

A NEW SPECIES OF *CISTALIA* FROM BRAZIL
AND COMMENTS ON SYSTEMATIC CHARACTERS IN THE
LETHAEINI (HEMIPTERA: LYGAEIDAE)¹

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ABSTRACT

Cistalia micans a new species from Brazil, is described and figured. The highly modified nature of the sperm reservoir in the Lethaeini is discussed. The potential importance of sperm reservoir morphology in understanding phylogenetic relationships within the tribe is noted. The iridescent head patches of *Cistalia* are discussed in relation to other genera and to sperm reservoir modifications. Figures of the sperm reservoir, clasper, genital capsule, and SEM photographs of the iridescent head patches are included.

The genus *Cistalia* Stål is a small genus of chiefly Neotropical lygaeids. The systematics of the genus has been reviewed by Slater and Baranowski (1973). Recently a striking new species from Brazil has become available for study. The male phallus of this species is so strikingly different from those of other lethaeines with which we were familiar that we were led to investigate representatives of several additional genera in an effort to better understand the position of *Cistalia* within the tribe.

Cistalia micans Slater & O'Donnell NEW SPECIES
(Fig. 1, 4, 6, 7, 8)

HOLOTYPE: male, BRAZIL, Espiritu Santo: Linhares, IX-1972. M. Alvarenga. In American Museum of Natural History.

PARATYPES: 2 males, 8 females same data as holotype. In American Museum of Natural History and J. A. Slater collections.

General coloration dark reddish brown; clavus and corial veins mesad of radius yellow-brown, contrasting with chocolate brown color of remainder of corium except for a small white macula at basal curve of cubitus; membrane concolorous with corium. First antennal segment orange yellow with a narrow black distal end; antennal segments 2 and 4, and basal 1/4 to 1/3 of segment 3 dark chocolate brown; distal 2/3 to 3/4 of segment 3 a strongly contrasting white or very pale yellow. Pleural and sternal surfaces uniformly shining reddish brown. Entire fore femora and distal 1/3 to 1/2 of mid and hind femora tan, and proximal 1/2 to 2/3 white; tibiae brown, becoming darker distally; middle and hind tarsi yellow; apical segment of these tarsi and all fore tarsal segments darker, nearly concolorous with tibiae.

Head, pronotum, scutellum and area of corium laterad of radial vein strongly shining, corial shining area contrasting strongly with pruinose surface of clavus and inner 1/2 of corium. Clothed above with short yellow

