THE GENUS *Dilocantha* (HYMENOPTERA: EUCHARITIDAE)

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Abstract.—Five species of *Dilocantha* are described from South and Central America: *D. albicoma*, n. sp., *D. bennetti*, n. sp., *D. flavicornis* (Walker), *D. lachaudii*, n. sp., and *D. serrata*, n. sp. *Dilocantha* are unique within Eucharitidae for having extreme sexual dimorphism and a patch of specialized setae filling a deep depression of the scutellum at the scutosternal sulcus. The patch of scutellar setae is associated with external secretions that may act as an ant appeasement structure similar to trichomes of ant-associated Staphylinidae. The first-instar of *D. serrata* is described.

Key Words: Eucharitidae, taxonomy, Neotropical, *Dilocantha*

All members of the Eucharitidae (Hymenoptera: Chalcidoidea) are specialized parasitoids of ants (Claussen 1940ab, Heraty 1994). Adults deposit their eggs into or on plant tissue, and the active first-instar larva is responsible for gaining access to the ant host, often by phoretic attachment to foraging ants (Claussen 1940a, 1941). One species is newly recorded as a parasite of *Ectatomma tuberculatum* (Olivier) (Formicidae: Ponerinae). *Dilocantha* are nested within a monophyletic group of New World Eucharitini (Eucharitinae) with *Kapala* Cameron and *Isomerula* Ashmead, species of which are known to attack larger ponerine ants of the genera *Pachycondyla*, *Ectatomma* and *Odontomachus* (Heraty 1994).

*Dilocantha* was first recognized for the species *Thoracantha flavicornis* Walker by Shipp (1894). Only the female of this one species from Brazil has been described, and its characteristic features do not readily apply to females of the other species or to the distinctive sexually dimorphic males. The sexes of Eucharitidae are readily separated by features of the antennae and metasoma, but usually the mesosoma does not exhibit much dimorphism. Males of *Dilocantha* have a much narrower and more highly vaulted mesosoma than females, and the postscutellar spines are more typical of the genus *Kapala* (thin and cylindrical) than the flattened and carapace-like spines of the female. Within Eucharitidae, similar postscutellar spines are known only for *Dicoelothorax* Ashmead and *Galearia* Brullé, both belonging to the same monophyletic group but not considered as sister taxa by current analyses of relationships (Heraty, unpublished).

All species of *Dilocantha* possess a unique patch of setae filling a deep lateral depression of the scutellum at the scutosternal sulcus (Figs. 1–4); the depressions on each side are completely separated medially. The setae within the depression are long and hooked or bent apically, resembling the hooks found in velcro® fabric. Each hair has minute longitudinal striations along most of its length, no externally visible pores, and is gold-brown basally and white or clear apically. The base of each hair is seated in a pronounced socket, which are interspersed by minute pores in the cu-
ticle (Fig. 3). In museum specimens, the depression and hairs are often associated with a silvery exudate covering the cuticle within the cavity and enveloping the base of the hairs (Figs. 3, 4). The structure and associated secretion are unique to Eucharitidae. The shape of the hairs and distribution of pores is similar to the trichomes of the staphylinid Xenodusa reflexa (Walker) (Kistner 1979, his fig. 2b), which are used for appeasement and adoption by the host ants. In staphylinids, the pores are associated with flask-like glandular cells and are characteristic of the ant-associated Aleocharinae (Jordan 1913, Kistner 1979). The secretory pores of Aleocharinae open into a cribiform plate (Pasteels 1968, Kistner 1979), which in Dilocanthe are not apparent on either slide-mounts or SEMs of the cuticle. Dissections did not reveal glandular cells associated with the pores or setae; however, all of the material dissected was preserved in alcohol and either critical-point-dried or chemically dried with hexamethyldisilazane, which preserves muscles and nerve tissue but possibly not glandular tissue. Minute pores associated with the scutocutellar sulcus occur in the closely related genus Kapala but without an associated depression, setal patch or exudate.

In all Eucharitinae, larvae develop on the host pupa and emerge from the host cocoon within the ant nest; Oraseminae have similar habits but usually attack Myrmicinae, which lack a pupal cocoon (Heraty 1994). Adults obviously must encounter the ant hosts before leaving the nest to mate and deposit eggs. In the few cases observed, the interaction is usually favorable, with the ants fondling or feeding the adult wasp and often protecting them when the nest is disturbed (Wheeler 1907, Clausen 1941, Ayre 1962, Vander Meer et al. 1989, personal observations). In Kapala, a genus closely related to Dilocanthe, worker ants within nest colonies of Ectatomma have been observed carrying adults by their elongate postscutellar spines (Lachaud and Pérez-Lachaud, pers. comm.), again treating the adults amicably. In Orasema xanthopus (Cameron) (Oraseminae) parasitic on Solenopsis invicta Buren, immatures and newly emerged adults possess a cuticular hydrocarbon profile similar to the host, allowing them to go undetected within the nest (Vander Meer et al. 1989). Acquisition of the similar cuticular hydrocarbon profile was presumed to be from social interactions and contact with the host brood. The protection is not permanent, and a few days after emerging in laboratory cultures the adults of Orasema are recognized and destroyed (personal observations). Under some conditions it may be advantageous for adult eucharitids to remain in the nest beyond a period considered acceptable to the ant hosts. Various behaviors for remaining with hosts which can include structural or chemical defences have been documented in other myrmecophilous insects. The morphology of some eucharitid genera, such as Galearia (cf. Guérin-Méneville 1845, fig. 8), which have a fusiform body shape and can withdraw the gaster under the carapace-like scutellar spines, appear as if they would be protected from the ants. The patch of hairs and exudate found in Dilocanthe could function as an appeasement structure similar to the trichomes of staphylinids, but no biological observations exist to support this idea.

