THE GENUS *STETHORUS* WEISE (COLEOPTERA: COCCINELLIDAE) IN CHILE

R. D. GORDON AND D. M. ANDERSON

Systematic Entomology Laboratory, IIBIII, Sci. & Educ. Admin., USDA[1]

ABSTRACT

Stethorus histrio Chazeau is recorded from Chile; *Stethorus sicardi* Brèthes is transferred to the genus *Scymnus,* subgenus *Pullus*; and the mite feeding habits of members of *Stethorus* are discussed. The larva of *S. histrio* is described and compared with the larvae of other *Stethorus* species.

The feeding habits of *Stethorus* species are unusual for the family Coccinellidae. Most coccinellids are predaceous on insects of the order Homoptera, and some (Epilachninae) are plant feeders, but species of *Stethorus* feed almost exclusively on tetranychid mites. Some species are effective as biological control agents on commercial crops such as citrus, other fruit trees, and cotton. Kapur (1948) reviewed the world literature on feeding habits and host preferences of *Stethorus* species. The purpose of this paper is to clarify the status of Chilean members of this genus, through studies of both adults (Gordon) and larvae (Anderson).

Alfonso Aguilera of the Universidad del Norte, Coquimbo, Chile, recently sent specimens of an unidentified species of *Stethorus* from Chile. These specimens were feeding on mites infesting the leaves of *Vitis* sp. Specimens of the same species already present in the USNM collection are labeled "feeding on citrus mite," so it appears that this species is capable of preying upon different mites. It seems that possibilities exist for using this species as a biocontrol agent in temperate regions.

Stethorus is distributed throughout the tropical and temperate regions of the world. The Old World species were taxonomically treated by Kapur (1948), with 20 species listed from that region. The New World species have never been reviewed as a whole. There are currently 5 species described from North America and 2 from South America, but there are more than 7 New World species. Several undescribed species are represented in the USNM collection alone.

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Genus *Stethorus* Weise

Stethorus Weise, 1885, p. 65.—Casey, 1899, p. 135.—Kapur, 1948, p. 300. Type-species; *Stethorus punctillum* Weise, by subsequent designation of Korschefsky, 1931.

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[1]Mail address: c/o U. S. National Museum, Washington, D. C. 20560.

Nephopullus Brèthes, 1924, p. 167.—Kapur, 1948, p. 300. Type-species; *Nephopullus darwini* Brèthes, by subsequent designation of Korschefsky, 1931.

Small Scymini, 1.0-1.5 mm long. Black except antenna and mouthparts pale yellow, leg may be pale yellow. Head with somewhat coarsely faceted eye; clypeus truncate anteriorly, anterolateral angle rounded, not emarginate around base of antenna; antenna short, scape 8-segmented, club 3-segmented; mandible bifid at apex; maxillary palpus with terminal segment oblong, obliquely truncate and narrower towards apex. Prosternum without carinae, produced anteriorly to partly conceal mouthparts. Abdomen with 6 visible sterna, first sternum usually with complete post-coxal line as in *Pullus*. Tarsus with 3 or 4 segments, tarsal claw bifid, inner claw shorter in male than female. Genital plate small, transverse, not triangular; spermathecal capsule present or absent.

Stethorus was placed in the tribe Stethorini by Dobzhansky (1924), and this placement was followed by several subsequent authors. Korschefsky (1931) synonymized Stethorini with Scymini, and Kapur (1948) followed his treatment, giving excellent supporting evidence that *Stethorus* is a somewhat aberrant genus of Scymnini, a viewpoint with which we agree.

Stethorus is easily separated from all other genera of Scymnini because the clypeus is not emarginate around the antennal bases, and the prosternum is arcuately produced in front, partly concealing the mouthparts.

