

Paratypes—15, Otoe Pasture and 101 Ranch, Noble Co., Okla., June 29, 1926. (W. J. Brown and G. A. Bieberdorf).

This species occurs with *cavidomus* in the burrows of the common prairie dog.

***Aphodius cavidomus* n. sp.**

Length 3.2-4.3 mm.; reddish-yellow to pale brownish-red; the elytral suture and sometimes head and pronotum slightly darker. Head slightly more than two-thirds as wide as pronotum; distinctly punctate throughout, the punctures fine and separated by distances about three times as great as their own diameters, less close on the vertex; frontal suture faintly indicated.

Pronotum slightly more than two-thirds as long as wide; sides not fimbriate; surface punctate throughout; the punctures very fine, sparse and often indistinct at middle, coarser, closer, and unequal on the sides; base with very fine marginal line.

Elytral striae rather closely, finely punctate; intervals very finely, sparsely, and often indistinctly punctate, alutaceous at apex.

Mesosternum distinctly carinate between the coxae. Metasternum indistinctly, very sparsely and finely punctate at middle, alutaceous on the sides. Abdomen very sparsely punctate. Middle and hind femora with a few very fine and indistinct punctures. Anterior tibia feebly or not crenate above the upper tooth. Posterior leg slender, the first segment of the tarsus equal in length to the three following together.

Holotype—Otoe Pasture, Noble Co., Okla., June 29, 1926 (W. J. Brown); No. 2505 in the Canadian National Collection, Ottawa.

Paratypes—90, Otoe Pasture and 101 Ranch, Noble Co., Okla., June 21, 28, and 29, 1926 (W. J. Brown and G. A. Bieberdorf).

The larger specimens in the series at hand are slightly darker in color and more indistinctly punctate. These are males, but the characters are not constant enough to permit accurate separation of the sexes. The type is one of the smaller examples with a distinctly punctate dorsum. The species occurs with *cynomyia* in the burrows of the common prairie dog.

THE GENUS *JASSUS* IN AMERICA NORTH OF MEXICO.

(CICADELLIDAE HEMIP.)*

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The genus *Jassus* is a very large genus of leafhoppers known to occur over a very large portion of the earth. Many species have been described from India, Africa, Central and South America, the Phillipines and several other countries. A very few species, however, seem to occur in America north of Mexico. Since only one of these species is well known, two but slightly known, and two apparently new to science, the writer feels that a short paper introducing us to the small part of the genus known to occur in the United States would not be out of place. A paper on the other American species is being prepared and should be ready for publication before long.

*—Contribution from the Department of Entomology, University of Kansas.

COLOR VARIATIONS WITHIN THE SPECIES:

In studying the members of this genus it soon became apparent that a great deal of color variation may occur within the species. This is readily seen when one examines a representative group of specimens of *Jassus olitorius* Say. In this species there appears to be a distinct dimorphism of males, if only the extremes of coloring are studied, one form tending to be quite dark brown, sometimes almost black, so that the yellow vertex is very conspicuous; the other being much lighter, in extreme cases almost a yellowish-brown, the vertex, pronotum and elytra being of almost the same color. The former type was evidently before Spangberg when he described *Jassus fuscipennis*. Between these extreme types there are all gradations of color, so that it is very difficult to ascribe any definite color to the males. Moreover in size there is also a very considerable variation in the males. The females also vary in size, but as in the males, much more so in color. Some are a light brown; others almost as dark as the darkest males. In most of them the two pale bands across the elytra are quite distinct; in many, however, they are scarcely discernible. In *Jassus borealis* Spangberg a very great range of variation is also evident. Most of the males and a large part of the females are practically unicolorous and a rusty-brown in color. However, this brown may become distinctly darker till the entire specimen is uniformly dark brown. In still other cases the general color of the insect may not be darkened, but the veins may be, till they stand out very distinctly against the lighter background, and in some cases darkened areas may be found on the elytra between the veins. In some cases there is a vague light band across the elytra beyond the clavus, though in the males, and some females, there seems to be no sign of it.

The above is enough to indicate something of the problem one meets in attempting to separate the several species of the genus. Because of this wide variation in color and the similarity of the general appearance of some of the species, the writer has attempted a somewhat detailed study of the specific characters of these five species, especially with reference to the genitalia, both male and female.

