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A revision of Australian Thrasorinae (Hymenoptera: Figitidae) with a description of a new genus and six new species

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Abstract A new genus of Thrasorinae (Hymenoptera: Figitidae) is described from Australia, and includes specimens reared from an unidentified *Ophelimus* species (Eulophidae: Ophelimiini) on *Eucalyptus cinerea* (Myrtaceae). *Mikeius*, new genus, includes six species: *M. berryi* sp. n., *M. gatesi* sp. n., *M. grandawi* sp. n., *M. hartigi* (Girault) n. comb., *M. neumanni* sp. n. and *M. schauffi* sp. n.; *M. hartigi* is designated as the type species of *Mikeius*. *Thrasorus* Weld is revised, and the description of *T. schmidtae* sp. n. is provided, as well as a redescription of *T. pilosus* Weld. All records to date indicate that species of *Mikeius* and *Thrasorus* are associated with hosts that induce galls on species of *Acacia* and *Eucalyptus*, although most of these host records await verification. A list of world species of Thrasorinae is provided.

Key words Cynipoidea, *Mikeius*, new genus, new species, redescription, *Thrasorus*.

INTRODUCTION

Cynipoid wasps represent one of the more extensive radiations of extant parasitic Hymenoptera, with current estimates at just over 3000 described species (Ronquist 1999; Fontal-Cazalla *et al.* 2002; Buffington *et al.* 2007), but Nordlander (1984) estimated that 24 000 species are likely to occur. Although cynipoids are recovered deeply nested within the entomophagous parasitic Hymenoptera (Ronquist *et al.* 1999; Downton & Austin 2001; Castro & Downton 2006), the majority of Cynipidae are obligate phytophages (Weld 1952; Ronquist 1999). Ronquist (1995, 1999) and Buffington *et al.* (2007) both point to two stem groups of cynipoids, i.e. Parnipinae and Thrasorinae, as examples of species whose biology lies somewhere between entomophagy and phytophagy. Hence, understanding the taxonomy, biology and phylogenetics of these groups helps elucidate the evolutionary origins of the phytophagous cynipid lineage.

The focus of this paper is a revision of the Australian Thrasorinae, including a description of a new genus, *Mikeius* gen. n. as well as a new combination, *M. hartigi* (Girault) and descriptions of five new species: *M. berryi* sp. n., *M. gatesi* sp. n., *M. grandawi* sp. n., *M. neumanni* sp. n. and *M. schauffi* sp. n. Also provided is a redescription *Thrasorus pilosus* Weld, including a description of the male for the first time, as well as the description of *T. schmidtae* sp. n. Included is a diagnosis of *Thrasorus* and *Mikeius* to allow separation from Nearctic and Neotropical thrasorine genera (and close relative), namely *Euceroptres* Ashmead, *Myrtopsen* Rübtsaamen, *Pegascynips*

Brèthes and the newly described *Scutimica* Ros-Farré (Ros-Farré & Pujade-Villar 2007). A key to species of Thrasorinae of Australia is provided.

MATERIALS AND METHODS

Rearing methods. Branches with fully developed galls (Fig. 1F) were collected by I.-K. Kim (ANIC: Australian National Insect Collection, Canberra, Australia) from *E. cinerea* on the Commonwealth Scientific and Industrial Research Organisation (CSIRO) Black Mountain site in Canberra. To avoid mixing with other parasitoids of other insects on the host tree, all leaves were removed and then bare branches were placed in vinyl bags to collect wasps every 1 or 2 days.

