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(Coleoptera: Carabidae)**

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A taxonomic synopsis of the Tribe Loricerini (Coleoptera: Carabidae)

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An account is given of the taxonomy of the Tribe Loricerini, based on a study of the characteristics of representative adults of all known species, the larvae of four species, and the pupa of one species. A single genus, *Loricera* Latreille, is recognized, the monotypic *Elliptosoma* Wollaston being ranked as a subgenus. Nine species belonging to the subgenus *Loricera* (*sensu stricto*) are recognized, including the newly described *L. aptena* (type locality, Durango, Mexico). The names *L. stevensi* Andrewes and *L. aparupa* Andrewes are synonymized. The species of *Loricera* (*sensu stricto*) are arrayed in three species groups.

A hypothetical phylogeny and account of zoogeography are presented, the chief conclusions of which are that *L. wollastoni* is a phylogenetic and zoogeographic relic, and that the Nearctic-Holarctic species are more closely related to one another than to the species of Central Asia. Evolution of closely related species is related to events of the Pleistocene.

Introduction

This study of the Loricerini began with the discovery of a new species of *Loricera* in the Sierra Madre Occidental, Durango, Mexico. We wished to record the discovery and provide a name for use in a paper on zoogeography by the senior author. Being opposed in principle to publication of isolated descriptions of new species, we enlarged our frame of reference to include, initially, comparisons among the other New World species. Then, we obtained specimens of the Madeiran *Elliptosoma wollastoni* Javet, and finally we studied all of the described species, including descriptions of fossils ascribed to the genus *Loricera*.

Because of Lindroth's admirable publication (1961), we did not feel compelled to offer a detailed treatment of the United States-Canadian species. We were not inclined to undertake a study of geographical variation of the Palearctic populations of *Loricera pili-cornis*, nor a study of variation in *Elliptosoma wollastoni*. We saw so few specimens of the species from India and the adjacent parts of China and Tibet that we are unable to provide a definitive treatment of these forms. Thus this paper is a synopsis rather than a full-scale revision. It includes descriptions, illustrations, and a key to the adults of all of the known species. The larvae of four species are described. Our views are presented concerning relationships of the Tribe Loricerini as well as on intra-tribal relationships and on phylogeny and zoogeography of this group.

Material

We examined 300 adult specimens of Loricerini, representing 10 species; six larvae representing four species; and three pupae of one species. For purposes of comparison, selected features of a few adults were examined, representing the Tribes Migadopini, Nebrini, Siagonini, Promecognathini, Elaphrini, and Scaritini.

These abbreviations denote institutions in which the specimens examined are deposited: BMNH, British Museum (Natural History), London; CAS, California Academy of Sciences, San Francisco, California; and UASM, Strickland Museum, University of Alberta.

Methods

Recognition and Ranking

Comparisons were made of the external features (including hind wings), male genitalia, female ovipositor, and sclerites of the bursa copulatrix to define species and to classify them.

Because closely related species in this tribe are usually allopatric, morphological criteria were used. Similar allopatric forms (or individuals) were regarded as specifically distinct if they differed sharply in several characters.

For purposes of classification, it was assumed that related species would share a distinctive combination of characteristics. Thus groupings of species were made on the basis of morphological distinctness. The groups were arranged and ranked relative to one another on the basis of phylogenetic considerations. The system was checked against the geographical distribution of the groups that were recognized on the assumption that some degree of concordance would be expected between propinquity of descent and geographical proximity of the descendants.

Measurements

The following measurements were made with an ocular micrometer in a binocular microscope. At the magnification used, one unit equalled 0.04 mm.

Length of antennal articles 3 and 4 (L. Ant. Art. 3 and L. Ant. Art. 4): linear distance from constriction near base of article to apex.

