

An Introduced Species of *Epichrysocharis* (Hymenoptera: Eulophidae) Producing Galls on *Eucalyptus* in California with Notes on the Described Species and Placement of the Genus

M. E. SCHAUFF AND R. GARRISON

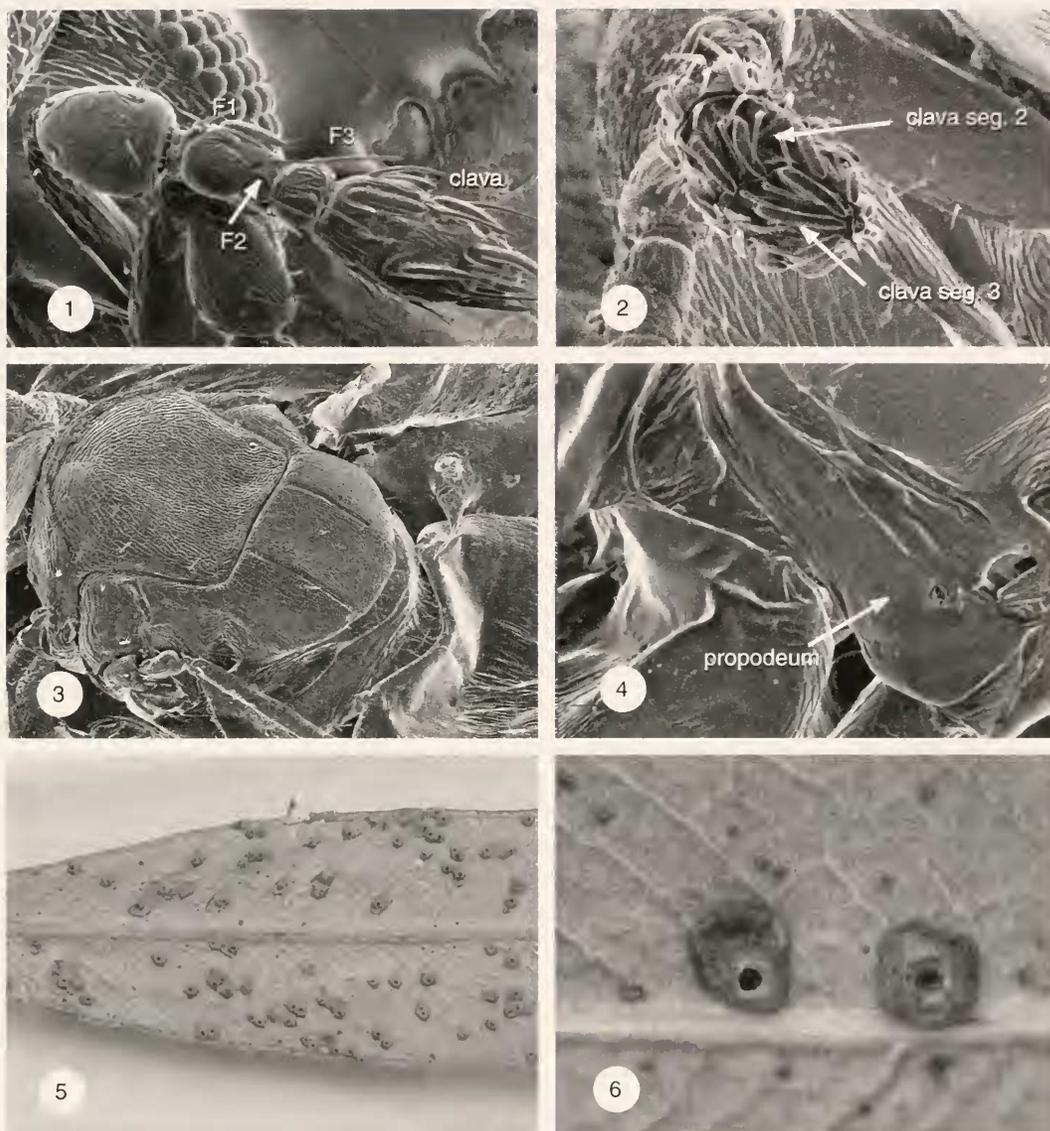
(MES) Systematic Entomology Laboratory, USDA, PSI, Agricultural Research Service,
c/o National Museum of Natural History, Washington, D.C. 20560-0168, USA;
(RG) Department of Agricultural Commissioner, Weights and Measures,
County of Los Angeles, 3400 La Madera Ave., El Monte, CA 91732, USA