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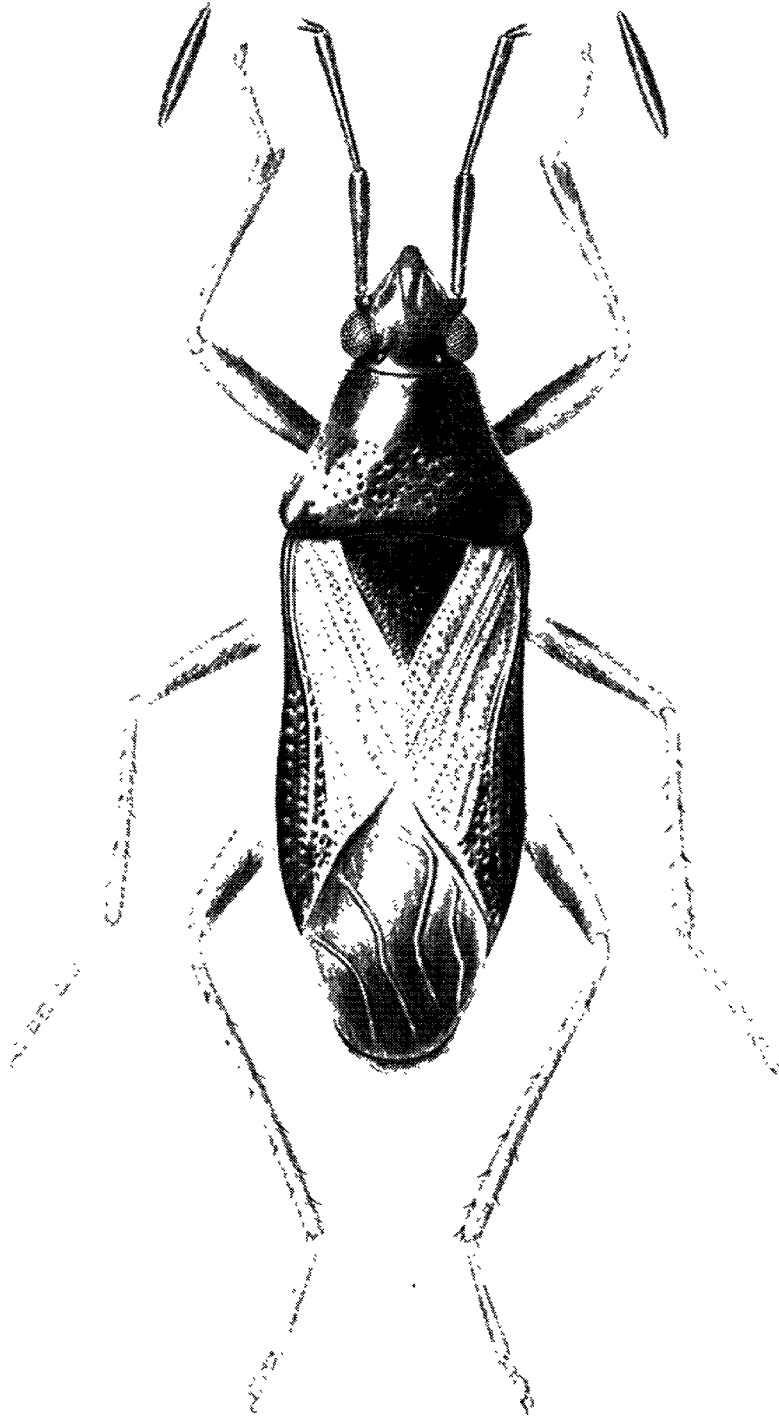


Fig. 1. *Cistalia micans* n. sp. dorsal view.

semierect to decumbent hairs; antennal segments clothed largely with decumbent pubescence, several upright hairs present but these shorter than diameter of an antennal segment.

Head moderately convex across vertex, non-declivent anteriorly; tylus evenly rounded, not quite attaining middle of first antennal segment; lateral margins of juga carinate. Compound eyes large, touching anterolateral margins of pronotum. Length head 0.75 (all measurements in millimeters), width head 0.92, interocular space 0.52. Pronotum with transverse impression shallow, obsolete; posterior lobe distinctly punctate, more heavily so than anterior lobe, calli impunctate; scattered punctures present near anterior pronotal margin; lateral margins evenly narrowing anteriorly, carinate; posterior margin shallowly concave. Pronotum 1.02 long, 1.60 wide. Scutellum shallowly rugose, distinctly and evenly punctate, ecarinate. Scutellum 0.92 long, 0.85 wide. Claval commissure 0.45 long.

Hemelytra with lateral corial margins feebly sinuate, nearly straight, tapering posteriorly; clavus with 4 distinct rows of punctures; corium with cubitus strongly elevated above surface, membrane extending to or slightly beyond end of abdomen; distance apex-clavus to apex-corium 1.05; distance apex-corium to apex-abdomen 0.75. Metathoracic scent gland auricle nearly straight or slightly curving caudad distally, apex subtruncate; evaporative area large, occupying ventral 2/3 of metapleuron, the lateral (dorsal) margin truncate but sloping ventrad posteriorly. Fore femora slightly incrassate, armed below with 2 short stout spines distally and several elongate prominent hairs proximal to these on ventral surface; middle and hind femora mutic. Labium extending posteriorly to metacoxae, first segment reaching base of head; length labial segments I 0.70, II 0.70, III 0.55, IV 0.38. Antennae moderately stout, first segment somewhat enlarged on distal 1/2; segments 3 and 4 slightly fusiform. Length antennal segments: I 0.80; II 0.98; III 0.82; IV 0.92. Total length 4.90.