**Terms and Methods**

Important terms are indicated in Figs. 1 and 5, but generally follow Heraty (1985, 1989, 1994). The first antennal flagellomere is labelled as F2 to reflect the loss of F1 (annelus) in Eucharitini. MPS refer to the multiporous plate sensillae. Mt refers to the metasomal tergites (Mt1 = petiole); Ms refers to the metasomal sternites. Material was borrowed from the following: CNCI, Canadian National Collection, Ottawa (G. Gibson); BMNH, Museum of Natural History, London (J. Noyes); FLA, Florida State Collection of Arthropods, Gainesville (R. Stange); HOND, Departamento de Protección Vegetal, Tegucigalpa, Honduras (R. Cave); IZW, Institut Zoologique, Académie
Dilocantha Shipp

Dilocantha Shipp, 1894: 188. Type species: Thoracantha flavicornis Walker, by monotypy and original designation.


Diagnosis.—Recognized by having a dense patch of long hook-tipped hairs filling the scutocutellar sulcus (Figs. 1–4, 5, 8–9, 14, 18, 19). The scutellar spines of females are usually broad and flat (Figs. 6, 13, 19) but can be narrow and cylindrical (Fig. 14). In males the spines are always cylindrical and thin (Figs. 10, 15, 21). In both sexes the mesoscutum is vaulted (Figs. 1, 4, 5, 8–9, 24) with strong transverse carinae on the midlobe. Both sexes are presented in the key to genera by Ashmead (1904) that includes New World genera (duplicated by Schmeideknecht 1909). Males do not key adequately as Ashmead appears to have made the assumption that males would have scutellar spines similar to the female (broad, contiguous and flat) rather than long and slender (his couplet 32).

Description.—Length 3.2–4.8 mm. General body color black; female antenna yellowish brown, male antenna darker; legs beyond coxa light yellow; wings hyaline or infuscate, forewing venation brown, postmarginal vein transparent.

Head: In frontal view subquadrate, eyes rounded and bare; median ocellus in line with lateral ocelli and included within scrobes, frons extending slightly above ventral margin of lateral ocelli. Occiput vertical and weakly aciculate to smooth, dorsal margin with prominent carina. Frons reticulate or granulate, usually with fine oblique carinae lateral to scrobes, lower face similarly sculptured; scrobal depression shallow and broadly impressed. Clypeus with distinct anteclypeus, clypeal margin transverse or only slightly rounded; supraclypeal area present, lateral margins vague. Genal depression absent; hypostomal lobes broadly separated. Mandibles falcate. Labrum with six digits. Antenna of female with 10 segments (Figs. 7, 8, 11, 16, 17), male with 12 segments (Figs. 9, 24); anellus absent; funicle of female with 7 segments, F2L:F2W less than 3 times as long as broad, funicular segments simple or serrate; funicular segments of male each with an elongate dorsal ramus, rami progressively slightly shorter and alternating in origin on each side of midline. MPS of female small and recessed into depressions, MPS of male minute and restricted to outer lateral margin of ramus.

Mesosoma: Pronotum abutting mesoscutum, no overlap of sclerites. Mesosoma robust and strongly vaulted above head (Figs. 5, 8, 9, 24), height of mesoscutum 1.4–1.5 times height of head, anterior margin of mesoscutum reflected behind head; posteralaterally with large plate-like flange extending over tegula; dorsum pilose; notauli deeply impressed and broadly separated posteriorly; posterodorsal margin of midlobe bilobed in frontal view. In male, midlobe of mesoscutum with median carinae bordered laterally by a strong vertical carina extending dorsally 0.8 times the distance up the vertical face of the midlobe to a strong transverse shelf dorsally, carinae never extending more than 0.2 times height of mesoscutum in female. Scutocutellar sulcus (SSS) transverse, strongly impressed laterally (nearly to midline) and filled with dense patch of long bent-tipped hairs (Figs. 1–4, 5, 8, 16). Axillary lobe small; axillae as distinct channel. Femur laterally but absent at margin of scutellum bearing flat anterior to frenal lobe; abrupt posteriorly; free long spines reaching to gaster and separated spines of female broad flattened (Figs. 6, 13,
bare; median ocellus in line with ocelli and included within extensions extending slightly above rim of lateral ocelli. Occiput weakly aciculate to smooth, rim with prominent carina. Labrum or granulate, usually with carinae lateral to scrobes, low-dorally sculptured; scrobal del- lown and broadly impressed. A distinct anteclypeus, clypeal verse or only slightly rounded; area present, lateral margins of depression absent; hypostome broadly separated. Mandibles with six digits. Antennae of 10 segments (Figs. 7, 8, 11, 13) with 12 segments (Figs. 9, absent; funicle of female with F2L:F2W less than 3 times as wide, funicular segments simple; funicular segments of male each large dorsal ramus, rami pro- tightly shorter and alternating each side of midline. MPS of cell and recceded into depression of male minute and restricted to the margin of ramus.