THE MALE GENITALIA

In many genera of Cicadellids the genital plates of the male are of great value in separating the species. In the genus *Jassus*, however, they have been little used due to the fact that they do not extend below the pygofer in the usual horizontal plane, but are always more or less distinctly vertically inclined. If dissected out, however, they are found to be of characteristic shape in the several species. In their chaetotaxy also they show specific characters which may be used occasionally in the separation of difficult species.

In the pygofer of the male there are at least two characters which may be used in systematic work. As shown by the drawings the shape of the pygofer varies considerably for the several species, and the number, size and position of the long hairs borne by them gives a very striking character which may be readily used.

The so-called "internal genitalia" are also quite definite for each species. The genital claspers are quite distinctive, at least apically. Their enlarged

bases are found to vary within the species. A superficial examination seems to show that this part of the clasper is laid down more or less concentrically and that the variations are probably due to differences in the extent of their development. The ventral or main part of the oedeagus is also quite characteristic in each of the species, the unusual form in *J. snowi* indicating that a subdivision of the genus may be desirable when the species of other countries have been fully studied. Altogether the various male genitalia afford splendid aid to the taxonomist in his study of the genus.

THE FEMALE GENITALIA

In the female the last ventral segment of the abdomen is in many genera of Cicadellidae of distinctive value. In this genus some writers have made much use of it and others but little. In some species it is quite distinctive, but in many others the differences are quite minute, so that this character is not of as much value as in many other genera. In addition to using the last ventral segment of the abdomen, it was thought that though they would not usually be of much practical value in separating the species, yet the valves of the ovipositor might be also used or that a study of these valves might at least be of scientific interest in showing specific differences. This study revealed that such differences do occur in all three pairs of valves and that in possible cases, as a last resort, they may be found helpful.

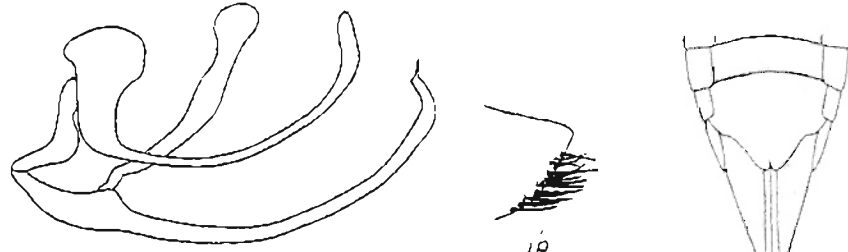
The general anatomy of these valves is now well known. The outer pair, commonly called the ovipositor in descriptions, are really the lateral valves and arise from the ninth segment of the abdomen. The outlines of these valves are quite distinctive in the several species and even more definite are the differences in their chaetotaxy. While examining slides of these valves it was noticed that not only are the large marginal hairs of characteristic size, shape and distribution, but that the small microscopic hairs also vary in the several species in like manner. Moreover the extent to which the valves are covered with these hairs is quite definite in each species. Similar differences are evident in the small hairs to be found on the last ventral abdominal segment of the female.

The middle or ventral valves arise from the eighth segment. Each of these valves consists of a more heavily chitinized portion and a membranous part. The relative size of this membranous part differs in the various species as does the appearance of the tip of the chitinized part. This latter arrowhead-like part is marked by lines which give it the appearance of palmer skin. It is interesting to note that the fineness or coarseness of these lines seems to be constant for the species and somewhat different in the various species.

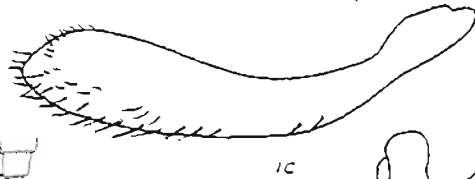
The inner or dorsal valves constitute the ovipositor proper and arise from the ninth segment. Only very minute microscopic differences are found in these valves in the several species. While specific differences are not strong in these valves, nevertheless their generic aspect seems to be very constant.

KEY TO SPECIES.

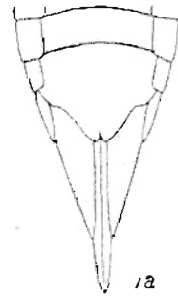
1. Costal margin distinctly lighter than rest of elytra *melanotus* Spangberg.
Costal margin not distinctly lighter than rest of elytra 2.
2. Lighter, grayish-brown species; dark brown veins strongly contrasting with cells of elytra and without light elytral hands *snowi* sp. n.