This species is closely related to *Cistalia binotata* Slater and Baranowski and will run to *binotata* in Slater and Baranowski's (1973) key. Three species of *Cistalia* (*alboannulata* Stal, *binotata* S. & B., and *micans* n.sp.) form a distinct group within the genus because of the nearly straight, evenly narrowed lateral pronotal margins. *C. binotata* and *micans* are the only *Cistalia* species that have the outer portion of the corium polished and shining and the inner half a strongly contrasting dull pruinose.

C. micans can readily be distinguished from *binotata* by having a polished and shining rather than pruinose scutellum, by lacking prominent white spots near the posterior end of the corium and distally on the clavus, by having an appreciably longer first antennal segment and by having the shining area of the corium extending further mesad.

The sperm reservoir of *Cistalia micans* is so highly modified from the generalized lygaeid type that morphological relationships are difficult to understand.

SPERM RESERVOIR RELATIONSHIPS

The generalized condition in the Lygaeidae is of a sperm reservoir with a bulb, the ventral portion of which is cup-shaped and strongly sclerotized (sclerotized cup) with a pair of "wings" projecting from the membranous

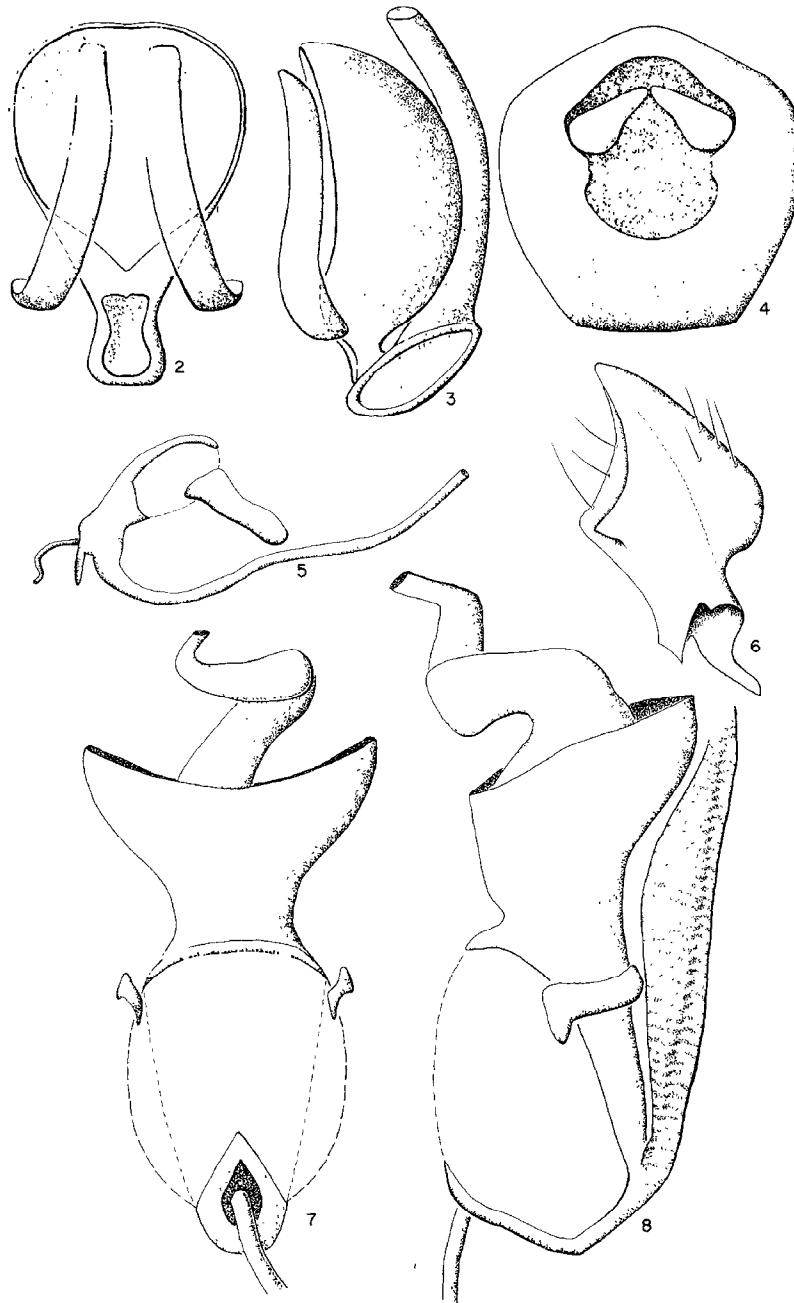


Fig. 2-8. *Dimorphopterus zuluensis*, Fig. 2-3: 2) sperm reservoir, dorsal view; 3) sperm reservoir, lateral view. Fig. 4. *Cistalia micans*, genital capsule, dorsal view. Fig. 5. *Lophoraglius* sp. nr. *guttulatus*, sperm reservoir, lateral view. Fig. 6-8. *Cistalia micans*: 6) clasper; 7) sperm reservoir, dorsal view; 8) sperm reservoir, lateral view.

dorsal portion of the bulb (Fig. 2, 3). From the base of the sclerotized cup arises a large strongly sclerotized ejaculatory duct (=seminal duct) that passes ventrad of the sclerotized cup (Fig. 3) and continues distally through the aedeagus (see Slater and Harrington 1970 for a definition of terms and a more detailed discussion of function).

In *Cistalia* the sclerotized portion of the "bulb" appears to have become greatly enlarged and to be continued distad of the membranous area of the bulb as a complete tubular or cylindrical structure (Fig. 7, 8). Within this large heavily sclerotized "cylinder" lies a coiled tube that emerges distally from a large opening in the sclerotized "cylinder." This coiled tube appears to arise near the base of the bulb. The sclerotized wings are reduced to small strips (Fig. 8) that curve ventrad around the sclerotized portion of the bulb. Ventrad of the bulb and attached to the bulb near the base is a peculiar sheath-like, somewhat corrugated structure that becomes evanescent distally. This structure definitely does not carry a tubular connection to the distal portion of the aedeagus.