Pronotum abutting mesoscutum overlap of sclerites. Mesosoma strongly vaulted above head (9, 24), height of mesoscutum is height of head. Anterior marsupium reflected behind head; daily with large plate-like flange over tegula; dorsum pilose; no impression and broadly separa- torily; posterior dorsal margin of bed in frontal view. In male, mesoscutum with median caed laterally by a strong vertical ding dorsally 0.8 times the distance vertical face of the midlobe to transverse shelf dorsally, carine ling more than 0.2 times height in female. Scutocutellar S transverse, strongly im- rally (nearly to midline) and ene patch of long bent-tipped hairs (Figs. 1–4, 5, 8, 9, 14, 18); lateral axillary lobe small; axillary sulcus present as distinct channel. Frenal groove distinct laterally but absent medially; posterior margin of scutellum broadly rounded or flat anterior to frenal line, or elevated and abrupt posteriorly; frenum with pair of long spines reaching to or beyond apex of gaster and separated to base; scutellar spines of female broad and dorsoventrally flattened (Figs. 6, 13, 19) or narrow and cylindrical (Fig. 14), spines longitudinally carinate, cariniae much finer and sculpture more rugose medially, ventral surface of spines obliquely carinate; scutellar spines of male cylindrical and broadly separated basally (Figs. 10, 15, 21). Propodeum, petiole, coxae and most of mesepi- meron colliculate to very finely reticulate or shagreened; propodeal disc flat and bordered by a strong carina (Fig. 23); meta- pleuron strongly areolate-rugose; callus
with dense, fine, white setae; spiracle with elongate and narrow emargination of ventral margin; metepimeron groove absent. Femoral groove absent, mesepimeron flat or only slightly impressed (Fig. 1); mesepimeron evenly sculptured, finely striate to granulate, transepimeral sulcus absent; acropleuron deeply grooved for reception of upper corner of prepectus; mesepisternum with anteromedial margin overlapping posterior margin of prepectus; ventral margin of mesepisternum wedge-shaped and extending vertically anterior to the midcoxa (Fig. 1). Prepectus fused with pronotum and in the same plane; prepectus triangular, apex of prepectus narrowly separated from tegula; pronotal spine present; spiracle narrowly enclosed dorsally. Coxae bare except for few minute ventral setae, mesocoxa without lateral groove or carina; calcar bifid and slightly bent apically; hind tibia with 1 spur, tibiae and tarsi with sparse reclinate setae. Forewing of female 2.6–2.9 times as long as broad (Fig. 25), costal cell with moderate covering of fine ventral setae, disc with moderate covering of fine, short setae, dorsal setae sparse and minute, venation mostly distinct but postmarginal vein slightly longer than the stigmal vein; forewing of male 2.4–2.7 times as long as broad (Fig. 9), costal cell with dense covering of long ventral setae, disc with dense covering of long setae on both surfaces; both sexes without marginal fringe. Hind wing venation incomplete medially; short marginal fringe along posterior margin and disc with moderate covering of fine setae.

Metasoma: Petiole of female triangular in cross section, flat dorsally and with dorsal lateral carina, 1.3–1.8 times as long as hind coxa; petiole of male cylindrical, 5.4–7.7 times as long as hind coxa; base of petiole truncate, with basal carina and not overlapping nucha; gastric terga smooth, and glabrous. Ms2 smooth, in males articulating with apex of petiole. Hypopygium with 6 long hairs on each side of midline. Valvulae acicular; apex of first valvula smooth; gonostylus fused. Posterior margin of Mt2 with one longitudinal line of weakness.

Phylogenetic affinities.—Dilocantha is a distinctive member of the Eucharitini (Heraty 1994) in the kapaline clade, a New World group recognized by the following synapomorphic features: 1) presence of a distinct anteclypeus, 2) scutellar spines generally exceeding the metasoma and divided almost to their bases, 3) lateral axillary lobe minute and hidden behind tegula, and 4) propodeal spiracle emarginate. Its position within the kapaline clade as closely related to the genera Liratella Girault, Isomerala Shipp, Galearia and Thoracantha is indicated by possession of 1) short F2 (basal flagellomere less than 3 times as long as broad), 2) absence of a metepimeral groove, and 3) labial palpus 1 or 2 segmented. The presence of strongly impressed notaular grooves and a pilose callus, both plesiomorphic with respect to the above-mentioned genera, suggest that Dilocantha is the potential sister group of these taxa. The presence of a metepimeral sulcus in Kapala would place this genus as the sister group of the above taxa. Notably, none of the other three kapaline genera with carapace-like scutellar spines (Dicoelothorax, Galearia and Thoracantha) are placed as the sister group of Dilocantha, and current analyses of generic relationships suggest that at least three independent origins of this feature (unpublished). This would reinforce the notion that D. lachaudii, with cylindrical spines, is plesiomorphic to the other species. Other characteristics such as serrat flagellomeres and rounded scutellar apex are autapomorphic in the other taxa and no characteristics appear to indicate relationships among the remaining species in which females have a distinct carapace. The extreme sexual dimorphism is unusual in Eucharitidae, but occurs to a similar degree in Galearia. The patch of setae in the scutocutellar sulcus is unique within Eucharitidae.

Distribution.—Neotropical, ranging from Central America to Argentina.

Biological and hosts.—Unknown.
KEY TO SPECIES OF \textit{Dilocantha}

1. Female (Figs. 5, 8). Antennal flagellum cylindrical or serrate .......................... 2
   - Male (Fig. 9). Antennal flagellum with elongate rami (not known in \textit{albicoma}) .......... 6

2. Scutellar spines narrow, cylindrical and broadly separated medially (Fig. 14) .......... 6
   - Scutellar spines broad, flattened, carapace-like and narrowly separated medially (Figs. 6, 13, 19) . 3

3. Apex of scutellum broadly rounded in profile (Fig. 12) \textit{flavicornis} (Walker) ........ 4
   - Apex of scutellum abruptly in profile with strong marginal carina (Figs. 4, 5, 8, 18) .......... 4

4. Basal flagellomeres serrate (Fig. 17) \textit{serrata}, n. sp. .......................... 5
   - Basal flagellomeres cylindrical (Figs. 7, 11) ................................................. 5

5. Scutellar spines narrowly separated, basal separation of spines wider than medial separation (as in Fig. 19); flagellum short, 0.83 times height of head; petiole stout, 3.4 times as long as broad and 1.3 times as long as hind coxa ........... \textit{bennetti}, n. sp. 5
   - Scutellar spines more broadly separated medially, basal separation narrower than medial separation (Fig. 6); flagellum length 0.86–1.0 times height of head; petiole longer, 3.5–4.0 times as long as broad and 1.5–1.8 times as long as hind coxa .......... \textit{albicoma}, n. sp. 6