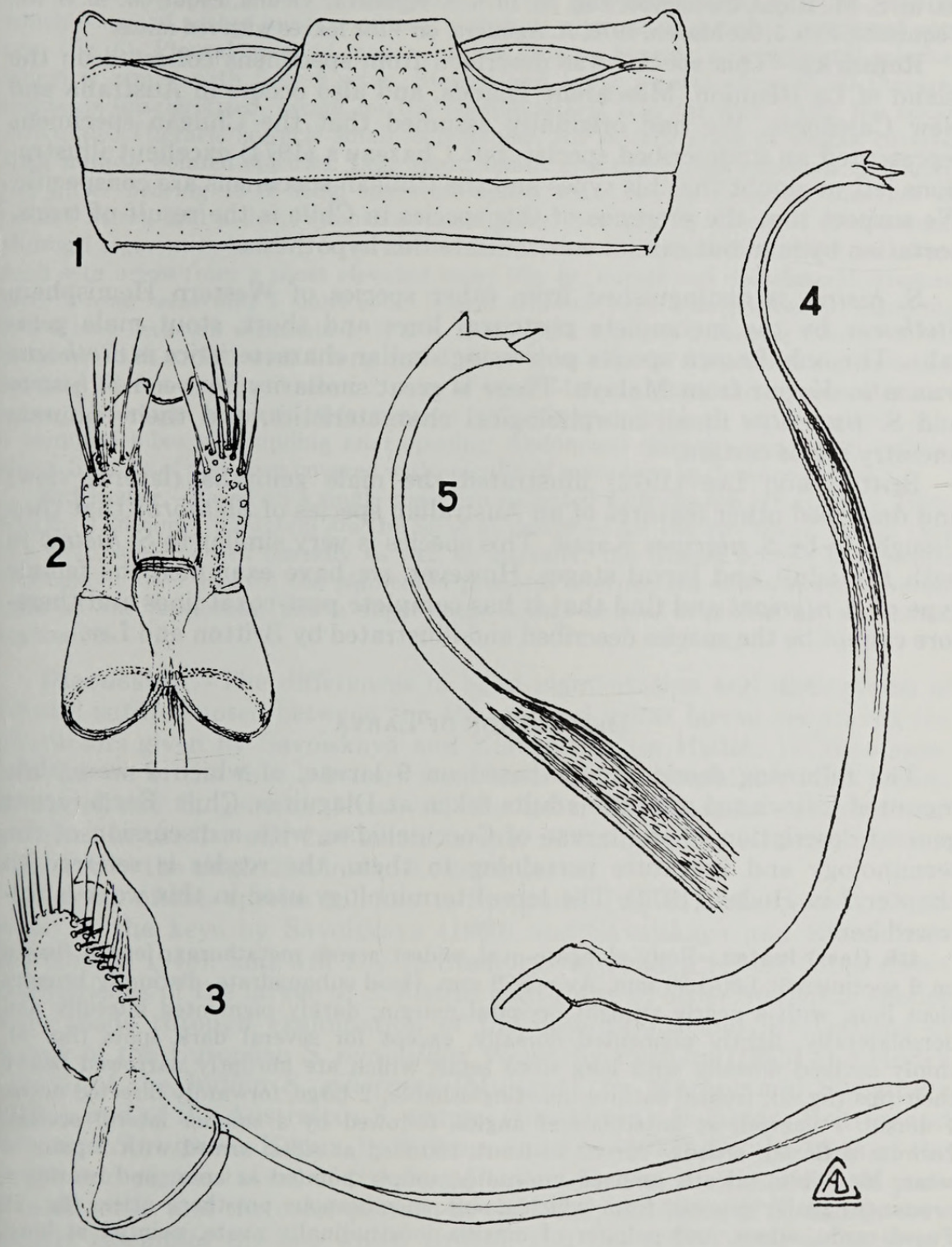
Brèthes (1924) described 2 species of *Nephopullus, N. darwini* from Uruguay and *N. sicardi* from Chile. Korschefsky (1931) designated *N. darwini* as the type-species of *Nephopullus,* and Kapur (1948) correctly placed *Nephopullus* as a junior synonym of *Stethorus.* The types of both *N. darwini* and *N. sicardi* have been examined in the course of this study. The unique and therefore holotype specimen of *N. darwini* is a member of *Stethorus.* It is a male in the British Museum (NH) labeled "Type/Maldonado, Uruguay, C. Darwin/Darwin Coll. 1885.—119/Maldonado/Nephopullus darwini Brèthes". *N. sicardi* does not belong in *Stethorus* but is a member of the genus *Scymnus,* possibly the subgenus *Pullus.* Brèthes stated that *Nephopullus* differed from *Pullus* because it lacked prosternal carinae; however, some species of *Pullus* also lack carinae, and so a separate genus may not be justified. *N. sicardi* is here transferred to *Scymnus,* subgenus *Pullus,* new combination. Brèthes had 3 examples of *N. sicardi,* 2 (females) of which are presently in the British Museum. The specimen labeled "Type/Germain/Chili/Fry Coll. 1905. 100/ Nephopullus sicardi Brèthes" is here designated and labeled lectotype. The other specimen labeled "31939/Germain/Chili/Fry Coll. 1905. 100/Nephopullus sicardi Brèthes" is designated and labeled paralectotype.

