Chapter 9. **EUCHARITIDAE**

John Heraty

Recognition. New World Eucharitidae are recognized by the following features: mandibles elongate and sickle-shaped (Fig. 9); malar sulcus absent; labrum with single row of 4–16 marginal digits; pronotum reduced and ventral to mesoscutum, not visible in dorsal view (Figs. 10, 11); petiole elongate, usually longer than metacoxa; female with gaster large; both sexes with first gastral tergum usually more than half as long as gaster (Figs. 2, 5, 6).

Systematics. In the New World, Eucharitidae are comprised of two subfamilies, Oraseminae and Eucharitinae, which together form a monophyletic group. Monophyly of these two subfamilies is supported by the above features as well as by features of the strongly sclerotized first-instar larva (Heraty and Darling 1984).

In addition to Oraseminae and Eucharitinae, Bouček (1988) recognized three other subfamilies found in the Old World tropics. These three subfamilies are not treated here and the following comments refer strictly to Oraseminae and Eucharitinae in the New World (i.e., Eucharitidae sensu Heraty 1985). Eucharitidae are most closely related to the families Perilampidae (based largely on features of the first-instar larva) and Pteromalidae. Both Eucharitidae and Perilampidae have sometimes been placed together as subfamilies in Pteromalidae.

Biology. New World species of Eucharitidae are parasites of ant pupae (Formicidae). Eggs are deposited away from the host into plant tissue and the active first-instar larva, termed a planidium, gains access to the ant colony. The planidium, which is less than 0.9 mm in length, moves by looping or jumping, and enters the nest by phoretic attachment to a foraging ant or possibly through use of an intermediate host such as an immature individual of Thysanoptera. Initially, the eucharitid larva parasitizes the larva of the host ant, but development is completed on the host pupa. Pupation and emergence of the parasite takes place in the ant nest.

Behavior of the larva on the host pupa is virtually the same for all Eucharitidae, but major differences are found in ovipositional behavior and host choice. Oraseminae deposit single eggs into incisions in leaf tissue that are formed by the enlarged ovipositor; their hosts are generally confined to the Myrmicinae, but one North American species has been associated with Formicinae (Johnson et al. 1986). Eucharitinae deposit clusters of 80 to 10,000

eggs into preexisting cavities within flower or leaf buds, and rarely into fruits or scattered over the leaf surface; their hosts in the New World are restricted to Ponerinae or Formicinae.

Fauna. Eucharitidae are worldwide, but only a few genera are shared between the Old and New World. The Nearctic fauna is a result of northern extensions of a primarily Neotropical fauna. Eucharitids are mainly tropical and subtropical in distribution, although species of *Pseudochalcura* occur as far north as Yukon Territory and Alaska. *Pseudometagea* is the only genus confined to the Nearctic region.

Literature. Bouček (1988) and Heraty (1994) treated the classification of Oraseminae and Eucharitinae on a world basis. Gahan (1940) revised the Oraseminae for the New World and Heraty (1985, 1986) revised the Eucharitinae for the Nearctic region. Several reviews on eucharitid biology have included species from the Nearctic region (Clausen 1940*a*, *b*, 1941; Johnson et al. 1986; Heraty and Darling 1984; Heraty and Barber 1990; Heraty 1994).

Use of key. The scope of this study includes Canada, United States, and northern Mexico. The genus *Isomerala* is included because it occurs in Mexico within the limits of the Nearctic region, but it should probably be considered as strictly Neotropical.

Key to genera of Eucharitidae

1 Prepectus completely separated from pronotum and reaching tegula (Fig. 2); flagellum with distinct anellus (Fig. 3); head and mesosoma usually metallic green or blue; Gs_1 constricted basally by transverse crenulate furrow; ovipositor stylets subapically expanded and strongly ridged (Figs. 1, 2) .... ORASEMINAE, ***Orasema*** Cameron

Key: Gahan (1940). **Fauna**: 14 spp., transcontinental, extending north into Canada (AB, MB, ON). **Hosts**: mostly *Pheidole*, *Solenopsis* and *Leptothorax* (all Myrmicinae), but 1 sp. from *Formica* (Formicinae). **Oviposition**: into leaves or flower buds of many plants.