6. Scutellar spines very narrow and tapering to a fine blunt point apically (Figs. 9, 10) ..... 6
   - Scutellar spines evenly cylindrical to apex (Figs. 15, 21) ................................ 6

7. Antennal rami short, ramus of F2 as long as height of head .................. \textit{flavicornis} (Walker)
   - Antennal rami long, ramus of F2 1.28–1.3 times as long as height of head (Fig. 24) .... 8

8. Spines broadly separated basally, spines narrow and diverging (Fig. 15); frons evenly reticulate without striae; apex of scutellum bilobed in posterior view; wings hyaline .......... \textit{lachaudii}, n. sp. 8
   - Spines separated by less than twice the spine width basally (Fig. 21); frons reticulate with numerous irregular striae; apex of scutellum rounded in posterior view; wings weakly infuscate .......... \textit{serrata}, n. sp. 9

\textbf{Dilocantha albicoma} Heraty, new species (Figs. 5–7)

Type material.—Holotype, ♂, "MEX [Mexico]: Campeche, 4 mi E Francisco Escarce
carga, 23.vii.83, R. Anderson." Deposited in CNIC. Paratypes (4 ♀): MEXICO: Campeche, 6 km W Francisco Escarce
gara, 110 m, El Tormento, Res. Sta., 23.vii.83, M. Kaulbars (1, UC). Veracruz, 36 km W Las Choapas, 9.ix.1975, R. Villegas (1, UCD). GUATEMALA: Sacatepequez, Volcan Agua, 1700m above Antigua Guate
tilla, 5.vii.1990, R. Cave (1, HOND).

Diagnosis.—Female recognized by the simple antennal flagellomeres, angulate apex of the scutellum, broad separation of the postscutellar spines medially so that the basal separation is the narrower, flagellum more than 0.86 times the height of the head, and petiole 1.5–1.8 times as long as hind coxa. Males are unknown.

Female.—Length, 3.2–3.3 mm. Body black, apex of F12 and following tergites brown. Wings weakly infuscate, forewing venation light brown to translucent. Head 1.46–1.6 times as broad as high. Frons and face very finely reticulate with few fine striae lateral to scrobes and across genae, nearly smooth adjacent to eyes. Occipital carina weak and extending just beyond lateral ocellus. Eyes separated by 2.32–2.5 times their height. Malar space 1.05–1.19 times height of eye. Labrum with 6 elongate digits, each terminated by a long spatulate seta. Mouthparts relatively large, Galea able to extend beyond clypeus by a distance equal to height of clypeus; maxillary palpus with 2 segments, apical segment short, only twice as long as broad; labial palpus 2-segmented, apical segment short and only slightly longer than broad. Antennal scape reaching 0.7 times distance to median ocellus; length of flagellum 0.88–1.0 times height of head, F2 tapering, following segments cylindrical (Fig. 7), F2 1.2 times as long as F3, apical flagellomere slightly longer than broad and rounded apically; MPS numerous on all flagellomeres and recessed into deep broad depressions, surface of each flagellum strongly scalloped, sculpture finer toward base of each flagellum.
Mesoscutal height 1.25 times head height (Fig. 5). Midlobe of mesoscutum with dense covering of fine setae, sparser medially and densely laterally; median area of midlobe with strong transverse carinae and median weak longitudinal carina, the strong carina bordering the anterior declivous face of the midlobe continuing dorsally only to level of second transverse carina; lateral lobes of mesoscutal smooth and covered with fine, long setae (0.25 mm) that have the extreme apices very thin and bent. Scutellum medially with shallow longitudinal impression, at SSS the median channel bordered by two distinct raised knobs; SSS impression filled with erect, golden to whitish apically, bent-tipped setae (0.15 mm in length), longer, white setae covering most of axilla except narrow anterior band, setae finer dorsally and more bent than hooked, scutellum excluding axil shorter white setae; a smooth; posterior margin carinate and abruptly angletrior declivous face of about 80–90° to dorsum regular and shagreened; relatively narrow, dorsoventrall broadly separated medially not strongly bent apically and with sparse semi-prepectus smooth and d separated from tegula, prepectus carinate. Manwing with few minute otherwise bare. Margiwing short. Petiole 3.9– broad, 1.6–1.8 times as long.

Male.—Unknown.

Etymology.—Latin affixed, referring to the whitish setae on the mesosoma.

Dilocantha bennetti Holmgren
(Figs. 1–3)

Type material.—Holotype male, Cumuto Arepo (F1), TRINIDAD, 26.vi.1978 (1), 5.vii.1978 (1), 11.vii.1978 (1), 10.viii.1978 (1), 21.vii.1978 (1), 17.xi.1978 (1), 17.xii.1978 (1); all CNCI; Culepe, 2 km north of Bennett Malase, Malaise trap (1, UCNCI); Culepe, Sausal Road, 24–27.xi.1978, (1, CNCI); St. Augustine, J.S. Noyes (1, BMNH); 15.x.1918, A-761, H. M. Simla Field Sta., Arringating, 8–9.iii.1977, P. R. T. trap, rain forest (1, FLUH); Loma Linda, Andrews Trace, Andes, 83–93–13, 2 (CNCI); 13 lx of paro, Quesnell Farm, Andes, 33, malaise, upper montane rainforest, 83–86 UCR); Tunapuna Mt., S.
scutellum excluding axillula with finer and shorter white setae; axillula bare and smooth; posterior margin of scutellar disc carinate and abruptly angled in profile, posterior declivous face of scutellum angled about 80–90° to dorsum, posterior face irregular and shagreened; scutellar spines relatively narrow, dorsoventrally flattened and broadly separated medially (Fig. 6), spines not strongly bent apically. Femora smooth and with sparse semi-erect setae. Upper prepectus smooth and densely setose, apex separated from tegula, anterior margin of prepectus carinate. Marginal vein of forewing with few minute setae apically, but otherwise bare. Marginal fringe of hind wing short. Petiole 3.9–4.0 times as long as broad, 1.6–1.8 times as long as hind coxa.