Abstract.—*Epichrysocharis burwelli* Schauff, new species (Hymenoptera: Eulophidae) is described from specimens collected in southern California. *Epichrysocharis burwelli* forms small blister-like galls on the leaves of *Eucalyptus citriodora*. The previously described species of *Epichrysocharis* are reviewed and separated from *E. burwelli*. Evidence suggests that this species was accidentally introduced into the United States from Australia.

In early 1999, specimens of a small chalcidoid wasp were submitted to the Systematic Entomology Laboratory, USDA, by the California Department of Food and Agriculture (CDFA) for identification. These tiny wasps were found emerging from galls on the leaves of *Eucalyptus citriodora* in the Los Angeles area. Recently, their occurrence has been noted in several nurseries, and they are becoming widespread in the Los Angeles area. Study of these specimens and subsequent rearings revealed them to belong to the genus *Epichrysocharis* (Hymenoptera: Eulophidae). This genus was only known to occur in Australia and includes 3 species (Bouček 1988). After study of the types of those species it was determined that the specimens reared in California represented a species unknown to science. We take this opportunity to describe this species and present information on the known species of the genus to facilitate their identification. Given the known distribution of this genus, it is highly likely that this species was accidentally introduced into California from Australia.

The biology of *Epichrysocharis* species

had been unknown, although it was stated that they had been "associated with small galls on Eucalypt leaves" (Bouček 1988). The specimens recorded from California were reared from small blister-like galls on the leaves of *Eucalyptus citriodora* and unemerged specimens have been dissected from inside galls on the leaves. We can find no evidence that *E. burwelli* is parasitizing some other insect in or associated with the galls. It can now be confirmed that this species is a gall former. The galls themselves appear as small reddish or brownish blisters on the surface of the leaf (Figs. 5, 6). The galls are expressed on both surfaces of the leaves (that is, a single gall produces a "blister" on both surfaces) and the wasps do not seem to have a preference for one side or the other as emergence holes can be seen on both sides of a single leaf. The emergence holes are round and tend to be in the center of the gall (Fig. 6). The galls can be quite numerous and we have counted in excess of 40 in a single square centimeter of leaf surface. Whether or not this gall formation causes significant damage to the plant has not yet been assessed. However, the appearance



Figs. 1–6. 1–4. Scanning electron micrographs: 1, Female antenna, dorsolateral view. 2, Female clava, dorsoapical view. 3, Mesosoma, dorsal view. 4, Propodeum. 5–6. *Eucalyptus citriodora* leaf: 5, Surface with galls. 6, Closeup of gall showing emergence hole.

of these galls on nursery stock would most likely reduce the attractiveness of the plant and lower its market value. The wasps appear to be spreading and are now found in seven localities within Los Angeles County.

During the editing of this paper an additional series of three specimens of another small tetrastichine was reared from

Eucalyptus leaves in Santa Barbara, California. This species is readily distinguished from *Epichrysocharis burwelli*, but because of the condition and limited number of specimens I have been unable to definitively assign this species to a genus. Along with a third species of tetrastichine described by Headrick *et al.* (1995) from California, and introduced from Australia

on *Chamelaucium unciatum* (Myrtaceae), it is apparent that phytophagous species are increasingly becoming established in the U.S.

Terminology for morphology follows Gibson (1997) and LaSalle (1994).