Stethorus histrio Chazeau
Figs. 1-5

Stethorus histrio Chazeau, 1974, p. 269.

Male.—Length 1.0-1.2 mm, width 0.80-0.86 mm. Form oval, not strongly convex. Black, except mouthparts, antennae and legs yellowish brown. Dorsum with short, decumbent, yellowish-white pubescence. Head finely punctured, punctures separated by a diameter or less. Pronotal punctures slightly coarser than on head, separated by less than to 3 times a diameter except denser at anterolateral angle, surface smooth, shiny. Punctures on elytron coarse, dense, separated by less than a diameter, surface faintly alutaceous. Ventral surface with fine, sparse pubescence, punctation fine, indistinct except abdominal sterna obviously and densely punctured. Apical abdominal sternum truncate posteriorly. Postcoxal line on basal abdominal ster-

num short, incomplete (fig. 1). Genitalia with phallobase short, stout, 1/2 as long as trabes; paramere broad, flat, shorter than basal lobe, with short, stout spines arising from large pores ventrally near apex (fig. 3); basal lobe broad, flattened dorsoventrally, with apical emargination medially (fig. 2); sipho short, robust, apex trifid (figs. 4, 5).



Figs. 1-5, *Stethorus histrio* Chazeau, adult. Fig. 1, first abdominal sternum and postcoxal lines. Figs. 2-5, male genitalia. Fig. 2, ventral view of phallobase; fig. 3, lateral view of phallobase; fig. 4, sipho; fig. 5, tip of sipho.

Female.—Similar to male except for sexual characters. Apex of last abdominal sternum rounded; spermathecal capsule absent; genital plate transversely oval.

Type-locality.—Cilaos, La Rèunion, Mascarene Islands.

Type-depository.—Museum national d'Histoire naturelle, Paris.

Material examined.—CHILE: Diaguitas; La Cruz, S. Rojas, feeding on citrus mite; La Cruz, Valpo., 1965; Recreo, 12-VIII-1968, A. Aguilera, en laurel; Vicuña, 600 m. S. M., Elqui, Coquimbo, Feb. 20, 1976, A. Aguilera; Vicuña, Elqui, 650 m. S. M., Coquimbo, Feb. 5, 26, March, 1976, A. Aguilera, on *Vitis* leaves with red mites.

Remarks.—This species was described from specimens collected on the island of La Rèunion, Mascarene Islands, and also occurs in Australia and New Caledonia. We had originally assumed that the Chilean specimens represented an undescribed species, but Chazeau's (1974) excellent illustrations left no doubt that his types and the Chilean specimens are conspecific. We suspect that the presence of this species in Chile is the result of transportation by man but cannot substantiate this hypothesis.