Descriptions. Morphological terminology follows that of Ronquist and Nordlander (1989) and Fontal-Cazalla *et al.* (2002); cuticular surface terminology follows that of Harris (1979). Under each 'material examined' section, text within brackets is that of the author of this paper. Specimens were examined using a Leica Wild M10 with fluorescent lighting. Images for figures were obtained using an EntoVision Imaging Suite, which included a firewire JVC KY-75 3CCD digital camera mounted to a Leica M16 zoom lens via a Leica z-step microscope stand. This system fed image data to a desktop computer where Cartograph 5.6.0 (Microvision Instruments, France) was used to capture a fixed number of focal planes (based on magnification); the resulting focal planes were merged into a single, in-focus composite image. Lighting was achieved using techniques summarised in Buffington *et al.* (2005). All images contained within this study are freely available from <http://www.morphbank.com>. In some cases, digital

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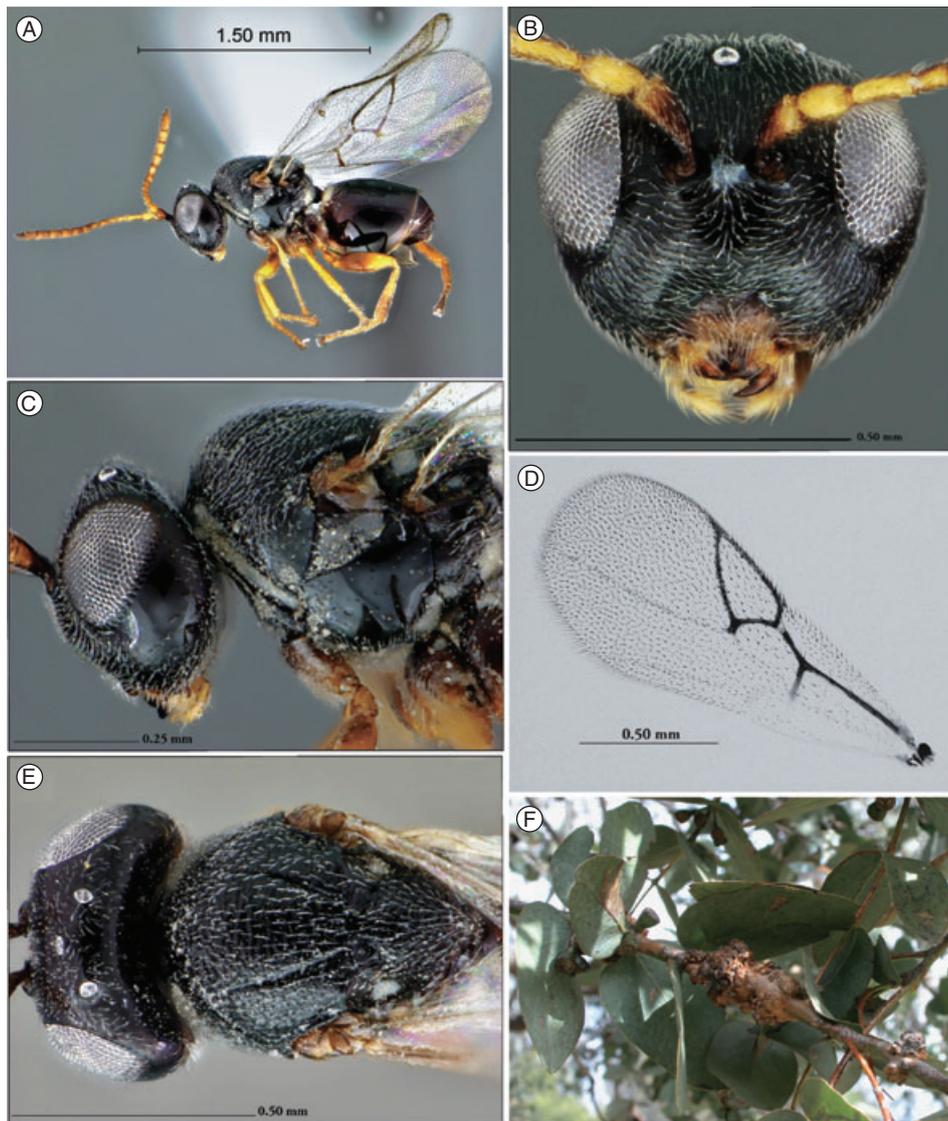


Fig. 1. *Mikeius hartigi* (Girault), female. (A) Habitus; (B) head, anterior view; (C) head and mesosoma, lateral view; (D) forewing; (E) head and mesosoma, dorsal view; (F) stem gall induced on *Eucalyptus cinerea* by an undetermined *Ophelimus* sp. (Eulophidae). Photo by I.-K. Kim.

drawings were made from these composite images using Adobe Photoshop®. Collections of images stored on MorphBank can be accessed through the links provided in the text and collection numbers in Table 1.