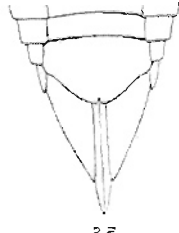
1 *J. olivarius*



1c



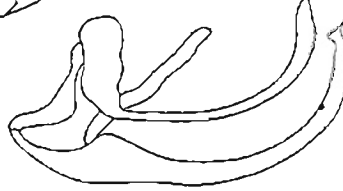
1a



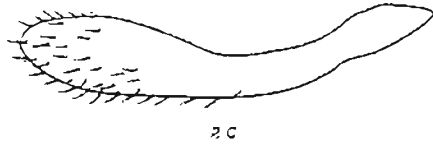
2a



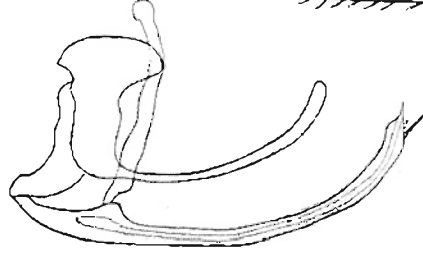
2b



2 *borealis*



2c



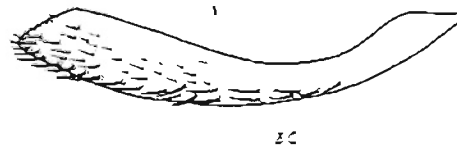
3 *J. melanosus*



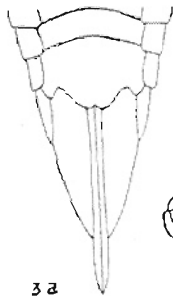
3b



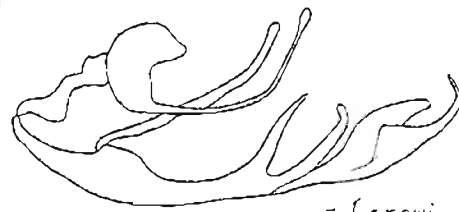
4 *J. floridanus*



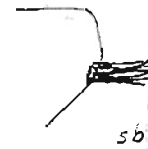
4c



5a



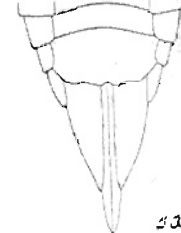
5 *J. snyderi*



5b



5c



5a

LIX.

- Darker, reddish-brown species; elytral veins not so distinct, elytral bands absent, faintly indicated or distinctly evident 3.
3. Species varying from light to dark brown; females usually with two distinct transverse elytral bands *olitorius* Say.
- Reddish-brown species; with, at most, but one transverse elytral band .. 4.
4. Elytral band distinct; last ventral segment of female without distinct median notch *floridanus* sp. n.
- Elytral band at best indistinct, frequently lacking; last ventral segment of female with short but wide notch *borealis* Spangberg.

***Jassus melanotus* Spangberg.**

Figs. 3, 3a, 3b, 3c.

Jassus melanotus Spangberg. Of. Vet. Akad. Forh., XXXV, No. 8, p. 19, 1878.

A black species with costal margins of elytra light. Length 5.5-8 mm.

Head narrower than pronotum; vertex wider than long, narrowed basally, anterior margin slightly produced beyond eyes, longitudinal median line distinct, ocelli about twice as far from each other as from the eyes; front about twice as long as wide, with median carina; clypeus strongly widened apically, with median carina. Pronotum about as long as vertex, nearly three times as wide as long, sparsely but distinctly granulated. Scutellum large. Elytra with venation distinct, strongly exceeding ovipositor. Last ventral segment of female about twice as long as preceding, lateral angles distinct, posterior margin strongly concave on either side of the produced median half which has no apical slit or notch; pygofer bearing a few fine hairs, strongly exceeded by ovipositor. Male plates long, bearing spines on apical two-thirds, apex acutely angled when viewed laterally; pygofer not angulate, bearing a considerable number of moderately large spines.

Color: Black when fully colored except for yellow vertex and light costal margins of elytra. Beneath mostly yellow, with coxae of hind legs and pygofer marked with black. Teneral forms dark brown to black with lighter line along elytral suture and light spots at tips of clavi.

Distribution: Specimens examined were taken in Ga., S. C., N. C., Miss., Tex., Tenn., Ill., and Ohio.