Male.—Unknown.

Etymology.—Latin albicomus for white-haired, referring to the predominance of whitish setae on the mesosoma.

_Dilobantha bennetti_ Heraty, _new species_
(Figs. 1–3, 8, 9)

pression, carinae bordered laterally by a short vertical carina that extends dorsally 0.15 times the distance up the vertical face or the midlobe and ventrolaterally continues as a border of the anterior declivous face of the midlobe; lateral lobes of mesoscutum smooth and covered with fine, long setae (0.18 mm) that have the extreme apices bent. Scutellum medially with shallow longitudinal impression, deeply impressed at SSS and forming a distinct pit, at SSS the median channel bordered by slightly raised knobs; SSS depression filled with erect, golden, bent-tipped setae (0.12 mm in length), longer, white setae covering most of axilla except for narrow anterior band, setae finer dorsally and more bent, scutellum excluding axillula with finer and shorter white setae; axillula weakly longitudinally carinate and bare; posterior margin of scutellar disc carinate and abruptly angled in profile, posterior declivous face of scutellum angled about 90° to dorsum, posterior face vertically carinate and finely reticulate, scutellar spines broad, dorsoventrally flattened and narrowly separated medially (as in Fig. 19), gently arched in lateral profile; ventral surface of spines obliquely carinate; declivous face of scutellum ventral to spines finely reticulate with a strong median carina. Femora smooth and with sparse adpressed setae. Upper prepectus smooth apically, granulate anteriorly and moderately setose, apex narrowly separated from tegula, anterior margin of prepectus carinate. Marginal vein of forewing with few minute setae apically, but otherwise bare. Hind wing with short marginal fringe. Petiole 3.4–3.6 times as long as broad, 1.3–1.5 times as long as hind coxa.

Male. — Length, 3.0–4.7 mm. Differs from female in the following features: antena brown, apical half of scape dark brown. Forewing weakly infuscate. Head 1.46–1.66 times as broad as high. Facial reticulations shallow, frons with few irregular carinae. Eyes separated by 2.11–2.44 times their height. Malar space 1.0–1.11 times height of eye. Labial palpus with one segment. Antennal scape reaching 0.7 times distance to median ocellus; F2 as long as broad basally, ramus of F2 1.05–1.32 times as long as head height (Fig. 9), terminal segment (clavus) undifferentiated and as long as ramus of penultimate flagellomere. MPS absent; setae along rami long, about equal to width of ramus. Posterior margin of scutellar disc abruptly angled in profile (Figs. 1, 9), apex emarginate and projection bifid in posterior view; scutellar spine abruptly narrowed to a very thin elongate process, broadly separated along entire length, basally with strong oblique carinae, apically with few fine longitudinal carinae (Fig. 10), spines broadly curved in profile, apex of spine rounded. Forewing with speculum closed basally. Petiole 1.9–2.4 times as long as broad, 5.7–7.5 times as long as hind coxa. Dorsal length of gaster slightly shorter than petiole, Ms8 broadly rounded and pilose. Genitalia: parameres with 4 long setae, digitus rounded with 5–6 marginal spines; tip of aedeagus acute.

Comments. — A morphologically similar female collected in Argentina (Tucuman, San Javier, 1100m, FLA) appears to be a different species based on having the scutellum distinctly bilobed and the spines more evenly spaced basally and broadly spaced apically. This female lacks a complete antennal flagellum and was not described.

Etymology. — Named on honor of Dr. Fred Bennett, former director of the Commonwealth Institute of Biological Control and collector of many of the specimens.

Dilocantha flavicornis (Walker) (Figs. 11–13)

Thoracantha flavicornis Walker, 1862: 382.
Type data: Brazil: Villa Nova. Type female, BMNH, type no. 5.630 (examined).
Described: female.
Schizaspidia flavicornis; Walker, 1871: 66.
Change of combination.
Thoracantha flavicornis; Westwood, 1874: 153. Illust. Subsequent description.

Dilocantha flavicornis; Change of combination

Type material. — Lectotype (designated), "Type: Villa flavicornis Walker; B.M. Type", catalogued in BMNH (examined).

Diagnosis. — Female simple antennal flagellum, apex of the scutellum. Cylindrical spines that carinate along their length, emarginate at the tip, the F2 is 1.05 times as long as head, and the frons has regular carinae lateral to D. flavicornis, the male bennetti both have very
palpus with one segment reaching 0.7 times the cellus; F2 as long as F2 1.05–1.32 times the terminal differentiated and the ultimate flagellomeres. Long rami long, about fusis. Posterior margin obtusely angled in profile carinate and projection few; scutellar spine a very thin elongate parallel along entire rong oblique carinae, longitudinally carinate and slightly curved in profile. Forewing with spec- Pteriole 1.9–2.4 times 7.5 times as long as the girth of gaster slightly Ms8 broadly rounded parameres with 4 long d with 5–6 marginal acute.

Phylogenetically similar Argentina (Tucuman, LA) appears to be a spec on having the scutellum and the spines basally and broadly female lacks a common and was not de- cribed on honor of Dr. director of the Com- Biological Control of the specimens.