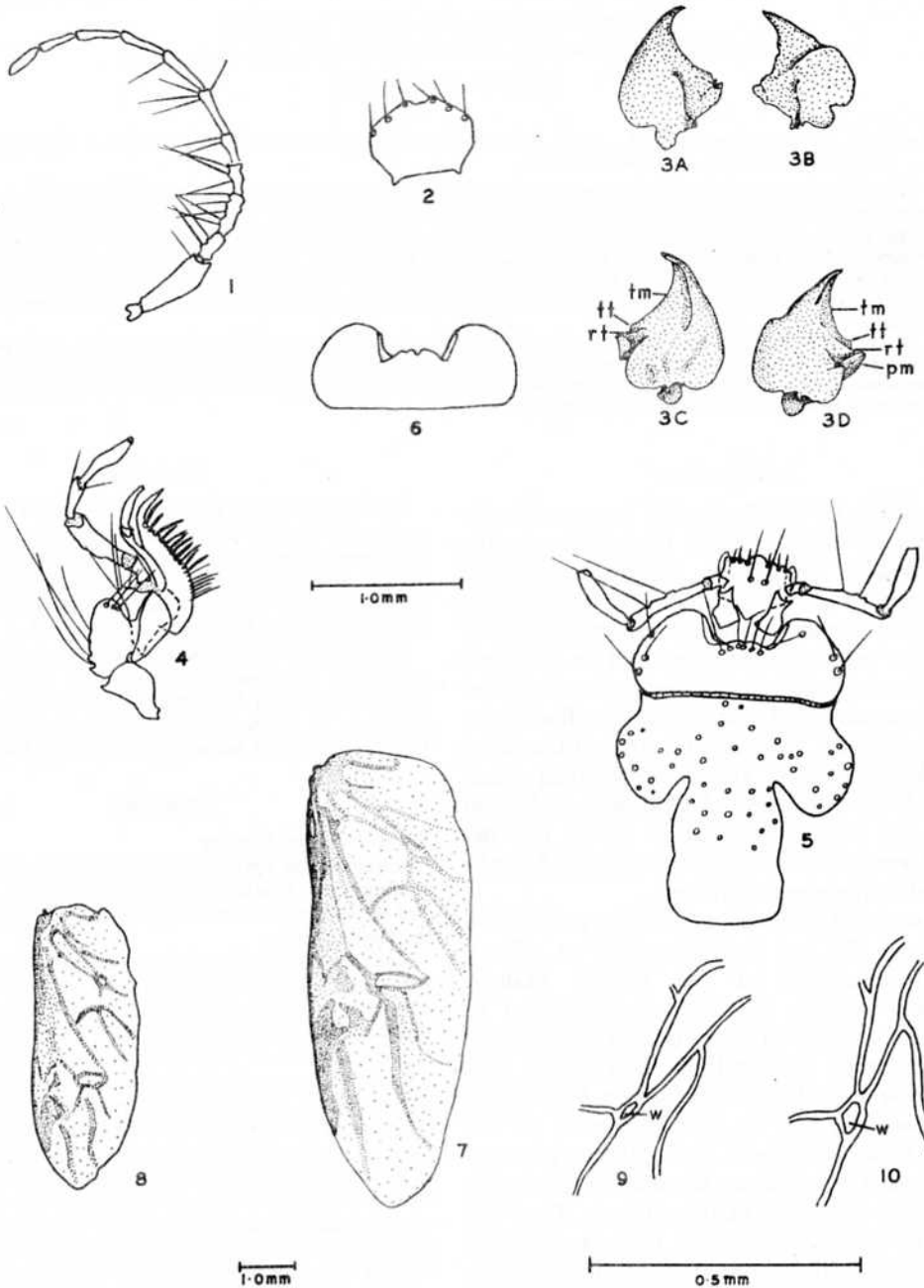


FIG. 1. Left antenna of *Loricera wollastoni* Javet (Santo de Serra, Madeira). FIG. 2. Labrum, dorsal aspect, of *Loricera rotundicollis* Chaudoir (nr. Angahuan, Michoacan, Mexico). FIG. 3. Mandibles of *Loricera rotundicollis* Chaudoir (nr. Angahuan, Michoacan, Mexico). A. left mandible, dorsal aspect. B. right mandible, dorsal aspect. C. left mandible, ventral aspect. D. right mandible, ventral aspect. *tm*, terebral margin; *tt*, terebral tooth; *rt*, retinacular tooth; *pm*, premolar tooth. FIG. 4. Left maxilla, ventral aspect, of *Loricera wollastoni* Javet. FIG. 5. Gula-submentum and labium, ventral aspect, of *Loricera wollastoni* Javet. FIG. 6. Mentum, ventral aspect, of *Loricera rotundicollis* Chaudoir (nr. Angahuan, Michoacan, Mexico). FIG. 7. Left hind wing, dorsal aspect, of *Loricera mirabilis* Jedlička (Chasseurs de Ta-tsen-lou, Tibet). FIG. 8. Left hind wing, dorsal aspect, of *Loricera stevensi* (Sunderdhunga Valley, U.P., India). FIG. 9. Left hind wing, basal veins, and wedge cell of *Loricera pilicornis* Fabricius (Versailles, France). FIG. 10. Left hind wing, basal veins, and wedge cell of *Loricera rotundicollis* (Omiltemi, Guerrero, Mexico).