Hosts: Dr. H. L. Dozier reports taking this species on *Sagittaria*.

Remarks: Both sexes of this species are alike in color, but the male is distinctly smaller than the female. Some of the males of *J. olitorius* superficially resemble the males of this species, particularly in color, but lack the light costal margin on the elytra.

***Jassus snowi* sp. n.**

Figs. 5, 5a, 5b, 5c.

A grayish-brown to dark brown species with veins contrasting strongly with cells of elytra. Length 6.5-8.5 mm.

Head narrower than pronotum; vertex wider than long, narrowed basally, obtusely rounding in front and slightly produced beyond the eyes, with distinct median impressed line, ocelli nearly twice as far from each other as from the eyes; front scarcely twice as long as wide, with a faint median carina; clypeus with median ridge, widened apically, apical margin concave. Pronotum about as long as vertex, nearly three times as wide as long, distinctly granulated. Scutellum

large, with transverse impression. Elytra exceeding the ovipositor, with very distinct venation. Last ventral segment of female about twice as long as preceding, posterior margin almost truncate and sinuated between lateral angles and the slightly produced median portion; pygofer bearing few fine hairs, strongly exceeded by ovipositor. Plates of male long and club-like, apices broadly rounded when viewed laterally, bearing a row of stout spines near mesal margin; pygofer bearing a small group of long black hairs.

Color: Vertex uniformly yellowish-brown, often bearing a pair of brown or red spots near base. Pronotum slightly darker than vertex, the granulations usually dark brown. Scutellum uniformly yellowish-brown or darker. Elytra nearly uniformly grayish-brown with very dark veins and posterior margin fuscous. Eyes black. Face nearly unicolorous yellowish-brown, sometimes with two bright red stripes along sides of front. Underside brown, usually well spotted with black.

Holotype and *allotype*, female and male respectively, from the Santa Rita Mts., Arizona. Taken by F. H. Snow. These types with many paratypes, deposited in the Snow Entomological Collection. Other paratypes deposited in the United States National Museum, Cornell University Collection, Museum of Comparative Anatomy, Cambridge, and in Dr. Ball's collection. All these types except the last which was taken in Lower California, Mexico, are from Arizona.

Remarks: This species, named in honor of Dr. F. H. Snow who collected most of the specimens, shows internal genitalia which are quite distinct from those found in the other species from the United States. These genitalia would indicate that it belongs to a different subgenus.

***Jassus olitorius* Say.**

Figs. 1, 1a, 1b, 1c.

Jassus olitorius Say, Jl. Acad. Nat. Sci. Phila., vi, p. 310, 1831; Compl. Writ., ii, p. 385.

A light brown to dark brown species. Females with two light transverse bands. Length 6-8.5 mm.

Head narrower than prothorax; vertex wider than long, widened apically, anterior margin but slightly produced beyond the eyes, median impressed line distinct, ocelli about twice as far from each other as from the eyes; front about twice as long as wide, with median carina; clypeus widened apically. Pronotum a little longer than vertex, nearly three times as wide as long, sparsely but distinctly granulated. Scutellum large, wider than long. Elytra distinctly veined, strongly exceeding ovipositor. Last ventral segment of female over twice as long as preceding, lateral angles distinct, posterior margin strongly produced medially and bearing a narrow apical slit; pygofer bearing a few fine hairs and strongly exceeded by ovipositor. Male plates quite long, quite spiny on apical half and with apex obtusely angled when viewed laterally; pygofer sharply angulate apically and bearing a large group of fairly long hairs.

Color: Varying from practically uniform pale brown to almost black. Females light to dark brown. Vertex usually yellow. Pronotum darker, frequently with basal angles and two spots before transverse impression, black. Elytra with veins darker than cells, sometimes black, and with a light band across middle of clavus and a more prominent one through antepical cells. Face yellow, with frontal sutures below the antennae frequently darkened and some-

times with two red stripes along margins of front. Males showing definite color dimorphism. In both forms vertex yellow. Light form yellowish-brown with elytra becoming slightly smoky; dark form with black pronotum, scutellum and elytra, the latter becoming slightly lighter apically.

