on the middle than next the eye. Elytra long and narrow.

Color: White or yellowish white, elytra and wings whitish hyaline; eyes and tarsal claws brownish.

Three specimens were taken from rose bushes at Tullahoma, August 3 and 4.

Typhlocyba nigradorsum

(n. sp.)

Resembling *vulnerata* in size and shape, black, with a round, white spot on elytra at apex of scutellum. Length, 3 mm.

Head distinctly produced, acutely angled, vertex almost as long as width between the eyes. Pronotum longer than vertex and slightly wider than head, including eyes.

Color: Black, fading to smoky brown before apex of elytra, face uniform white, margin of vertex, median line and a spot either side, three points on disc of pronotum, two blotches on costal margin, a large round spot on elytra at apex of scutellum, and cross nervures before the apex, white.

Described from two specimens taken at a light at Clarksville, July 16 and 29.

Typhlocyba vulnerata

(Fitch.)

Erythroneura vulnerata, Fitch, Homop. N. Y. St. Cab., p. 62, 1851.

Typhlocyba vulnerata, Gill, Proc. U. S. Nat. Museum, XX, p. 764, 1898.

Head a little shorter and broader than in *comes*.

Color: Fulvous brown, a whitish median line cross vertex, pronotum and scutellum, often with a spot on either side on vertex and pronotum. A short white line on costal margin of elytra, interrupted at middle by an oblique black line and toward the apex by a sanguineous line; tips smoky with white spots and nervures.

Occurs on grapevines in great numbers. Taken at Paris, June 16; Dyersburg, June 17; Moscow, June 23; Lexington, June 25, and at Clarksville during July.

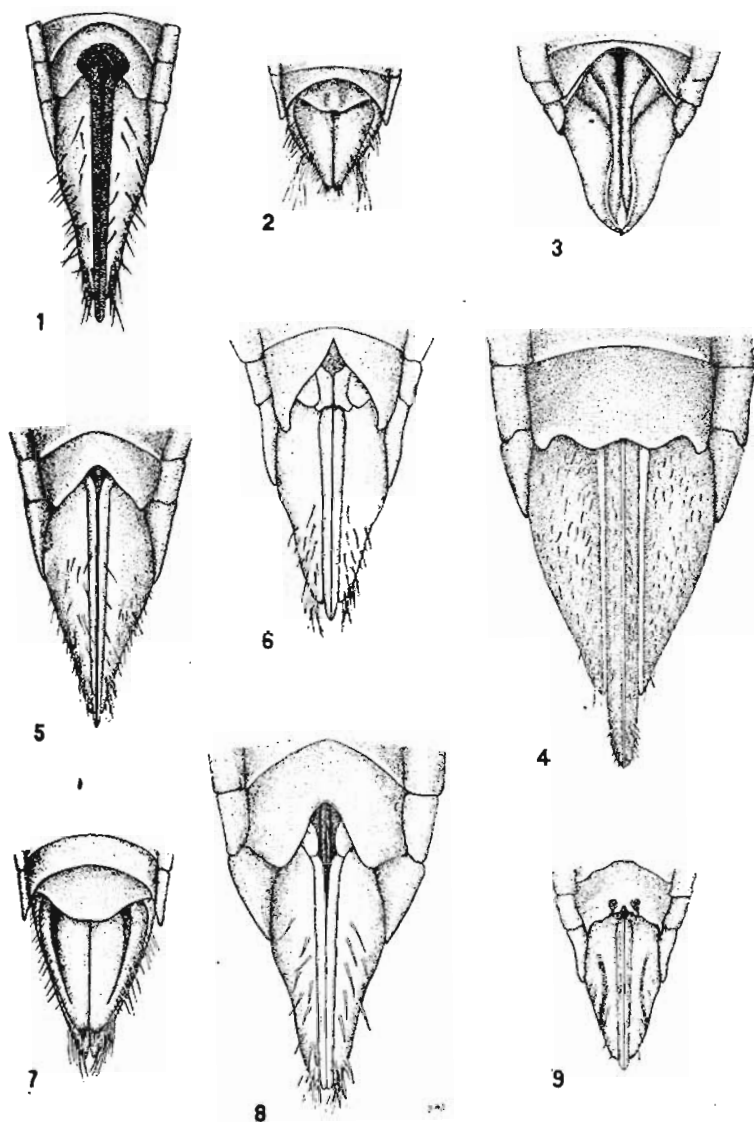


PLATE 1.—Fig. 1, *Thamnotettix flavotinctus* female genitalia; Fig. 2, *Thamnotettix flavotinctus* male genitalia; Fig. 3, *Tinobregmus viridescens* male genitalia; Fig. 4, *Tinobregmus viridescens* female genitalia; Fig. 5, *Thamnotettix crumbi* female genitalia; Fig. 6, *Chlorotettix iridescens* female genitalia; Fig. 7, *Chlorotettix suturalis* male genitalia; Fig. 8, *Chlorotettix suturalis* female genitalia; Fig. 9, *Piatymetopius abbreviatus* female genitalia.