Length of head (L. Head): linear distance from base of mandible to posterior margin of compound eye, measured on left side of head.

Length of pronotum (L.Pn.): linear distance from apical to basal margin.

Length of elytra (L. El.): linear distance from basal carina to apex.

Total length: the sum of the length of head, pronotum, and elytra.

Taxonomic Treatment

TRIBE Loricerini

Csiki (1927: 432–433) provides adequate coverage of the earlier literature dealing with Loricerini. Since then, the Loricerini have been treated in more or less detail in the following publications.

Andrewes 1929: 170–173. Jeannel 1941: 223–225 (Lorocerini). Csiki 1946: 182–183 (Loroce-rini). Ball 1960: 107; Lindroth 1961: 121.

The variant spelling *Loroce-rini* based on the name *Lorocera* is incorrect because the original spelling of the generic name is *Loricera* (Latreille 1802: 88–89).

Diagnostic Characteristics (Adults)

Carabid beetles, about 7 to 8 mm in length. Head with a single pair of supraorbital setae. Antennae with articles 2–4 nodose, each article with several long setae (Fig. 1). Clypeus narrowed, not covering bases of mandibles. Scrobes of mandibles asetose. Front coxal cavities closed-separated-unbridged. Middle and hind coxal cavities disjunct-confluent. Anterior tibiae anisochaete, antennal cleaners emarginate. Each elytron 12-striate.

Description (Adults)

Head—Constricted strongly posteriorly, with short neck. Dorsal surface with frontal grooves convergent posteriorly, enclosing triangular frontal area; vertex with more or less sharply defined median longitudinal groove, joined to frontal grooves. Ventral surface with gula-submentum broad, lobate anterolaterally (Fig. 5), with long hairs directed anteriorly. Eyes prominent. Antennae filiform; scape elongate; articles 2–6 with long setae directed anteriorly and ventrad with antennae horizontally perpendicular to longitudinal axis of body, setae of articles 2–4 in two irregular rows; scape and articles 2–3 glabrous, articles 5–11 with vestiture of short hairs, article 4 glabrous or with vestiture of short hairs apically.

Mouthparts—Labrum with transverse groove medially, anterior portion bent upward; slightly varied in shape, basically hexagonal, with four setae on anterior margin (Fig. 2). Mandibles (Fig. 3) flattened, scrobes and setae absent; short, broad, rather strongly curved; terebral area reduced compared to broad basal area; cutting edge with three teeth, posteriormost (premolar?) largest (Fig. 3C and D). Ventral grooves and associated hairs absent. Right mandible with large external lobe, and groove across dorsal surface (Fig. 3B). Maxillary stipes lobed externally, with long setae on lateral margin (Fig. 4). Labium (Fig. 5): mentum laterally with a few setae, shallowly emarginate medially with an irregular row of setae at base of emargination; glossae broad with a row of six setae apically; paraglossae small; labial palpus with penultimate article bisetose.

Thorax—Pronotum subcordate; single pair of punctures in posterior one-third (Figs. 14–22). Proepimeron with medial portion tapered, not bulbous, articulating socket of prosternum simple.

Legs—Slender. Front tarsus of male with articles 1–3 expanded, with vestiture on ventral surface.

Elytra—Small plica posterolaterally, first stria long, extended to apex; striae 3 and 4 each with a setigerous puncture at base; interval 4 with three discal setigerous punctures and one setigerous puncture near apex.

Hind wings—Venation as in Fig. 7; wedge cell reduced in some individuals of *L. pilicornis* (Fig. 9) and *L. decempunctata*.

Male abdomen—Tergum 8 as in Fig. 11A; sternum 8 as in Figs. 11B and 12; sternum 9 as in Fig. 11C.

Male genitalia—Median lobe more or less compressed; basal portion closed dorsally; membranous portion on left side, internal sac everted dorsally. Internal sac with fields of microtrichia and with two sclerites, proximal one interior with sac in everted position (Figs. 27C, 29C, 31C, 34C, 35B). Parameres (Figs. 27E, F, 33C, D) of moderate size, joined to median lobe by basal articulation, only (i.e. no membrane between parameres and passing over dorsal surface of median lobe).

Female abdomen—Tergum 8 as in Fig. 13A; sternum 8 as in Fig. 13B. Proctiger as in Fig. 13C. Sternum 10 made up of setose areas.