SYSTEMATICS

Key to species of Australian Thrasorinae

- 1 A. Microsculpture of mesoscutum composed of pits widely separated by smooth and shiny cuticle (e.g. Figs 2C,3G–H)..... *Thrasorus*, 2
- B. Microsculpture of mesoscutum composed of dense horizontal striations; no part of mesoscutum smooth and shiny (e.g. Fig. 1E,3A–F)..... *Mikeius* new genus
- 2 A. Anterior margin of mesopleuron setose; mesoscutal impression extremely short, represented by notch in posterior margin of mesoscutum (Fig. 3G)..... *T. pilosus* Weld

- B. Anterior margin of mesopleuron glabrous; mesoscutal impression absent (Fig. 3H)..... *T. schmidtae* sp. n.
- 3 A. Mesopleural carina absent, at most represented by few very faint striae (e.g. Fig. 1C)..... 4
- B. Mesopleural carina present, represented by either one distinct carina or several well-developed and continuous striae..... 5
- 4 A. Scutellar fovea subtriangular; bottom of scutellar fovea with distinct rib-like sculpturing (Fig. 3B); mesopleuron with very weak striae only occasionally present..... *M. gatesi* sp. n.
- C. Scutellar fovea round; bottom of scutellar fovea entirely smooth (Fig. 3C); mesopleuron without striae, entirely smooth..... *M. hartigi* (Girault)
- 5 A. Anterior margin of mesopleuron with setiferous pits..... 6
- D. Anterior margin of mesopleuron with deep striae..... *M. neumanni* sp. n.

Table 1 Summary of diagnostic features of thrasorine genera of the world

| Character | <i>Thrasorinus</i> | <i>Mikeius</i> | <i>Myrtopsen</i> | <i>Pegascynips</i> | <i>Scutimica</i> | <i>Euceroptres</i> |
|------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|-----------------------------------|
| Forewing areolate | Absent | Absent | Absent | Absent | Absent | Present |
| Mesoscutal sculpture | Smooth with notauli | Horizontally striate with notauli | Horizontally striate with notauli | Horizontally striate with notauli | Notauli extremely wide, incomplete | Horizontally striate with notauli |
| Metasomal terga 2 and 3 | T4 2× length of T3 | T4 2× length of T3 | T3 and T4 fused into a syntergum | T4 2× length of T3 | T3 and T4 fused into a syntergum | T4 subequal in length to T3 |
| Basal hairy ring on metasoma | Present laterally, broken dorsally | Absent |
| Metatibial spur | One-third length of tarsomere 1 | One-third length of tarsomere 1 | One-third length of tarsomere 1 | A half length of tarsomere 1 | One-third length of tarsomere 1 | One-third length of tarsomere 1 |
| Hosts | Galls on <i>Eucalyptus</i> spp. | Galls on <i>Eucalyptus</i> spp. | Galls on <i>Mimosa biuncifera</i> | Galls on <i>Nothofagus</i> spp. | Unknown | Cynipidae galls on <i>Quercus</i> |
| Morphbank collection link | 110363 | 110362 | 110387 | 110570 | None | 110388 |

- 6 A. Mesoscutal impression one-third to a half length of mesoscutum (when measured from posterior margin of mesoscutum) (e.g. Fig. 3A,F)..... 7
 E. Mesoscutal impression present as notch on the posterior margin of mesoscutum (Fig. 3E) *M. grandawi* sp. n.
- 7 A. Lateral aspect of pronotum with distinct ridges....
 *M. schauffi* sp. n.
 F. Lateral aspect of pronotum without ridges, at most with setiferous pits separated by smooth cuticle.....
 *M. berryi* sp. n.