Distribution: The writer has seen specimens from the following states: Ark., Tenn., Kans., Mo., N. J., N. Y., Mass., Me., Va., W. Va., Ia., Fla., Mich., Ga., Tex., Md., Ill., Ala., Wisc., N. C., S. C., Pa., Minn., Miss., La., and from Washington, D. C. and Ontario. Van Duzee also reports it from Arizona and the Bermudas. The species is thus known to occur throughout the eastern half of the United States. There is some question whether the reference to Arizona should apply to this species or to the new species described above.

Hosts: Seemingly a rather general feeder. The writer has frequently taken nymphs on several species of oak and very commonly also on *Ambrosia trifida*.

Remarks: It seems quite clear that Spangberg had a dark male of this species before him when he described *Jassus fuscipennis*. This is the only common and well known member of the genus in the United States.

Jassus floridanus sp. n.

Figure 4.

Close to *J. melanotus* Spangberg, but reddish-brown in color and with a light transverse band across elytra through anteapical cells. Length 7.5 mm.

Head narrower than prothorax; vertex wider apically than long, narrowed at base, obtusely rounded in front and slightly produced beyond the eyes, with distinct median impressed line, ocelli about twice as far from each other as from the eyes; front about twice as long as wide, with a faint median carina; clypeus narrowed immediately below base, gradually widened to below middle, and then suddenly and strongly widened to two large apical lobes, the apex distinctly concave. Pronotum about as long as vertex, three times as wide as long, with small but distinct granulations. Scutellum large with transverse impression at about middle. Elytra exceeding the ovipositor, with venation distinct. Last ventral segment of female over twice as long as preceding, lateral angles acute, posterior margin strongly produced medially, but without notch or slit; pygofer bearing a very few short, scattered hairs, strongly exceeded by ovipositor.

Color: Vertex and face brownish-yellow; eyes black; pronotum and scutellum nearly uniformly reddish-brown, lateral angles of latter slightly darkened. Elytra with clavi reddish-brown, the rest smoky-brown except for distinct light band which is widest on costal margins and extends to middle anteapical cell on each side; veins, except on claval area, for the most part dark brown or black. Underside nearly uniformly yellow except for darker pygofer and ovipositor and patch on metathorax. Wings smoky with black veins.

Holotype, female, Gainesville, Fla. Taken by C. J. Drake. Type in collection of Dr. H. O. Osborn.

Remarks: Except for color this species is very close to *J. melanotus*. The costal margins of the elytra, however, are darker than in the darkest specimens of that species and the lateral angles of the last ventral segment of the female are

not as strongly produced as in *melanotus*. Moreover there is a distinct, light elytral band in this species, no signs of which occur in Spangberg's species.

***Jassus borealis* Spangberg.**

Figs. 2, 2a, 2b, 2c.

Jassus borealis Spangberg, Of. Vat. Akad. Forh., xxxvi, No. 6, 24, pl. 16, fig. 8, 879.

A rusty-brown to dark brown species. Length 5.5-8 mm.

Head narrower than pronotum; vertex wider than long, narrowed basally, anterior margin but slightly produced beyond the eyes, median longitudinal line distinct, ocelli about twice as far from each other as from the eyes; front about twice as long as wide, with median carina; clypeus strongly expanded apically, with median carina, apex strongly concave. Pronotum no longer than vertex, fully three times as wide as long, sparsely but distinctly granulated. Scutellum large, wider than long. Elytra usually but slightly longer than ovipositor. Last ventral segment of female over twice as long as preceding, lateral angles distinct but posterior margin not deeply concave either side of the produced median half which has a distinct short and rather wide notch at its apex; ovipositor strongly exceeding finely and sparsely haired pygofer. Male plates long, haired apically, apex rounded when viewed laterally; pygofer quite well rounded apically, bearing a fair sized group of moderately long spines.

Color: Practically uniformly rusty-brown to dark brown. Vertex usually yellow with two dark or reddish spots caudad of middle. Scutellum sometimes with basal angles and two spots cephalad of transverse line, black. Elytra unicolorous or with veins darker, sometimes with a very faint light band across middle of clavus and another through the apices of the antepical cells; tips of elytra and wings sometimes banded with fuscous. Underside varying from brown to black, face sometimes with two red stripes extending on to median carina of clypeus.

Distribution: The writer has examined specimens of this species from Florida, Georgia and South Carolina.

Remarks: This species, as described above, fits Spangberg's description of *J. borealis* in every detail except that the ovipositor does not extend beyond the elytra as shown in his figure. Since the resemblance is so close in every other way, however, there seems to be no question about the correctness of this determination.