S. histrio is distinguished from other species of Western Hemisphere *Stethorus* by the incomplete postcoxal lines and short, stout male genitalia. The only known species possessing similar characteristics is *Stethorus truncatus* Kapur from Malaya. There is great similarity between *S. histrio* and *S. truncatus* in all morphological characteristics, and their common ancestry seems certain.

Britton and Lee (1972) illustrated the male genitalia (lateral view) and described other features of an Australian species of *Stethorus* that they thought to be *S. nigripes* Kapur. This species is very similar to *S. histrio* in both the adult and larval stages. However, we have examined the female type of *S. nigripes* and find that it has complete post-coxal lines and therefore cannot be the species described and illustrated by Britton and Lee.

Description of Larva

The following description is based on 9 larvae, of which 2 were slide mounted, associated with the adults taken at Diaguitas, Chile. For a recent general description of the larvae of Coccinellidae, with a discussion of the terminology and literature pertaining to them, the reader is referred to chapter 2 in Hodek (1973). The larval terminology used in this work is followed here.

4th (last) instar.—Body elongate-oval, widest across metathorax; length (based on 6 specimens): 1.60-1.90 mm, Av. = 1.79 mm. Head subquadrate, distinctly broader than long, with a nearly straight occipital margin; darkly pigmented laterally and dorsolaterally, lightly pigmented dorsally, except for several dark spots (fig. 6); thinly covered dorsally with long stout setae, which are abruptly narrowed before their tips (fig. 6); frontal sutures indistinguishable; 2 large, forwardly directed ocelli, 1 dorsal, 1 ventral, at anterolateral angles, followed by a smaller lateral ocellus. Labrum deflexed, broadly curved in front, rounded at sides, armed with 2 pairs of setae. Mandibles falcate, grooved internally, simply pointed at apex, and bearing a prominent molar process, from which a soft, membranous prostheca arises (fig. 7). Fused cardo, stipes, and palpifer of maxilla longitudinally ovate, pointed at base, and unpigmented, except for dark inner margin and dark crescent at base of palpifer. Male of maxilla reduced to a small, membranous lobe. Maxillary palpi composed of 3 articles, of which the 3rd is subconical, longer than either of the first 2, and bears several peglike terminal sensilla; all articles unpigmented except for dark half rings. Labium membranous fused, without any evident division, to anterior end of submentum. Labial palpi of 2 articles, unpigmented except for a narrow half-ring