Diagnosis of Thrasorinae genera

Ros-Farré and Pujade-Villar (2007) summarise the diagnostics of Thrasorinae, Plectocynipinae and *Euceroptres*. Members of the Thrasorinae tend to be morphologically homogenous. Table 1 summarises key diagnostic morphological and life-history features of each genus of Thrasorinae. Some characters of particular importance include forewing areolate present in *Euceroptres* Ashmead (absent in other thrasorines) and hairy ring absent at base of metasoma (other thrasorines have a dorsally interrupted hairy ring); terga 3 and 4 form a syntergum in *Myrtopsen* Rübsaamen and *Scutimica* Ros-Farré (terga 3 and 4 remaining distinct sclerites in other thrasorines); *Scutimica* has deep, incomplete notauli on the mesoscutum that forms an elongate pit; whereas, *Myrtopsen* has a transversely strigate mesoscutum and complete, narrow notauli, metatibial spur half the length of metatarsomere 1 in *Pegascynips* Brèthes (at most one-third length of metatarsomere 1 in other thrasorines); *Thrasorinus* Weld has a smooth, shiny, mesoscutum with narrow, complete notauli (Figs 2C,3G,H); *Mikeius* gen. n. has a distinctly crenulate to horizontally strigate mesoscutum (Figs 1E,3A–F). A complete list of species of Thrasorinae is provided in Table 2.

Mikeius gen. nov. (Figs 1,3A–F)

Type species *Amblynotus hartigi* Girault, new combination

Description (female). *Head.* Black; frons smooth to horizontally strigate; malar space variously strigate; gena and vertex smooth, shiny; entire head except gena covered in short appressed setae (Fig. 1A–E). Antennae orange, semiclavate, scape 1.25× length of radicle, short appressed setae on all flagellomeres, 12 flagellomeres present, moniliform; last two flagellomeres nearly fused (Fig. 1A).

Mesosoma. Lateral surface of pronotum polished to umbilicate, densely covered in short appressed setae (Fig. 1C). Mesopleuron polished, anterior end smooth to umbilicate; mesopleural carina present to variously strigate to absent; mesopleural triangle deeply impressed, setose, clearly defined along all edges (Fig. 1C). Mesoscutum transversely strigate and moderately setose; anteroadmedian signum present; median mesoscutal impression present or absent, when present, one-tenth to one-fourth length of mesocutum; notauli complete,