– Prepectus fused with pronotum (Figs. 6–8); flagellum without basal anellus (Figs. 4, 6, 8); head and mesosoma yellow, brown, or black, sometimes with faint metallic color; Gs_1 smooth or longitudinally striate, without median transverse furrow (Fig. 5); ovipositor stylets needle-like, without ridges or with only slightly raised ridges (Fig. 5) ..... EUCHARITINAE, 2

2(1) Prepectus reaching tegula, sometimes distinguished from pronotum by shallow furrow (Fig. 7); occiput broadly concave; metapleuron distinct from propodeum; funicle with segments cylindrical; Gs_1 often produced forward below petiole; petiole cylindrical or globose medially (Fig. 5) ..... ***Pseudometagea*** Ashmead
Key: Heraty (1985). **Fauna**: 8 spp. **Hosts**: *Lasius* (Formicinae). **Oviposition**: into flower buds or seed heads.

– Prepectus not reaching tegula (Figs. 6, 8) and not distinguished from pronotum by furrow; occiput flat; metapleuron indistinct; funicle with segments variously shaped, if cylindrical then mesosoma patterned yellow and brown and scutellum with short apical spines (Figs. 8, 11); Gs_1 not expanded or produced forward; petiole cylindrical, not globose 3

3(2) Scutellum with apex rounded (Fig. 10); postgenae fused behind mandibles. *Female*: funicle with segments slightly lobed to serrate. *Male*: funicle with segments 1–5 or 1–7 branched (Fig. 4) ..... ***Pseudochalcura*** Ashmead
Key: Heraty (1986). **Fauna**: 3 spp., 2 in USA (southern FL), and the widespread *P. gibbosa* (Provancher). **Hosts**: *Camponotus* (Formicinae).

– Scutellum with apex produced into paired spines (Figs. 11–13); postgenae broadly or narrowly separated, but not fused medially. *Female*: funicle with segments cylindrical to serrate. *Male*: funicle with segments either cylindrical or all segments with elongate branch 4

4(2) Scutellum with spines as long as mesosoma and broadly separated at base (Fig. 13); mesosoma strongly elevated above dorsal margin of head (Fig. 6). *Male*: funicle with segments each having elongate narrow branch 5

– Scutellum with spines much shorter than length of scutellum and narrowly separated at base (Figs. 11, 12); mesosoma globose, rounded above dorsal margin of head. *Male*: funicle with segments cylindrical or branched, but if branched then branches broad and flattened 6

5(4) Eye broadly rounded (Fig. 13) ..... ***Kapala*** Cameron
Fauna: 3 or 4 spp., in USA (AZ and southeastern states) and Mexico. **Hosts**: *Odontomachus* (Ponerinae). **Oviposition**: into flower buds of Asteraceae and Fagaceae.

– Eye nipple-shaped and strongly produced (Fig. 9) ..... ***Isomerala*** Cameron

Fauna: 1 sp., *I. coronata* Westwood, in Mexico. **Hosts**: *Ectatomma* (Ponerinae).

6(4) Head black or dark bluish-green, rest of body yellow to orange with brown to black patterns; funicle with segments cylindrical (Fig. 8); scutellum with apical spines only slightly longer than broad (Fig. 11) ..... ***Obeza*** Heraty

Key: Heraty (1985). **Fauna**: 2 spp., in USA (AZ and southeastern states) and Mexico. **Hosts**: *Camponotus* (Formicinae). **Oviposition**: into small fruits of Boraginaceae and Ericaceae.

– Head and rest of body black. *Female*: funicle with segments lobed. *Male*: funicle with segments each having long flat branch; scutellum with apical spines more than twice as long as broad (Fig. 12) ..... ***Lophyrocera*** Ashmead

Fauna: 1 sp., *L. apicalis* Ashmead, in western USA. **Hosts**: probably *Camponotus* (Formicinae).