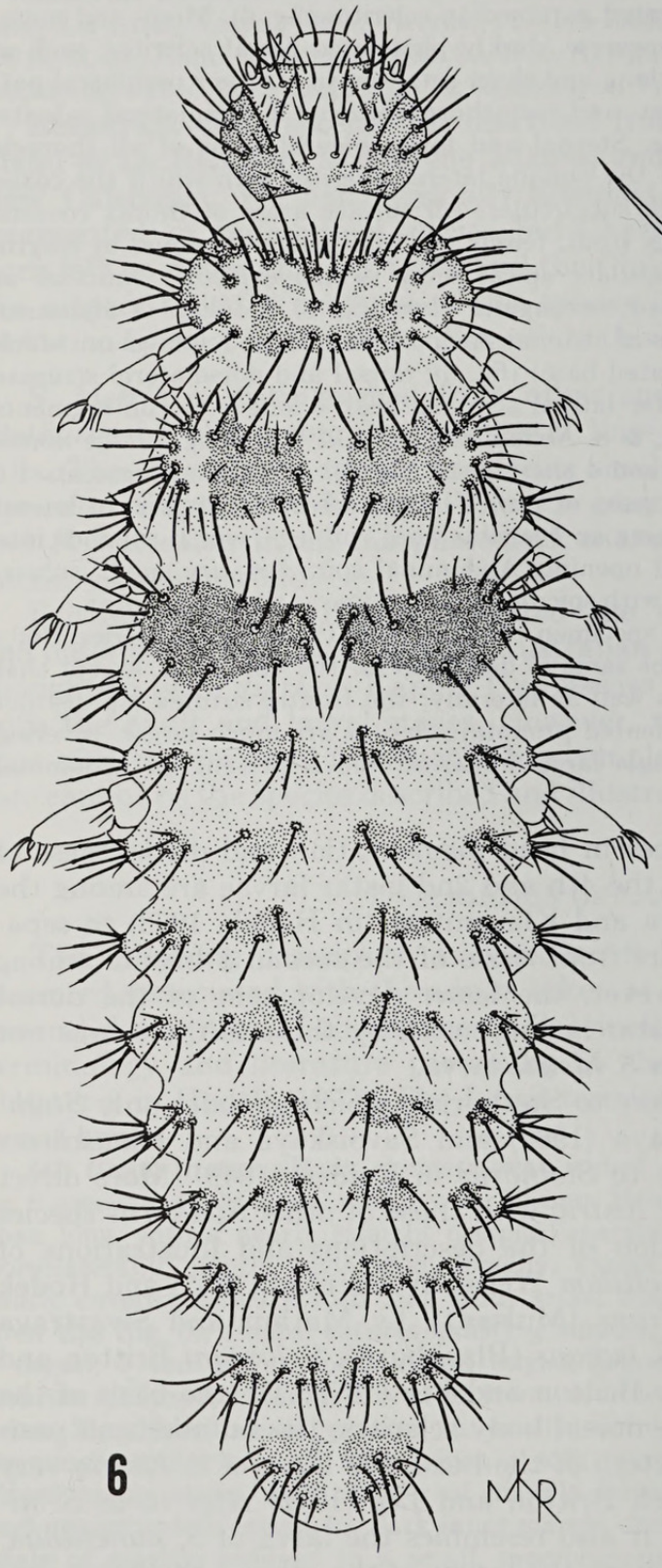
in each article, and arising from brownish articular half-rings. Antenna of 1 very short article, broader than long, unpigmented except for a narrow basal ring, and bearing an elongate conical sensillum, 4 short sensilla, and 2 setae. Prothorax transverse, rounded at sides; thinly covered with a mixture of long and short setae similar to those on the head, each arising from a short, darkly pigmented tubercle, and further marked by a pair of darkly pigmented paramedian sclerites (fig. 6). Meso- and metathorax each bearing a pair of transverse, darkly pigmented tergal sclerites, each of which is armed with a mixture of long and short setae set in a rather peripheral pattern (fig. 6). Pleural areas of meso- and metathorax bearing a dorsolateral sclerite, which is armed with 5 or 6 setae. Sternal and lower pleural areas of all thoracic segments unsclerotized, except for the oblique lateral sclerites with which the coxae articulate. Thoracic spiracle small, subcircular. All surface areas of thorax covered with minute pointed spicules. Legs stout, femur and tibiotarsus subequal in length, the latter bearing 16-18 long, spatulate apical setae (which evidently function as tenent hairs), and a deeply toothed tarsungular claw (fig. 8). Dorsum of abdomen, through segment 8, bearing 6 rows of strumae (pigmented setiferous plates on which each seta arises from a short elevated base) (fig. 6); dorsal and dorsolateral strumae have 3 long setae and 1 short seta; lateral strumae bear 4 long setae on segments 2-6, 3 long setae on segments 1, 7, & 8. Abdominal segment 9 bearing 2 large dorsal strumae, each armed with 4 long and 4 short setae (fig. 6). Abdominal segments 1-8 bearing 2 pairs of ventral setae, 2 pairs of ventro-lateral setae, and 4 pairs of lateral setae. Abdominal segment 10 forming an eversible anal "proleg", which expands into 4 terminal lobes surrounding anal opening. Abdominal spiracles very small, subcircular. Surface of abdomen covered with spicules of same type as those on thorax.