Acronyms for museums are: (BM) Bohart Museum, University of California, Davis, CA, USA; (CNC) Canadian National Collection, Ottawa, Ontario, Canada; (QM) Queensland Museum, Brisbane, Australia; (BMNH) The Natural History Museum, London, UK; (USNM) National Museum of Natural History, Smithsonian Institution, Washington, D.C., USA.

Epichrysocharis Girault

Epichrysocharis Girault 1913b:36. Type species, *Epichrysocharis fusca* Girault. Original designation.

Brachychrysocharopsis Girault, 1922:103. Type species, *Brachychrysocharopsis aligherini* Girault. By monotypy. Synonymy by Bouček (1988: 690).

Diagnosis.—Length generally 0.5mm or less; antenna (Figs. 1, 2) with 2 anelli, 3 funicles, all quadrate or wider than long, F1 wider than F2 or F3, F2 smaller than F3, F1 closely appressed to F2 and partially extended over and covering F2 such that in some views F2 is hidden giving the impression that the funicle is 2-segmented, clava longer than funicle; clava 3-segmented, 3rd segment with suture obliquely angled from 2nd (Fig. 2); malar suture complete; pronotum very narrow medially, overhung by anterior margin of mesoscutum and not visible from above; mesoscutum large, convex, without median longitudinal groove, adnotaular setae restricted to area near notaulus in one or two irregular lines and often with only 2–3 setae on each side; scutellum with submedian grooves and two pair of setae; propodeum very short medially, generally equal to or shorter than metanotum, with no median or subspiracular carinae; spiracle round; metasoma sessile, broadly attached to mesosoma and with no obvious

petiole, phragma generally projecting into gaster. Submarginal vein with single dorsal seta, marginal vein subequal to submarginal, stigmal vein well developed and about 1/2 length of marginal.

Epichrysocharis closely resembles a number of small Australian tetrastichines which also have very short antennae but are currently placed in the large genus *Aprostocetus*. In addition, there are other genera generally considered closely related to *Aprostocetus*, which have shortened funicles (all 3 funiculars quadrate to slightly wider than long, about the same width, and funicle about equal in length to or slightly longer than clava [see, for example, *A. (Epomphaloides) flavus* (Bouček 1988, fig. 1191)]). While we have not studied these species closely, and many are probably undescribed, one of the defining characters of *Aprostocetus* is that the raised lobe of the callus partially overhangs the outer rim of the propodeal spiracle (Graham 1987; LaSalle 1994). We have not observed this condition in the species which we place in *Epichrysocharis*.

Bouček (1988) synonymized *Epentastichus* Girault under *Aprostocetus*. The senior author has examined the type species, *Epentastichus nugatorius* Girault (QM). Unfortunately, the body of the type has been lost and only two heads, mounted on a slide, remain. These heads are in poor condition, but the antennae of these two partial specimens are very similar to *Epichrysocharis*. However, given the fragmentary nature of the specimens, and in the absence of more detailed revisionary work, we do not feel that enough evidence exists at this time to make any further nomenclatural changes regarding the placement of *E. nugatorius*. Bouček (1988) also synonymized *Epomphaloides* with *Aprostocetus*.

Several species of other genera from the Australian fauna have also been reared from or associated with galls on *Eucalyptus*. Although they were studied at the generic level by Bouček (1988), the included species have not been critically revised.

What is apparent, is that this whole complex of generic names and species is much more diverse than indicated by the few species described at this time, and that much work on the taxonomy will need to be done to increase our understanding of the limits of this group of genera.

Species of *Epichrysocharis*

Epichrysocharis aligherini (Girault)

Brachychrysocharopsis aligherini Girault 1922: 103. Transferred to *Epichrysocharis* by Bouček 1988.

Diagnosis.—Mesosoma and metasoma black; forewing with apical fringe equal to about 1/3 wing width; ovipositor about 2/3 to 3/4 length of metasoma, slightly exerted past tip of gaster. This species is distinguished by the uniform dark coloration and the elongate ovipositor which extends for well over half the length of the metasoma.

