

**A NEW SPECIES OF *CIRROSPILUS* WESTWOOD (HYMENOPTERA:
EULOPHIDAE) FROM THE SOUTHWESTERN UNITED STATES
AND MEXICO**

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Abstract.—*Cirrospilus coachellae*, n. sp. (Hymenoptera: Eulophidae), is described from the southwestern United States and Mexico. Comparisons are made with described species of *Cirrospilus* and differences between *Cirrospilus* and the closely related *Zagrammosoma* are discussed. *Cirrospilus coachellae* is the primary parasitoid providing control of the citrus peelminer, *Marmara* sp. (Lepidoptera: Gracillariidae), a cyclical pest of citrus in the southwestern United States.

Key Words: Hymenoptera, Eulophidae, *Cirrospilus*, taxonomy, Chalcidoidea

Eulophidae in the genus *Cirrospilus* Westwood are cosmopolitan in distribution and parasitize insects with cryptic feeding habits. *Cirrospilus* parasitizes leaf-miners, leaf-rollers and galling insects in the orders Lepidoptera, Coleoptera, Diptera and Hymenoptera (Schauff et al. 1997, Bouček 1988). Species of *Cirrospilus* typically are larval ectoparasitoids, but also have been documented to utilize primary ichneumonoid parasitoids attacking concealed insects and to directly attack several life stages of the primary host (Bouček and Askew 1968). Currently, there are over 300 species of *Cirrospilus* described worldwide, of which the majority occur in the Holarctic region.

Cirrospilus belongs to the subfamily Eulophinae, as characterized by the submarginal vein smoothly joining the parastigma, a postmarginal vein often longer than the stigmal vein, and a minimum of three setae on the dorsal surface of the submarginal vein (Schauff et al. 1997). *Cirrospilus* is characterized by having the funicle two-segmented, notauli complete, and the post-

marginal vein shorter than or equal in length to the stigmal vein (Schauff et al. 1997). Gordh (1978) recognized another closely related eulophine genus, *Zagrammosoma* Ashmead, as distinct from *Cirrospilus* on the basis of two characters: head with the vertex distinctly vaulted so as to extend above the compound eye in *Zagrammosoma*, and the propodeum with a well developed median carina in *Cirrospilus* but only a weak carina in *Zagrammosoma*. LaSalle (1989) further separated these genera by noting in *Zagrammosoma* the notaulus curves to meet the axilla anteriorly, thus not approaching the scutoscuteellar suture, while in *Cirrospilus* the notaulus extends straight to the scutoscuteellar suture. LaSalle discounted the propodeal carina character because of its inconsistency across taxa.

Yefremova (1996) cited additional characters which serve to distinguish *Zagrammosoma* from *Cirrospilus*. In *Zagrammosoma*, the axilla is situated anterior to the posterior margin of the mesoscutum and typically is elongated. *Cirrospilus* has the axilla located posterior to the posterior mar-

gin of the mesoscutum, and the axilla is more triangular than the axilla of *Zagrammosoma*. Based upon material examined by the author, Yefremova's character appears sufficient to separate the two genera. However, the question remains as to whether recognizing *Zagrammosoma* as distinct will eventually render *Cirrospilus* paraphyletic.

The species described here belongs to *Cirrospilus*, however it splits the diagnostic characters pertaining to the vaulted vertex and notaulus configuration. *Cirrospilus coachellae* has the vertex distinctly vaulted and the notaulus straight, while other members of *Cirrospilus* do not possess the vaulted vertex (as seen in *Zagrammosoma*). *Cirrospilus coachellae* has the axillar character used by Yefremova (1996) to differentiate *Cirrospilus* and *Zagrammosoma*.

Specimens used in this study were borrowed from or are deposited in the institutions referred to in the type material section. The acronyms are as follows:

- BMNH: The Natural History Museum, London, U.K.
 UCR: University of California, Riverside, Entomology Research Museum, Riverside, California, U.S.A.
 USNM: National Museum of Natural History, Smithsonian Institution, Washington, D.C., U.S.A.