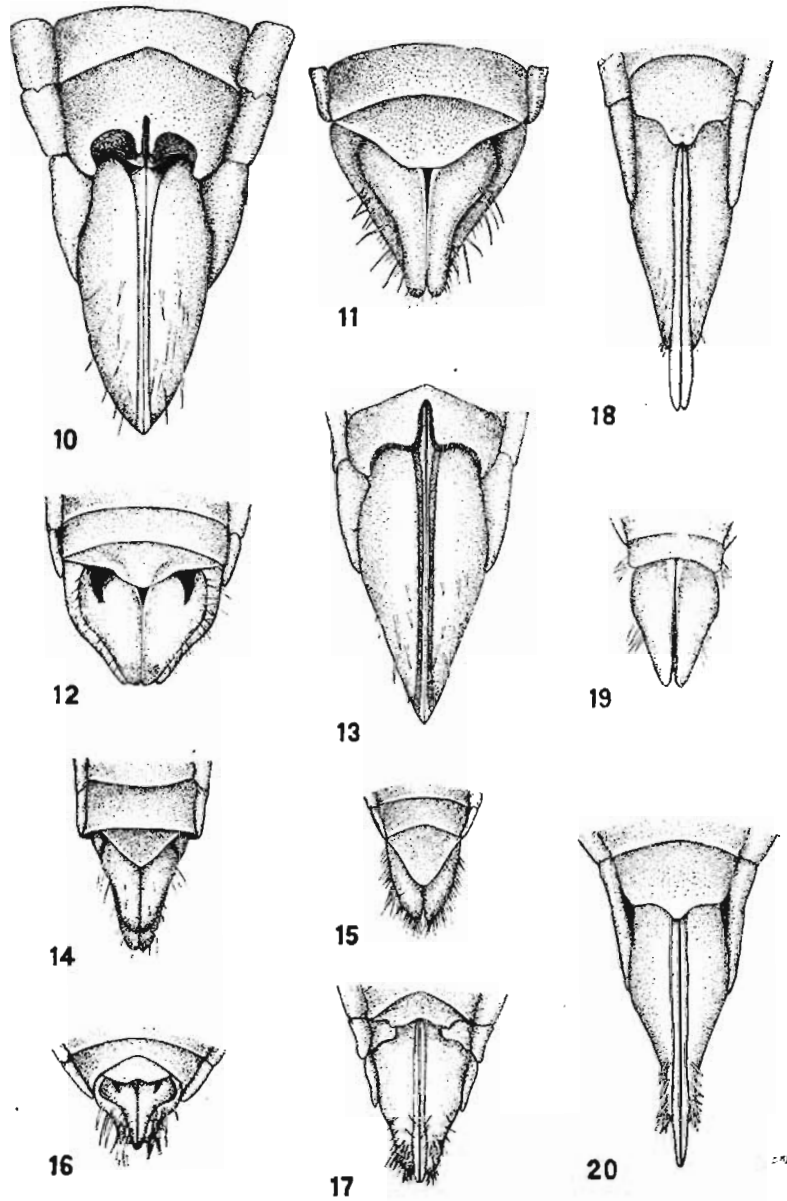


PLATE 2.—Fig. 10, *Phlepsioides brunneus* female genitalia; Fig. 11, *Phlepsioides brunneus* male genitalia; Fig. 12, *Phlepsioides tennesse* male genitalia; Fig. 13, *Phlepsioides tennesse* female genitalia; Fig. 14, *Phlepsioides tullahomii* male genitalia; Fig. 15, *Platymetopius bicolor* male genitalia; Fig. 16, *Deltoccephalus interruptus* male genitalia; Fig. 17, *Deltoccephalus interruptus* female genitalia; Fig. 18, *Typhlocyba morgani* female genitalia; Fig. 19, *Typhlocyba osborni* male genitalia; Fig. 20, *Typhlocyba osborni* female genitalia.

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