Type.—The single type specimen of this species is slide mounted. It is badly crushed and disarticulated with the head, mesosoma, metasoma, legs, and antennae scattered over the slide. The head is fragmented and the antennae mostly disarticulated and shriveled making it nearly impossible to make out the relative sizes and numbers of segments. A single forewing remains attached to the mesosoma. The other wings cannot be found. The specimen is not cleared, but a few characters can be discerned, and based on what can be seen, it appears that this species is appropriately placed in *Epichrysocharis*. There is no register number evident on the slide. Deposited in QM.

Epichrysocharis fusca (Girault)

Quadrastichus fusca Girault 1913b: 234. Transferred to *Epichrysocharis* by Girault 1913b. Isotypic with *Q. fusca*.

Diagnosis.—Body light brown or yellow, head yellow; antenna with F1, F2, and F3 all wider than long and all subequal in length. F1 and F2 each with a single lon-

gitudinal sensillum. Ovipositor about 1/3 length of metasoma. This species is distinctive because it is the only one with a longitudinal sensillum on F2.

Type.—The type (QM register no. Hy-1847) of this species is a female, slide mounted with the body minus the head under one cover slip and the head under the second cover slip. The head is badly crushed, but one antenna is clearly visible. The body is not cleared. Deposited in QM.

Epichrysocharis nigriventris (Girault)

Epentastichus nigriventris Girault 1913a: 242. Transferred to *Epichrysocharis* by Bouček 1988.

Diagnosis.—Head yellow, mesosoma yellow orange, metasoma brown to dark brown, hind femur brown, hind tibia and tarsus yellow; mesoscutum and scutellum striate reticulate; mesocutum about 2× as long as scutellum, metasoma ovate and slightly shorter than mesosoma (30:25); antenna with F1 as long as wide, 3× as long as F2, clava about 4× as long as F2 and 2× as long as wide; only F1 and clava with multiporous plate sensillae; hypopygium reaching nearly to end of metasoma.

Types.—Two specimens (QM register no. Hy-1849) of this species are point mounted on a single pin. Girault noted that the species was described from two females, but did not designate a holotype. We hereby designate as lectotype the specimen nearest the point of the card mount and the other specimen as paralectotype. The lectotype is partially submerged in glue, but not as completely as the paralectotype. The heads of both specimens have been slide mounted, and there is no way of associating any one head with one of the point mounted bodies although it seems that both specimens do belong to the same species. Deposited in QM.

Epichrysocharis burwelli Schauff, new species (Figs. 1–4)

Diagnosis.—Body brown, with face vertex, upper margin of eyes, and scrobes yellow.

low; F1 with longitudinal sensillum (Fig. 1); ovipositor about 1/2 length of metasoma, with hypopygium reaching half the length; forewing fringe about 1/4 wing width. The distinctly brown and yellow head with a uniformly brown mesosoma and metasoma and relatively short ovipositor set this species apart from the others in the genus. In addition, *E. nigriventris* has the hypopygium reaching almost to the end of the metasoma and *E. aligherini* has a longer ovipositor which is slightly exerted past the tip of the metasoma.

Description.—Female. Length 0.5–0.6mm. Color. Brown or light brown except following yellow: a small strip below each torulus, scrobes, vertex, dorsal occiput, a small thin stripe bordering the eye from about the line of the toruli up and around the back of the eye for about half its length, antennae, and apices of tibiae and usually first three tarsomeres.

Head: Face alutaceous to strigose, scobal basin nearly smooth, vertex and occiput rugose to finely alutaceous. Posterior ocelli widely separated, anterior ocellus only about 1 diameter in front of posterior ocelli and with POL about $5 \times$ OOL. Mandible with 3 distinct teeth. Toruli inserted even with bottom of eye. Antenna (Figs. 1, 2) with scape $3 \times$ as long as wide, second anellus with 2 dorsal setae, F1 slightly longer than wide (10:12) on ventral surface, as long as wide on dorsal surface, with single longitudinal sensillum, F2 $2 \times$ as wide as long, loosely appressed to F1 and partially covered dorsally by F1, F3 $1.5 \times$ as wide as long, clava $2 \times$ as long as wide with several longitudinal sensillae some of which extend past tip of clava.