***Cirrospilus coachellae* Gates,
 new species
 (Figs. 1–4.)**

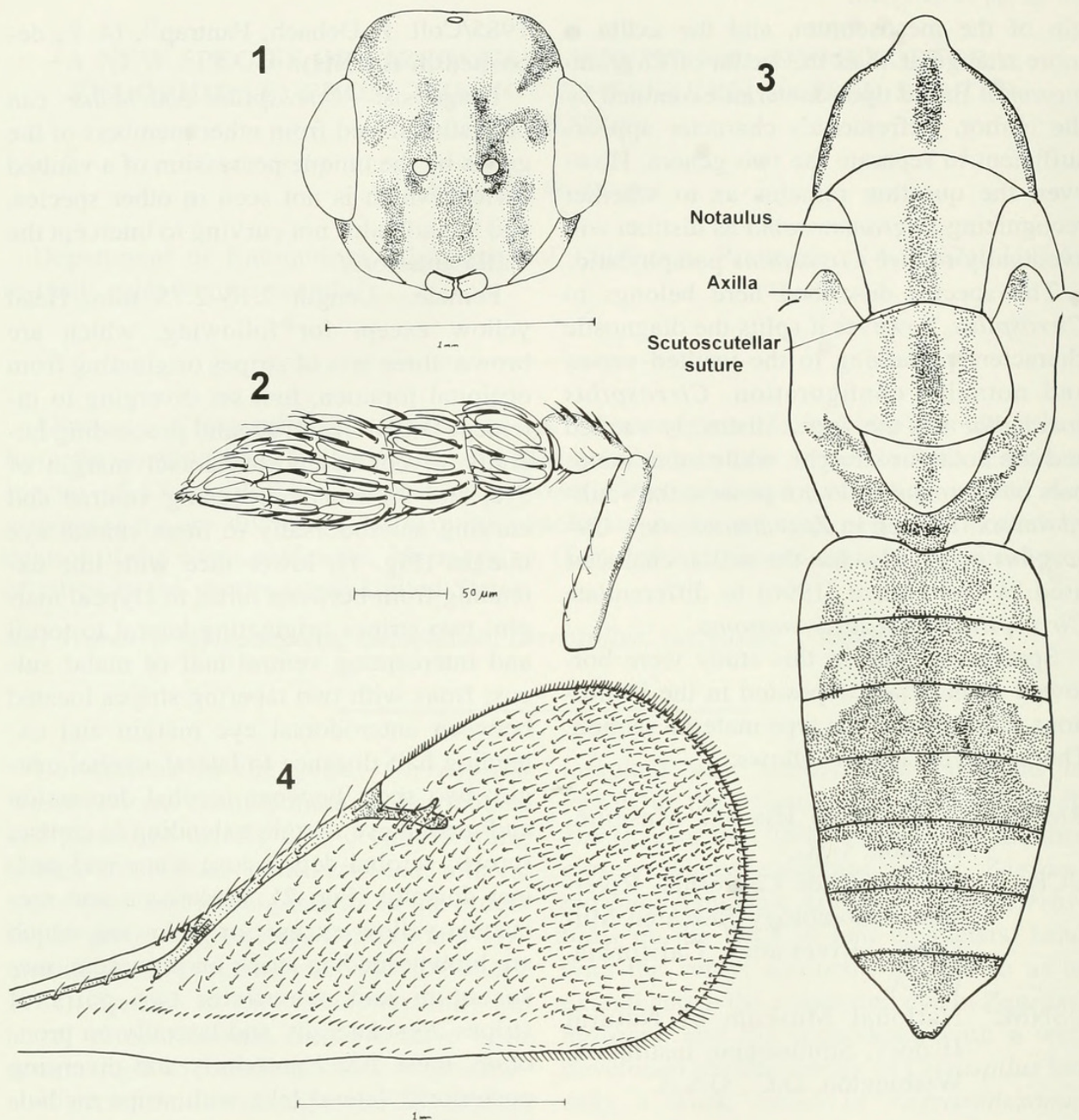
Type Material.—Holotype ♀, card mounted, "USA: CA: River. Co., Coachella Valley, NW Salton Sea, 5.VII.96, M. Guilen, collector/Ex *Marmara* sp. peelmines on grapefruit," deposited in USNM.

Paratypes: same data as holotype, card mounted, (Total paratypes: 23 ♀, 12 ♂; deposited in UCR, 8 ♀, 5 ♂; deposited in USNM, 8 ♀, 4 ♂; deposited in BMNH, 7 ♀, 3 ♂). Additional pointed material: "Mex. Baja Cal. Sur, Las Barracas, 14-IV

1985/Coll. P. Debach, Pantrap", (4 ♀, deposited in BMNH).

Diagnosis.—*Cirrospilus coachellae* can be distinguished from other members of the genus by the unique possession of a vaulted vertex, which is not seen in other species, and the notaulus not curving to intercept the axilla anteriorly.