The sperm reservoir of *Cistalia* is so modified that it is difficult to understand the relationship of the ejaculatory duct to that of the generalized condition. It is our belief that the ejaculatory duct has become incorporated within the enormous "cylinder" which actually seems to have been formed from an enlargement of the sclerotized cup and an enlargement of a basal ventral sclerotized "spur" (see below). It is tempting because of its basal connection to view the peculiar sheath-like ventral structure as the non-functional original ejaculatory duct. We do not believe this to be the case. Not only is there no evidence of a tubular duct associated with this corrugated structure but more importantly such an interpretation would necessitate the development of a completely new duct within the sperm reservoir whereas the corrugated sheath-like structure could be developed merely by modification of already existing membranes in the phallus.

A structurally similar modification of the sperm reservoir area occurs in *Cryphula* and in *Petissius*.

In species of the *Lophoraglius guttulatus* "complex" (Old World Tropics) the sperm reservoir area is very different (Fig. 5), yet it, too, is not of the generalized lygaeid type. In this complex the ejaculatory duct instead of curving ventrad "below" the sclerotized "cup" curves in exactly the opposite direction so that it passes above or "in front of" (dorsad of) the membranous portion of the bulb. Since these structures are completely and rigidly sclerotized at their point of basal attachment, this cannot result from merely a "flipping over" of the ejaculatory duct to enable it to run on the opposite side of the bulb from the plesiomorphic position. It is possible that the sclerotized cup portion of the bulb has developed in these insects on the opposite side from where it originally was, and that the originally sclerotized area has become membranous. Some support for this hypothesis might appear to come from the "wings" which in many lygaeids curve around the sclerotized cup toward the ejaculatory duct below. In the *Lophoraglius* complex the wings extend strongly from the membranous bulb toward the ejaculatory duct. Attractive as this hypothesis might be, there does not seem to us any evident adaptive advantage for such a drastic structural modification.

In many Lygaeinae and some Blissinae the sclerotized basal area from which the bulb and ejaculatory duct arise is enlarged and often has a ven-

tral sclerotized spur. It is possible that the *guttulatus*-type modification has been achieved by the reduction of the cup so that the bulb arises directly from the basal sclerotization. The peculiar position of the wings (Fig. 5) would seem to support this hypothesis. If this is so it will also account for the modifications found in *Cistalia* where the spur-like ventral development of the basal area of the sperm reservoir presumably enlarges, surrounds the ejaculatory duct, and becomes fused with the cup. The above interpretation seems to us to be the most parsimonious explanation for the striking modifications of the sperm reservoir area found in these lethaeines.