Mesosoma: Pronotum reduced, not visible medially from above. Mesoscutum, scutellum, dorsellum, and lateral propodeum finely alutaceous or coriaceous (Fig. 3). Mesoscutal midlobe with 2 or 3 minute, inconspicuous setae at notaular margin. Dorsellum lightly alutaceous. Propodeum smooth to very lightly alutaceous laterally (Fig. 4), with two minute setae laterad of

spiracle. Forewing $2 \times$ as long as wide, with longest marginal fringe seta 1/4 width of wing. Ratio of costal cell : parastigma : submarginal vein : marginal vein : stigmal vein 20:15:25:28:15.

Metasoma: Slightly shorter than mesosoma, ovate and slightly longer than wide, rounded posteriorly. First tergum nearly smooth medially, rest of mesosoma uniformly, densely rugose reticulate. Ovipositor about 1/2 length of metasoma. Hypopygium reaching about 1/2 length of metasoma.

Male.—Similar to female.

Types.—Holotype female on slide with data: California, Los Angeles Co., Montrey Park, Wilcox & 60 Fwy (s. side), 11 May, 1999. Reared *Eucalyptus citriodora*. Coll. D. Humphreys and M. Suim. Deposited in USNM. 52 female and 1 male paratypes with same data. Paratypes deposited in BMNH, BM, CNC, QM.

Etymology.—The species epithet honors Dr. C. Burwell, Queensland Museum without whose help this study could not have been completed.

ACKNOWLEDGMENTS

We are grateful to John Sorenson, California Department of Agriculture for sending the initial lot of specimens that led to this study. Chris Burwell, Queensland Museum, Brisbane, Australia for the loan of types and specimens. John LaSalle, CABI Bioscience, UK, F. C. Thompson, and D. R. Smith, Systematic Entomology Lab, USDA made valuable comments on the draft manuscript. Tami Carlow and Nit Malikul, Systematic Entomology Lab, ARS, USDA provided technical support.

LITERATURE CITED

- Bouček, Z. 1988. *Australasian Chalcidoidea (Hymenoptera): A biosystematic revision of genera of fourteen families, with a reclassification of species*. CAB International. Wallingford, UK. 832pp.
- Gibson, G. A. P. 1997. Chapter 2, Morphology and terminology. pp. 16–44. In: Gibson, G. A. P. et al., eds. *Annotated keys to the genera of North American Chalcidoidea (Hymenoptera)*. NRC Research Press, Ottawa.
- Girault, A. A. 1913a. Australian Hymenoptera: Chalcidoidea. IV. The family Eulophidae with de-

- scriptions of new genera and species. *Memoirs of the Queensland Museum* 2: 140-296.
- Girault, A. A. 1913b. A few new chalcidoid Hymenoptera from Queensland, Australia. *Bulletin of the Wisconsin Natural History Society* 11: 35-48.
- Girault, A. A. 1922. New chalcid flies from eastern Australia—II. (Hymenoptera: Chalcididae). *Insector Inscitiae Menstruus* 10: 100-108.
- Graham, M. W. R. de v. 1987. A reclassification of the European Tetrastichinae (Hymenoptera: Eulophidae), with a revision of certain genera. *Bulletin of the British Museum (Natural History). Entomology Series* 55: 1-392.
- Headrick, D. H., J. LaSalle, and R. A. Redak. 1995. A new genus of Australian Tetrastichinae (Hymenoptera: Eulophidae): an introduced pest of *Camelaurium uiciatum* (Myrtaceae) in California. *Journal of Natural History* 29: 1029-1036.
- LaSalle, J. 1994. North American genera of Tetrastichinae. *Journal of Natural History* 28: 109-236.