Dilocantha flavicornis (Walker) 1–13)
Walker, 1862: 382. Villa Nova. Type fe-
No. 5.630 (examined).
Walker, 1871: 66.
Westwood, 1874: 188. Change of combination.

Type material.—Lectotype, ♀ (here designated), "♀ Type; Villa Nova; Kupala flavicornis Walker; B.M. Type—5.630". Deposited in BMNH (examined).

Diagnosis.—Female recognized by the simple antennal flagellomeres and rounded apex of the scutellum. Males have evenly cylindrical spines that are longitudinally carinate along their length and strongly emarginate at the tip, the antennal ramus of F2 is 1.05 times as long as the height of the head, and the frons has numerous fine irregular carinae lateral to the scrobes. Unlike D. flavicornis, the male and female of D. bennetti both have very long fine setae on the mesoscutal lateral lobe and the facial sculpture is very fine and shallow. Otherwise it is difficult to make a direct association between the different sexes, especially on the basis of specimens from such widely divergent localities in eastern Brazil. However, D. bennetti is the only other South American species known, and both sexes are distinct from D. flavicornis.

Female [measurements do not include the type].—Length, 3.7 mm. Body black, apical tergites of gaster brown. Wings infuscate, forewing venation light brown. Head 1.55 times as broad as high. Frons and face very finely reticulate and without any striae lateral to scrobes or on genae. Occipital carina weak and extending just beyond lateral
ocellus. Eyes separated by 2.05 times their height. Malar space 0.96 times height of eye. Labrum with 4 elongate digits [not clearly visible], each terminated by a long spatulate seta. Mouthparts relatively small, galea not extending beyond margin of clypeus; maxillary palpus with 2 segments, apical segment 3 times as long as broad; single labial palpus minute. Antennal scape reaching 0.8 times distance to median ocellus; length of flagellum 0.90 times height of head, at least the basal 3 flagellomeres weakly serrate, following segments progressively more cylindrical (Fig. 11), F2 1.2 times as long as F3, apical flagellomere slightly longer than broad and rounded apically; MPS numerous on all flagellomeres and recessed into shallow depressions. Mesocutum height 1.04 times head height. Midlobe of mesocutum medially with dense covering of fine long setae, sparser and shorter on anterior ventral face; median area of midlobe with transverse carinae, these carinae not bordered laterally by a vertical carina but with a weak carinae bordering the declivous face laterally; lateral lobes of mesocutum smooth and covered with fine, long setae (0.3 mm) that have the extreme apices bent. Scutellum medially with shallow longitudinal impression, at SSS the median channel not bordered by distinct raised knobs; SSS depression filled with erect, golden to whitish apically, bent-tipped setae (0.15 mm in length), longer, white setae covering most of axilla except narrow anterior band, setae finer, relatively long, and more bent than hooked, scutellum excluding axillula with finer, relatively long white setae [continuing to base of spines]; axillula bare with few longitudinal striae; posterior margin of scutellar disc broadly rounded in profile to base of spine (Fig. 12), posterior face with broad shallow depression and finely reticulated (colliculate) as rest of scutellum; postscutellar spines broad and somewhat dorsoventrally flattened but with lateral margins very thick and medi- ally thin and plate like, lateral margins tapered to apex, spines narrowly separated medially (Fig. 13), strongly bent apically; declivous face of scutellum ventral to spines finely reticulate with several strong median carinae. Femora smooth and with sparse adpressed setae. Upper prepectus smooth and moderately setose, apex separated from tegula, anterior margin of prepectus carinate. Marginal vein of forewing with few minute setae along entire length, but otherwise bare. Marginal fringe of hind wing relatively long. Petiole 4.2 times as long as broad, 1.4 times as long as hind coxa.

Male.—Length, 3.7 mm. Differs from female in the following features: scape and pedicel dark brown, rest of antenna yellowish brown. Forewing hyaline. Head 1.55 times as broad as high. Facial reticulations shallow, smooth adjacent to margin of eye. Eyes separated by 2.2 times their height. Malar space 0.9 times height of eye. Labrum with 6 digits. Labial palpus with one segment. Antennal scape reaching 0.6 times distance to median ocellus; F2 slightly broader than long basally, ramus of F2 1.05 times as long as head height, terminal segment (clavus) undifferentiated, shorter in length than ramus of penultimate flagellomere by more than its width. MPS present as single row along outer lateral margin in apical two-thirds of each ramus, MPS recessed in shallow depression; setae along rami long, slightly shorter than width of ramus. Posterior margin of scutellar disc abruptly angled in profile, apex weakly bilobed; scutellar spines evenly cylindrical along entire length and broadly separated, strong longitudinal carinae along entire length, apical quarter of spines bent ventrally in profile, apex of spine emarginate. Forewing with speculum open basally. Petiole 1.9 times as long as broad, 5.4 times as long as hind coxa. Dorsal length of gaster slightly shorter than petiole, 1.3 times as long as petiole; M8 broadly rounded and pilose. Genitalia not observed.

Additional specimens examined.—BRAZIL: Para, 12.12.1893 (1♀, IZW); Rio De Janeiro, Silva Jardin, viii.1974, F.M. Olivi-
longly bent apically; scutellum ventral to petiole with several strong setae and with setae. Upper prepectus very dense, apex separated by prepectal vein of petiole along entire length, marginal fringe of hind femora 4.2 times as long as hind tibia. Differs from female in features: scape and clavus of antenna yellowish, Head 1.53 times as long as width of mesoscutum. Facial reticulation present to margin of eye. Eye facets 7.5 times their height. Height of eye. Labial palpus with one siphon reaching 0.6 times height of ocellus; F2 slightly longer than width of scutellum. Males have evenly cylindrical flagellomeres and angulate apex of scutellum. Males have evenly cylindrical flagellomeres that are separated basally by 3.0 times the basal width of the scutellum, the spines are longitudinally carinate along their length and weakly emarginate at the tip, and the antennal ramus of F2 is 1.28 times as long as the height of the head.