From a systematic viewpoint the most important considerations are these: (1) The *Lophoraglius* type of sperm reservoir also occurs in species of *Valtissus*, *Xestocoris*, and *Lipostemmata*, all of which are Western Hemisphere genera. (2) The "*Cistalia*-type" and the "*Lophoraglius*-type" reservoirs are both highly apomorphic conditions. (3) Neither of these types of sperm reservoir modifications can be directly derived from the other.

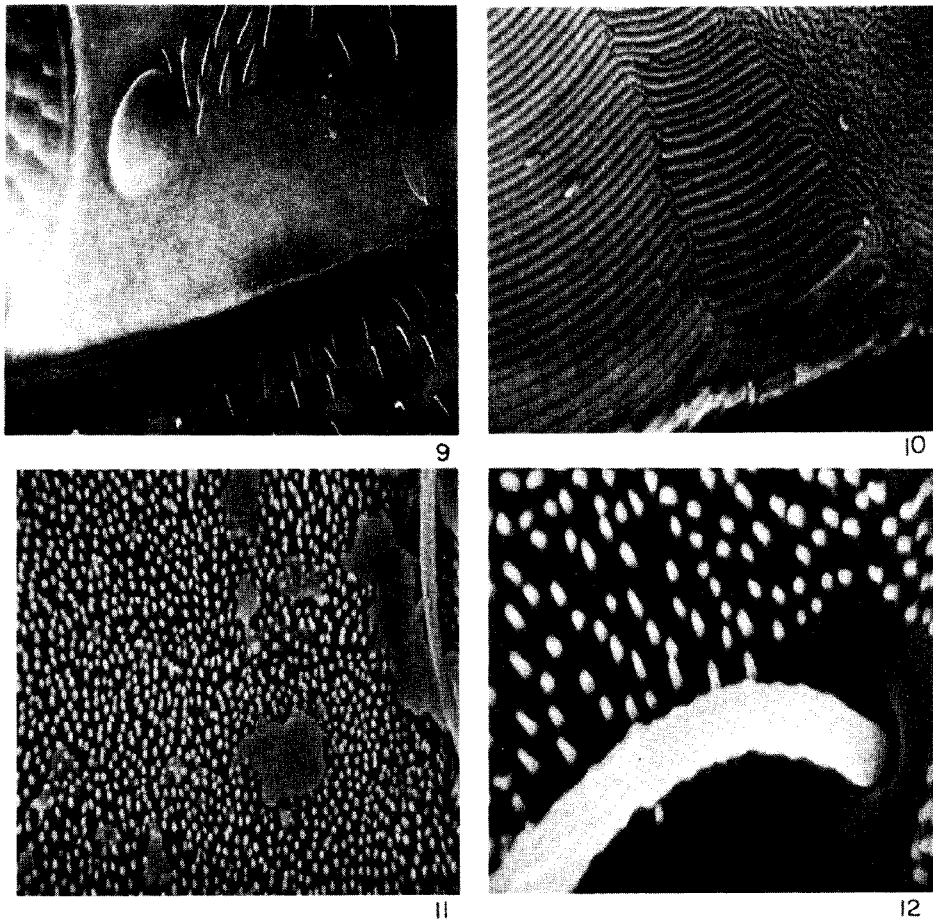


Fig. 9-12. *Lethaeus africanus*: 9) head, dorsal view showing "iridescent" area, (SEM) X240; 10) same X1000; 11) pronotum showing "iridescent" area, (SEM) X500; 12) same X1000.

Ashlock (1964) notes that 6 New World genera of Lethaeini have a synapomorphic feature at the base of the head dorsally. The 6 genera have a single median iridescent area whereas in other genera 2 iridescent areas are present. It is significant that all 3 genera with a single iridescent area that we have investigated have the *Cistalia*-type sperm reservoir (*Cistalia*, *Cryphula*, *Petissius*), further evidence that a holophyletic group is involved.