Female.—Length 2.16–2.75 mm. Head yellow except for following, which are brown: three sets of stripes originating from occipital foramen, first set diverging to intercept lateral ocelli, second proceeding laterally to contact posterodorsal margin of eye, and third set proceeding ventrad and curving anterodorsally to meet ventral eye margin (Fig. 1); lower face with line extending from between toruli to clypeal margin; two stripes originating lateral to toruli and intercepting ventral half of malar sulcus; frons with two tapering stripes located between anterodorsal eye margin and extending half distance to lateral scrobal margin; two spots between scrobal depression and medial eye margin extending to contact scrobe; scrobal depression; scape and pedicel dorsally (Fig. 2). Mesosoma and metasoma yellow except for following which are brown: median stripe on pronotum, mesoscutum and scutellum; two pairs of stripes dorsolaterally and laterally on pronotum, these fused anteriorly and diverging posteriorly; lateral lobe with stripe medially; axilla with antero-medial spot; broad submedial stripes on scutellum; propodeum medially from one-third posterior margin to about four-fifths anterior margin, except transverse, teardrop-shaped yellow spots lateral of dorsellum; gastral tergite 1 (Gt1) with triangular spot surrounding petiolar insertion, distal point of spot approaching posterior edge of tergite; Gt2–4 with lateral tergal spots separate from medial spots on Gt2 and increasing fusion caudally to form a solid stripe on Gt4; Gt3–7 with broad, longitudinal stripe connecting transverse bands at intersegmental junctions (Fig. 3). Wings hyaline and venation yellowish ex-



Figs. 1–4. *Cirrospilus coachellae*. 1, Head, anterior view. 2, Antenna, lateral view. 3, Mesosoma plus metasoma, dorsal view. 4, Wing, dorsal view. Figs. 1, 4, scale bar = 1 mm. Fig. 2, scale bar = 50 μ m.

cept brown at junction of stigmal and post-marginal veins (Fig. 4).

Head: Quadrate, $1.1\times$ higher than broad; distance between posterior ocelli $1.5\text{--}2.0\times$ greater than distance between posterior ocellus and eye margin. Face finely reticulate and moderately setiferous; occipital carina absent; eyes reddish, eye height nearly $2\times$ greater than malar space; antenna 8-segmented; scape and pedicel with fine longitudinal carinae medially;

pedicel longer than broad; one anellus; two funicular segments setose and lacking surface sculpture; F1 $1.0\text{--}1.1\times$ as long as broad; F2 $0.83\text{--}1.0\times$ as long as broad; clava $1.7\times$ as long as broad, tapering distally.

Mesosoma: Dorsum finely reticulate; mesoscutal midlobe about $1.2\times$ as long as broad; scutellum quadrate to $0.9\times$ as long as broad; propodeum reticulate with smooth median area; callus with few erect setae; coxae with fine longitudinal striations and

with a few setae; hind femur $3.0\text{--}5.0\times$ as long as broad. Forewings reaching beyond tip of gaster, with submarginal vein $0.8\text{--}0.9\times$ length of marginal vein; stigmal vein $2.4\text{--}4.0\times$ longer than postmarginal vein; all veins setose and stigmal vein more darkly infusate than remaining venation; wing evenly setose distad of parastigma, except for small asetose area at apex of stigmal vein.

Metasoma: Gaster $1.1\times$ longer than mesosoma; petiole short; tips of ovipositor sheath visible dorsally.

Male.—Length 1.67–2.32 mm. Smaller than female, body striping often paler and less extensive than in female.

Variation.—Aside from differences in specimen size, the primary variation is in the coloration and striping patterns. Longitudinal striping on the mesosoma ranges from contacting the anterior and posterior margins of a tergite (e.g., pronotum, scutellum), to being represented only as a central dash or absent altogether (e.g., parapsidal stripe). The gastral coloration varies primarily in thickness and extent of stripes.

Biology.—This species has been recovered in large numbers from the citrus peel-miner, a new species of *Marmara* (Lepidoptera: Gracillariidae) (Guillen, Davis and Heraty, in prep.), in the Coachella Valley of Riverside County, CA. It is a gregarious ectoparasitoid of the peelminer larva and up to 12 *C. coachellae* have been documented from a single individual (Guillen, personal communication). This same miner attacks the stems and leaves of *Nerium oleander* L. (Apocynaceae) and *Gossypium* sp. (Solanaceae) in Arizona (M. Guillen, personal communication), which also support *C. coachellae*. *Cirrospilus coachellae* has also been recovered from another similar undescribed species of *Marmara* mining stems of tree tobacco, *Nicotiana glauca* Grah. (Solanaceae).

Distribution.—This insect has been recovered from Riverside County, California, Yuma County, Arizona, and Baja California, Mexico.

Etymology.—This species is named for the Coachella Valley in the Colorado Desert of southern California where the type series was recovered.

ACKNOWLEDGMENTS

This work was partially supported by a UC-IPM grant to John Heraty (UCR). Additional support is provided by a grant from the Citrus Research Board (CRB) to John Heraty to survey native leafminer parasitoids. Thanks also to John LaSalle (BMNH) for providing additional specimens of this species collected in Baja California Sur and to Arthur Fong of the California State Park System for permission to collect on state park system lands. Thanks to John Heraty who provided critical comments upon earlier drafts of this manuscript.

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