Ovipositor—Coxites hairy, without a pair of narrow sclerites mediobasally (the 10th sternum of Tanner 1927, Fig. 21). Styli relatively short, apices rounded, each with a single seta subapically (Figs. 37, 38, 39).

Bursa copulatrix—Plicate anteriorly, with complex sclerites dorsally and triangular sclerites ventrally (Figs. 40–48).

Van Emden (1942) and Jeannel (1941) provide descriptions of the immature Loricerini, and

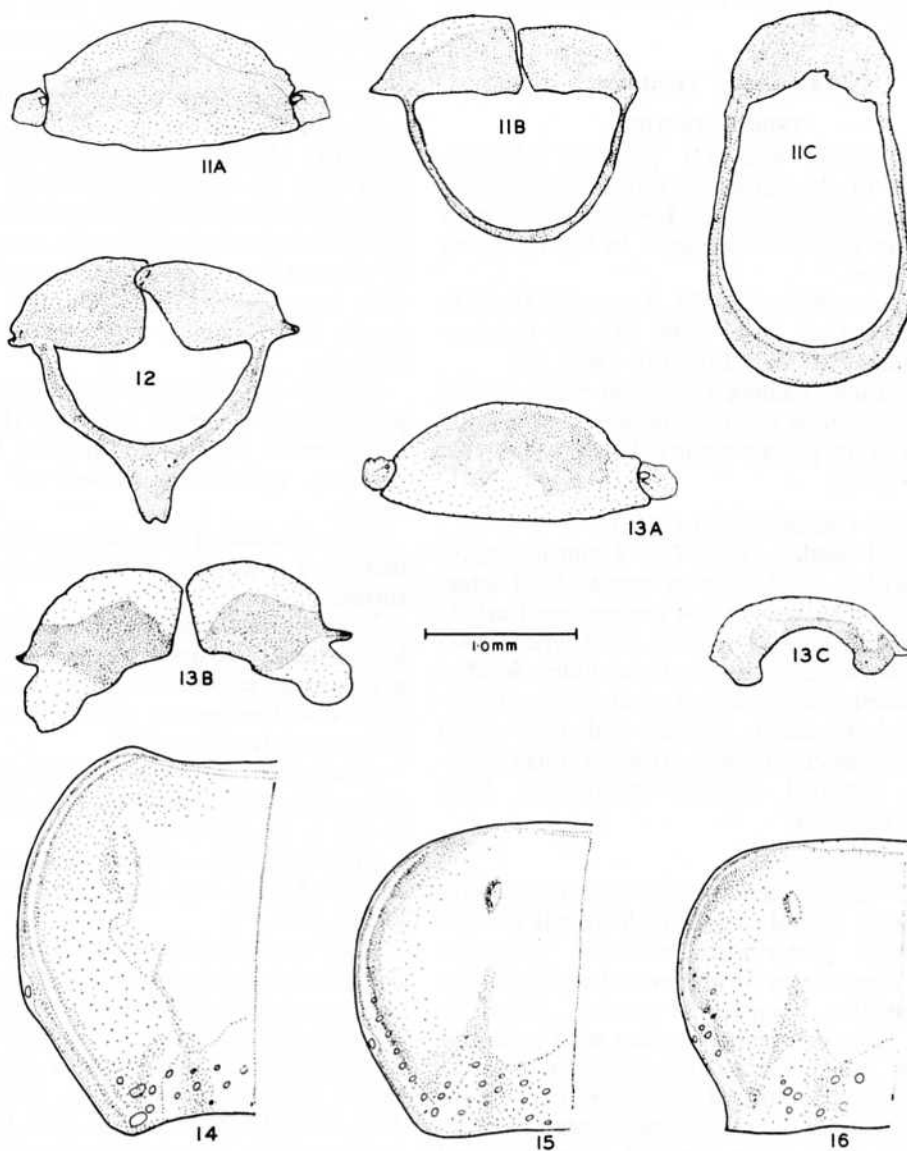
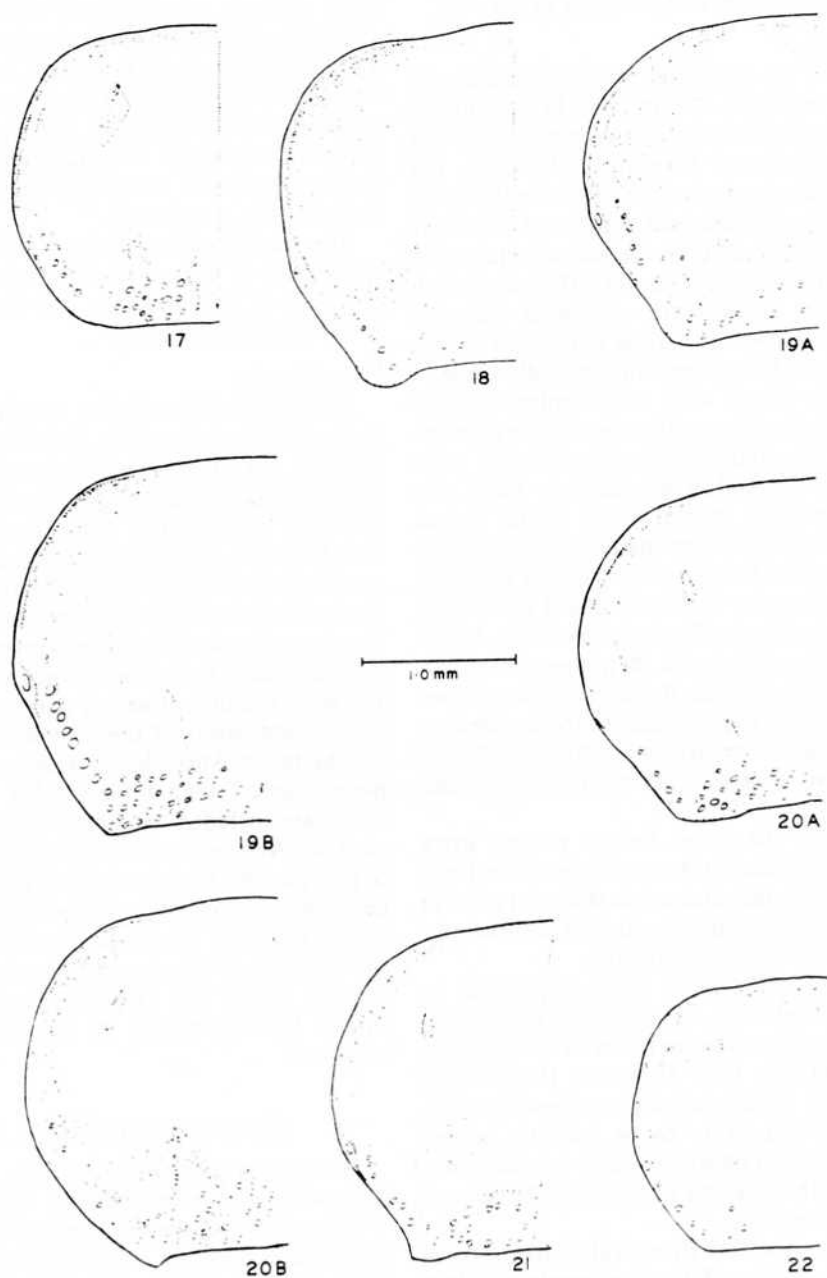