We have made a few preliminary observations on the nature of the "double iridescent head patches" as compared to thoracic lethaeine iridescence. The iridescence of these 2 surfaces is very different. SEM photographs (Fig. 9, 10) of the head patches show that they are formed of a series of fine corrugations arranged in 4 rows to form a circle: only a semicircle is visible when the head is intact. The pronotal iridescence by contrast is formed by a field of minute pegs scattered across the cuticular surface (Fig. 11, 12).

The corrugated rows that form the iridescent head patches are visible under high power of a good light microscope. We have not been able to detect these corrugations in species with a single median basal iridescent head patch. As with the sperm reservoir these iridescent areas appear to offer valuable characters for a more mature understanding of phylogenetic relationships within the Lethaeini.

ACKNOWLEDGEMENTS

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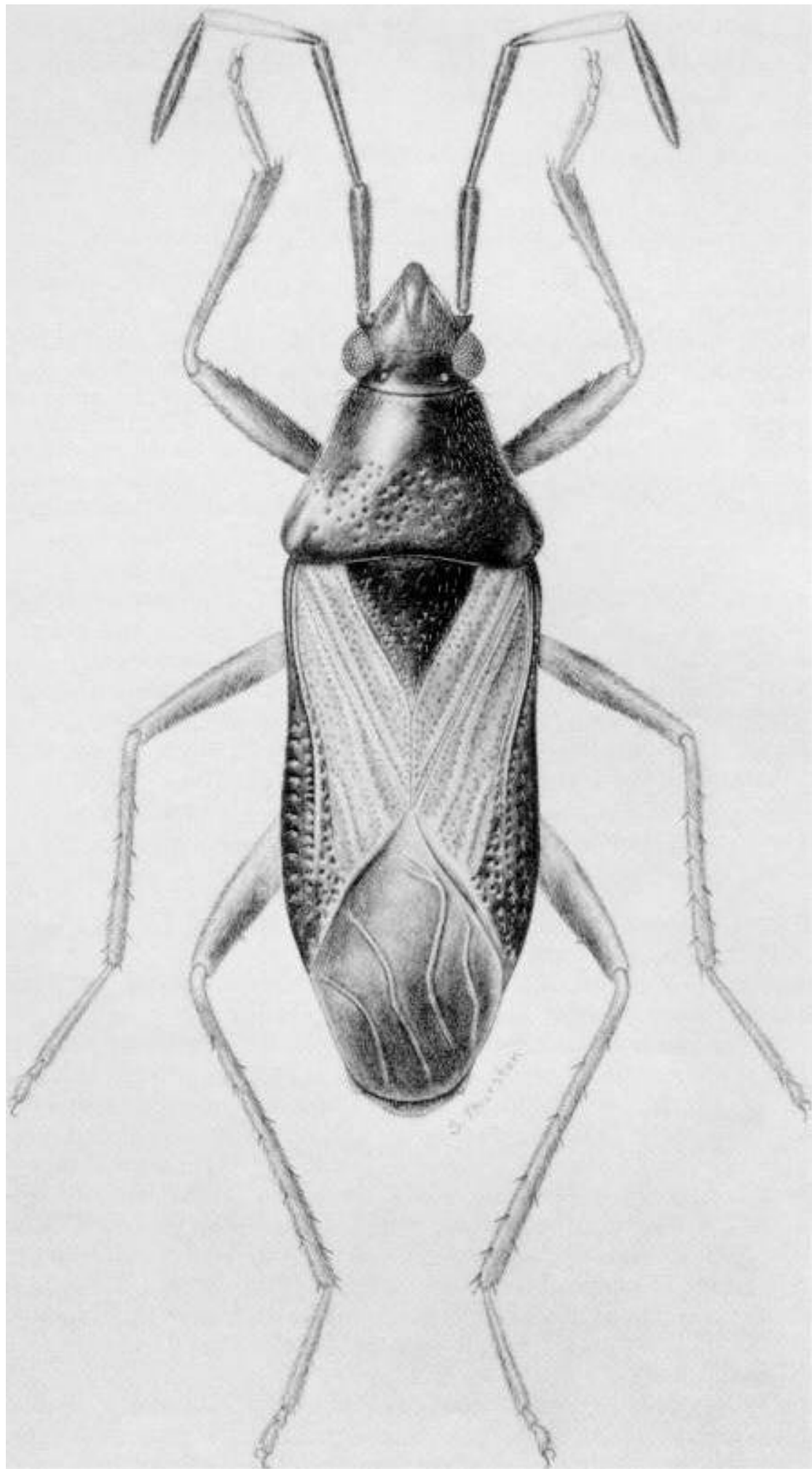
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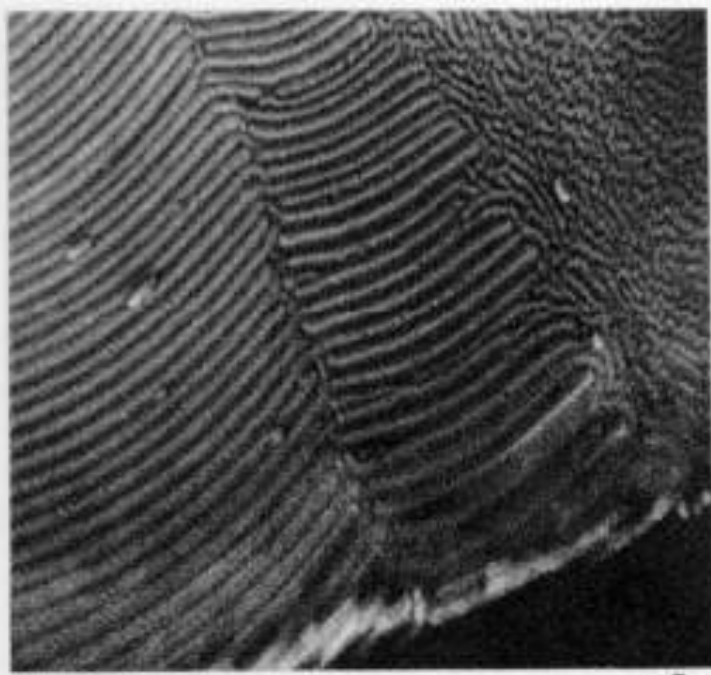
BOOK REVIEW