Female.—Length, 4.6 mm. Body black, Mtl2 entirely black, following tergites brown. Wings infuscate, forewing venation dark brown. Head 1.46 times as broad as high. Frons and face very finely reticulate, without fine striate. Occipital carina pronounced and extending barely beyond lateral ocelli. Eyes separated by 2.6 times their height. Malar space 1.1 times height of eye. Labrum with 6 elongate digits, each terminated by a long spatulate seta. Mouthparts relatively small, galea not extending beyond margin of clypeus; maxillary palpus with 2 segments, apical segment 3 times as long as broad; two labial palpomeres. Antenna with 10 segments; scape reaching 0.7 times distance to median ocellus; length of flagellum 0.91 times height of head, all segments cylindrical (Fig. 14). F2 1.3 times as long as F3, apical flagellomere slightly longer than broad and rounded apically; MPS numerous on all flagellomeres and recessed into shallow depressions. Mesoscutum height 1.1 times head height. Midlobe of mesoscutum with moderately dense covering of fine setae, sparser and shorter on anterior part of mesoscutum.

Dilcantha lachaudii Heraty, new species
(Figs. 14–16)

Type material.—Holotype, ♂, “Mexico: Chiapas, Finca Santa Elena, Municipio Tepaque, 22.1.1994, J.P. Lachaud, ex: Ectatomma ruidum”. Deposited in USNM.

Diagnosis.—This is the only known species of Dilcantha in which the scutellar spines are cylindrical and not carapace-like. The female also has cylindrical antennal flagellomeres and angulate apex of the scutellum. Males have evenly cylindrical flagellomeres that are separated basally by 3.0 times the basal width of the scutellum, the spines are longitudinally carinate along their length and weakly emarginate at the tip, and the antennal ramus of F2 is 1.28 times as long as the height of the head.

Female.—Length, 4.6 mm. Body black, Mtl2 entirely black, following tergites brown. Wings infuscate, forewing venation dark brown. Head 1.46 times as broad as high. Frons and face very finely reticulate, without fine striate. Occipital carina pronounced and extending barely beyond lateral ocelli. Eyes separated by 2.6 times their height. Malar space 1.1 times height of eye. Labrum with 6 elongate digits, each terminated by a long spatulate seta. Mouthparts relatively small, galea not extending beyond margin of clypeus; maxillary palpus with 2 segments, apical segment 3 times as long as broad; two labial palpomeres. Antenna with 10 segments; scape reaching 0.7 times distance to median ocellus; length of flagellum 0.91 times height of head, all segments cylindrical (Fig. 14). F2 1.3 times as long as F3, apical flagellomere slightly longer than broad and rounded apically; MPS numerous on all flagellomeres and recessed into shallow depressions. Mesoscutum height 1.1 times head height. Midlobe of mesoscutum with moderately dense covering of fine setae, sparser and shorter on anterior part of mesoscutum with strong transverse carinae, carinae bordered laterally by a strong carina that extends dorsally 0.3 times the distance up the vertical face of the midlobe and ventrally continues as a border of the anterior declivous face of the midlobe; lateral lobe of mesoscutum smooth and covered with fine, long setae (0.30 mm) that have the extreme apices hooked or bent. Scutellum with deep, medial longitudinal impression anteriorly, broad and crenulate posteriorly, at SSS the median channel bordered by distinct raised knobs; SSS depression filled with erect, golden, hook-tipped setae (0.14 mm in length), longer, white setae covering most of axilla except narrow anterior border, setae finer dorsally and more bent than hooked, scutellum excluding axilla with finer and shorter white setae; axilla smooth and bare; posterior margin of scutellar disc carinate and abruptly angled in profile, posterior declivous face of scutellum angled 90° to dorsum, posterior face shagreened; scutellar spines cylindrical and broadly separated medially (Fig. 14), only slightly bent apically; declivous face of scutellum ventral to spines finely reticulate with strong median carina. Femora smooth and with sparse adpressed setae. Upper prepectus smooth and moderately setose, apex separated from tegula, anterior margin of prepectus carinate. Forewing with speculum small and closed basally; marginal vein bare. Hind wing with short marginal fringe. Petiole 4.2 times as long as broad, 2.2 times as long as hind coxa.

Male.—Length, 4.4 mm. Differs from female in the following features: antenna dark brown, scape black. Forewing hyaline. Head 1.5 times as broad as high. Facial reticulations shallow, without carinae. Eyes separated by 2.6 times their height. Malar space 1.0 times height of eye. Labrum with 6 digits. Antennal scape reaching 0.6 times distance to median ocellus; F2 about as broad as long basally and with an elongate dorsal ramus, ramus of F2 1.28 times as long as head height, terminal segment (cla-
vus) undifferentiated, as long as ramus of penultimate flagellomere. MPS present as single or double row along outer lateral margin in apical two-thirds of each ramus, MPS recessed in shallow depression; setae along rami slightly shorter than width of ramus. Posterior margin of scutellar disc abruptly angled in profile, apex projecting and truncated in posterior view; scutellar spine evenly cylindrical along entire length and separated basally by 3 times the basal width of the spines (Fig. 18), strong longitudinal carinae along entire length, apical third of spine bent ventrally in profile, apex of spine weakly emarginate. Petiole 6.7 times as long as broad, 2.5 times as long as hind coxa. Dorsal length of gaster as long as petiole; Ms8 and genitalia not observed.

Etymology.—Named after Jean-Paul Lachaud and Gabriela Lachaud-Perez.