FIG. 11. Postabdominal sclerites of male of *Loricera wollastoni* Javet. A. Tergum VIII, dorsal aspect. B. Sternum VIII, ventral aspect. C. Sternum IX, ventral aspect. FIG. 12. Male sternum VIII, of *Loricera mirabilis* (Wassuland, Chungwa, Szechuan, China). FIG. 13. Female postabdominal sclerites of *Loricera wollastoni* Javet. A. Tergum VIII, dorsal aspect. B. Sternum VIII, ventral aspect. C. Proctiger. FIGS. 14–16. Pronotum, left half, dorsal aspect. 14. *Loricera wollastoni* Javet. 15. *Loricera pilicornis* Fabricius (Versailles, France). 16. *Loricera decempunctata* Eschscholtz (e. Duncan, British Columbia, Canada).



FIGS. 17-22. Pronotum, left half, dorsal aspect. 17. *Loricera foveata* LeConte (Modesto, California, U.S.A.). 18. *Loricera aptena*, new species (Arroyo Hondo, near LaFlor, Durango, Mexico). 19. *Loricera stevensi* Andrewes. A. (Tonglu, Sikkim, India). B. (Sunderdhunga Valley, U.P., India). 20. *Loricera mirabilis* Jedlička. A. (Wassuland, Chungwa, Szechuan, China). B. (Chasseurs de Ta-t sien-lou, Tibet). 21. *Loricera ovipennis* Semenov. 22. *Loricera obsoleta* Semenov.