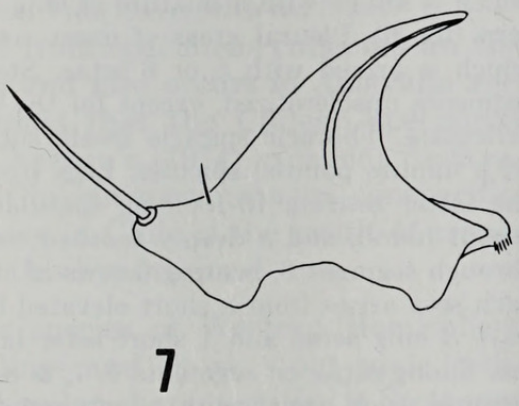
2nd instar.—Based on a single specimen collected with the 4th instar series. Body length: 1.26 mm. Characters are the same as described for the 4th instar, except that the head is pigmented dorsally as well as laterally; the frontal sutures are distinct throughout their length; the pigmented pronotal sclerites are much larger, covering most of the pronotum; and a single large dorsal struma is present on abdominal segment 9.

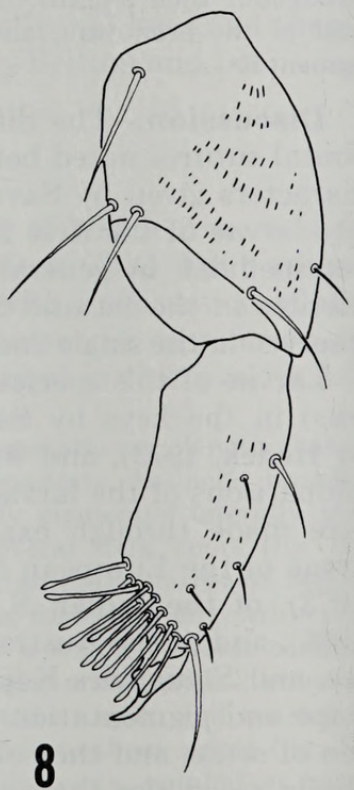
Discussion.—The differences in head pigmentation and distinctness of frontal sutures noted between the 4th and 2nd instar larvae are among the characters given by Savoiskaya and Klausnitzer (*in* Hodek, 1973) to separate larvae of the first 2 instars from those of the second 2 instars among Coccinellidae in general. However, the lesser development of the dorsal sclerites in the 1st and 2nd instar larvae, noted by those authors, was not observed in the single 2nd instar *S. histrio* larva.

Larvae of this species will key to Stethorini (which includes only *Stethorus*) in the keys by Savoiskaya (1960) and Savoiskaya and Klausnitzer (*in* Hodek, 1973), and will key to *Stethorus* in Emden (1949). More direct comparisons of the larvae of *S. histrio* with those of other *Stethorus* species were made through examination of the descriptions and illustrations of larvae of the European *S. punctillum* Weise, by Putnam (1955) and Hodek (1973), of the Indian *S. gilvifrons* (Mulsant), by Mathur and Sivastrava (1966), and of the Australian *S. vagans* (Blackburn), *S. loxtani* Britton and Lee, and *S. nigripes* Kapur, by Britton and Lee (1972). On the basis of the shape and pigmentation of the dorsal body sclerites, the number and position of setae, and the color pattern of the head, the larva of *S. histrio* very closely resembles the one which Britton and Lee (1972) refer to as *S. nigripes,* and, to a lesser extent, it also resembles the larva of *S. punctillum.* On the basis of the same characters, the larvae of the other 3 *Stethorus* species mentioned are easily distinguished from the larva of *S. histrio,* but their generic resemblance to the latter is apparent. Thus, the available keys and descriptive literature indicate that the larva of *S. histrio* is typical of *Ste-*

thorus. The comparisons made from the descriptions also support the conclusion, drawn from comparisons of adult specimens, that the closest relatives of *S. histrio* are native to the Australasian region.







Figs. 6-8, *Stethorus histrio* Chazeau, larva. Fig. 6, habitus view. Fig. 7, mandible. Fig. 8, leg.

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