*Dilocantha serrata* Heraty, new species

(Figs. 4, 18–25)


Diagnosis.—Female recognized by the serrate antennal flagellomeres and angulate apex of the scutellum. Males have evenly cylindrical spines that are longitudinally carinate along their length and weakly emarginate at the tip, and the antennal ramus of F2 is 1.3 times as long as the height of the head.

Female.—Length, 3.5–4.8 mm. Body black, Mt2 entirely black, following tergites brown. Wings infuscate, forewing venation dark brown. Head 1.46–1.6 times as broad as high. Frons and face very finely reticulate with few fine striae lateral to scrobes and across genae. Occipital carina pronounced and extending to or almost to margin of eye. Eyes separated by 2.3–2.55 times their height. Malar space 1.1–1.2 times height of eye. Labrum with 5–6 elongate digits, each terminated by a long spatulate seta. Mouthparts relatively large, galea able to extend beyond clypeus by a distance about equal to height of clypeus; maxillary palpus with 2 segments, apical segment 5–6 times as long as broad; single labial palpus long and thin. Antenna with 10 segments; scape reaching 0.7–0.8 times distance to median ocellus; length of flagellum 0.78–1.0 times height of head, at least the basal 3–4 flagellomeres strongly serrate, the following segments progressively more cylindrical (Fig. 17), F2 1.2 times as long as F3, apical flagellomere slightly longer than broad and acuminate; MPS numerous on all flagellomeres and recessed into shallow depressions. Mesoscutum height 1.4–1.5 times head height. Midlobe of mesoscutum with dense covering of fine seta, sparser and shorter on anterior vertical face; median area of midlobe with strong transverse carinae and median weak longitudinal carina, carinae bordered laterally by a strong carina that extends dorsally 0.3–0.5 times the distance up the vertical face of the midlobe and ventrally continues as a border of the anterior declivous face of the midlobe; lateral lobe of mesoscutum smooth and covered with fine, long setae (0.18–0.21 mm) that have the extreme api-

The image contains a page from a scientific publication, likely related to entomology or biology, featuring drawings of insect anatomy. The text is not fully visible, but it appears to describe the anatomy of an insect, possibly a scorpion fly, given the labeled parts and the context.

Elements of text include:
- **Figs. 17–25.** These figures seem to illustrate different views and parts of the insect. Each figure is labeled with parts such as 'SSS', 'pes', 'cc', 'sp', which are likely to be specific anatomical features.

The text discusses specific anatomical features and measurements of the insect, such as:
- **Antenna:** The antenna is described as being 0.7–0.8 times as long as the head.
- **Malar space:** It is 1.1–1.2 times as broad as the head.
- **Scutellum:** The scutellum is described as part of the female anatomy, with specific measurements and observations regarding its structure.

Descriptive elements include observations on the overall body structure, the relationship between different parts, and the significance of these observations in the study of the insect's anatomy.

In summary, the page provides detailed illustrations and measurements of an insect's anatomy, focusing on specific parts and their functional descriptions.
posterior margin of scutellar disc carinate and abruptly angled in profile, posterior declivous face of scutellum angled about 60° to dorsum (Fig. 18), posterior face usually vertically carinate; scutellar spines broad, dorsoventrally flattened and narrowly separated medially (Fig. 19), strongly bent apically; declivous face of scutellum ventral to spines finely reticulate with strong median carina. Femora smooth and with sparse apressed setae. Upper prepectus smooth and moderately setose, apex separated from tegula, anterior margin of prepectus carinate. Forewing (Fig. 25) with speculum small and open basally; marginal vein with few minute setae apically, but otherwise bare. Hind wing with short marginal fringe. Petiole 3.3–3.9 times as long as broad, 1.4–1.6 times as long as hind coxa. Dorsal length of gaster as long as petiole; Ms8 and genitalia not examined.

Immature.—The description of the first instar (planidium) is based on two larvae attached to one adult female from Las Selva (4.iv.1987). The indiscriminate attachment of planidia to adults of the same species is common among parasitoids of large ponerine ants and virtually unknown in any of the other groups of Eucharitidae. Presumably this behavior is correlated with very active larvae and probable phoretic attachment of larvae to foraging workers for transport to the host brood (cf. Clausen 1940b), or in this case, attachment to females visiting a site used for oviposition by a previous female. The first instar of *D. serrata* (Fig. 22) is similar to other Eucharitini (Heraty 1994). Larvae are 0.16–0.18 mm in length, possess a distinct labial plate, dorsal fusion of tergites I and II, a distinct tergo-plerale line separating the pleural region on tergites II–VIII, and two ventral setae on tergite III. The prominent narrow and rounded ventral margin of the cranium, elongate ventral process on tergites IV to IX and relative lengths of setae are the same as for *Kapala* (see Heraty and Darling 1984). *Kapala* has only two minute dorsal cranial sensillae; *D. serrata* has three pairs of sensillae: the anterior pair are relatively large and connected to the lateral margin by a thin line of desclerotization; the medial pair give rise to a minute setae, which is unknown in other Eucharitidae; the posterior pair are minute as in *Kapala*.

Comments.—One female paratype from Panama is distinct from the other specimens in having almost completely clear forewings, a shorter flagellum (0.78 times height of head), laterally smooth scutellum and axillula, medial carina on the scutellum, and no lateral carinae on the petiole, but these were considered as extremes of acceptable variation. A smooth scutellum and axillula, medial carinae bordering one side of the median scutellar channel, weak petiolar carinae and only slightly infuscate wings occur in the female paratype from the Osa peninsula that

is otherwise more similar to Costa Rican specimens.

Etymology.—Latin: *serrata* meaning serrated to the serrate antennae.

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**LITERATURE**


is otherwise more similar to all of the other Costa Rican specimens.

Etymology.—Latin *serra* for saw—referring to the serrate antennal flagellomeres.

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**LITERATURE CITED**


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