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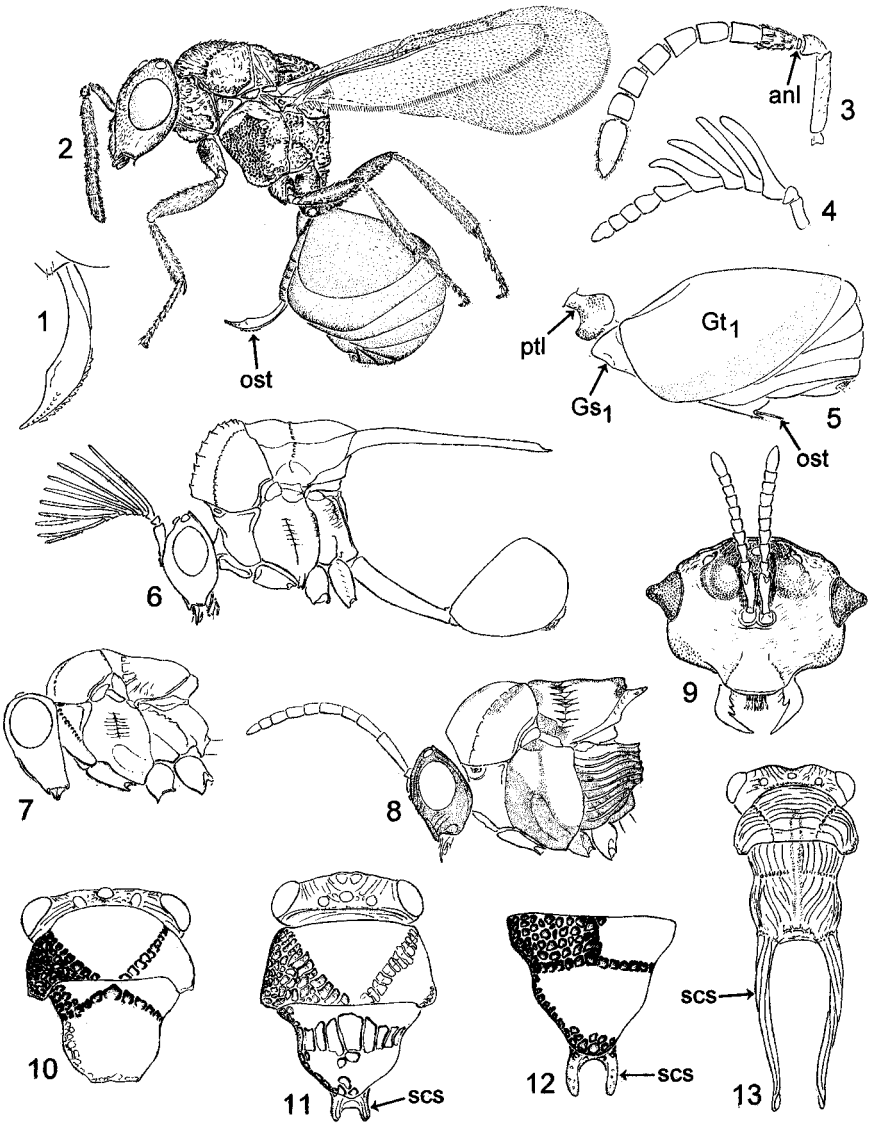

Figs. 1–13. 1–3, ***Orasema violacea*** (Ashmead) ♀: 1, ovipositor stylets; 2, body; 3, antenna. 4, ***Pseudochalcura gibbosa*** (Provancher), ♂ antenna. 5, ***Pseudometagea schwarzii*** (Ashmead), ♀ metasoma. 6, ***Kapala floridana*** (Ashmead), ♂ body. 7–8, ♀ head and mesosoma: 7, ***P. schwarzii***; 8, ***Obeza floridana*** (Ashmead). 9, ***Isomerala coronata*** (Westwood), ♀ head. 10–11, ♀ head and mesosoma: 10, ***P. gibbosa***; 11, ***O. floridana***. 12, ***Lophyrocera apicalis*** Ashmead, scutellum. 13, ***K. floridana***, head and mesosoma. (Abbreviation: scs = scutellar spine.)