IMMS' GENERAL TEXTBOOK OF ENTOMOLOGY (now in 2 volumes). O. W. Richards and R. G. Davies. 1977. Chapman and Hall, London. 1354 p, consecutive pagination with 418 p in Vol. 1. (Vol. 1, \$25.00 hard, \$13.50 paper; Vol. 2, \$60.00). Contents: Organization is identical to that of the previous (9th, 1957) edition. Part 1, Anatomy and Physiology, Part 2, Development and Metamorphosis (in Vol 1); and Part 3, The Orders Of Insects, without keys to families formerly included. Chapter titles and sequence are virtually identical to those of the former edition: the order of

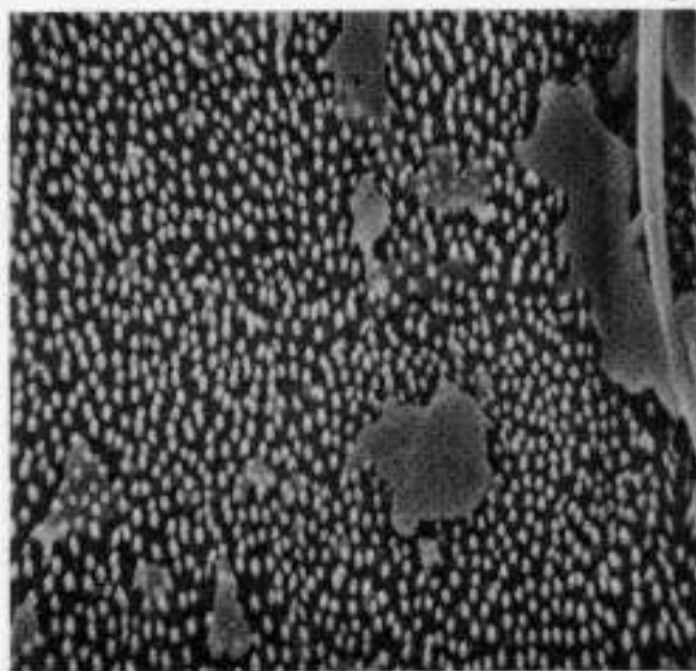




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