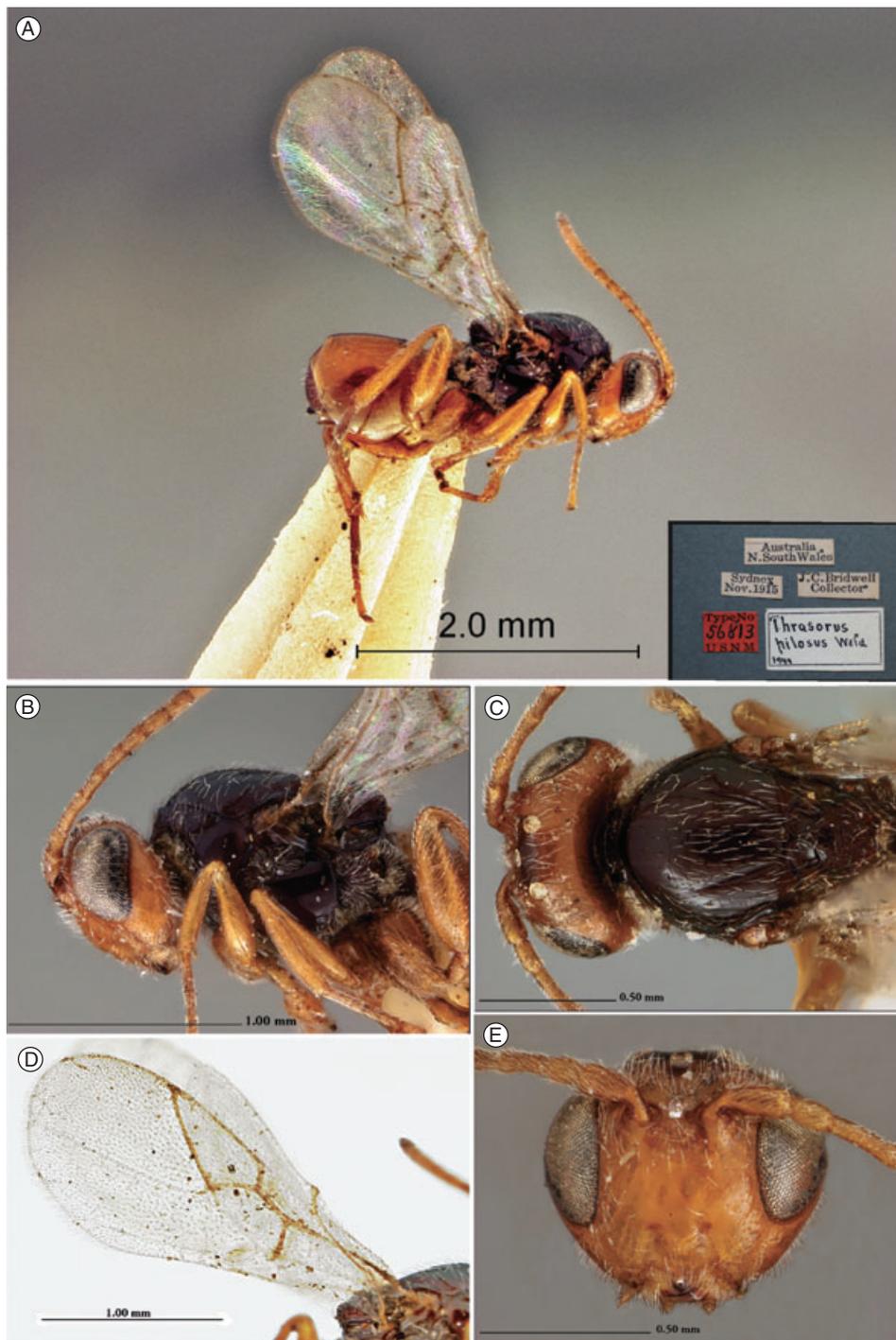


Fig. 2. *Thrasorus pilosus*, holotype, female. (A) Habitus; inset, specimen labels; (B) head and mesosoma, lateral view; (C) head and mesosoma dorsal view; (D) right forewing; (E) head, anterior view.

originating at anterior end of parascutal impression; notauli of uniform width to slightly wider posteriorly (Figs 1E,3A–F). Disk of scutellum transversely striate anteriorly, moderately to heavily rugose posteriorly (Fig. 3A–F); scutellar ridge separating scutellar fovea narrow to short and wide; scutellar fovea round to subtriangular, with or without posterior rim, centre either smooth to ribbed; entire scutellar disk evenly covered in short, appressed setae (Figs 1E,3A–F).

Metapleural-propodeal complex. Metapleuron ranging from completely setose to anterior two-thirds setose, remaining posterior surface smooth, glabrous; propodeum covered in

long, thin setae (Fig. 1A); cuticle deeply rugulose across entire propodeum. Nucha short, deeply striate.

Wings. Marginal cell closed along anterior margin (Fig. 1D); distinct break present in vein proximal to marginal cell (Fig. 1D); short setae present on wing surface and along margins.

Legs. Femora and tibiae orange-yellow with long, sparse setae. Tarsomeres orange-yellow, covered in short, appressed setae (Fig. 1A).

Metasoma. Ranging from black or brown to orange; petiole frequently obscured by anterior margin of tergum 3 (T3).

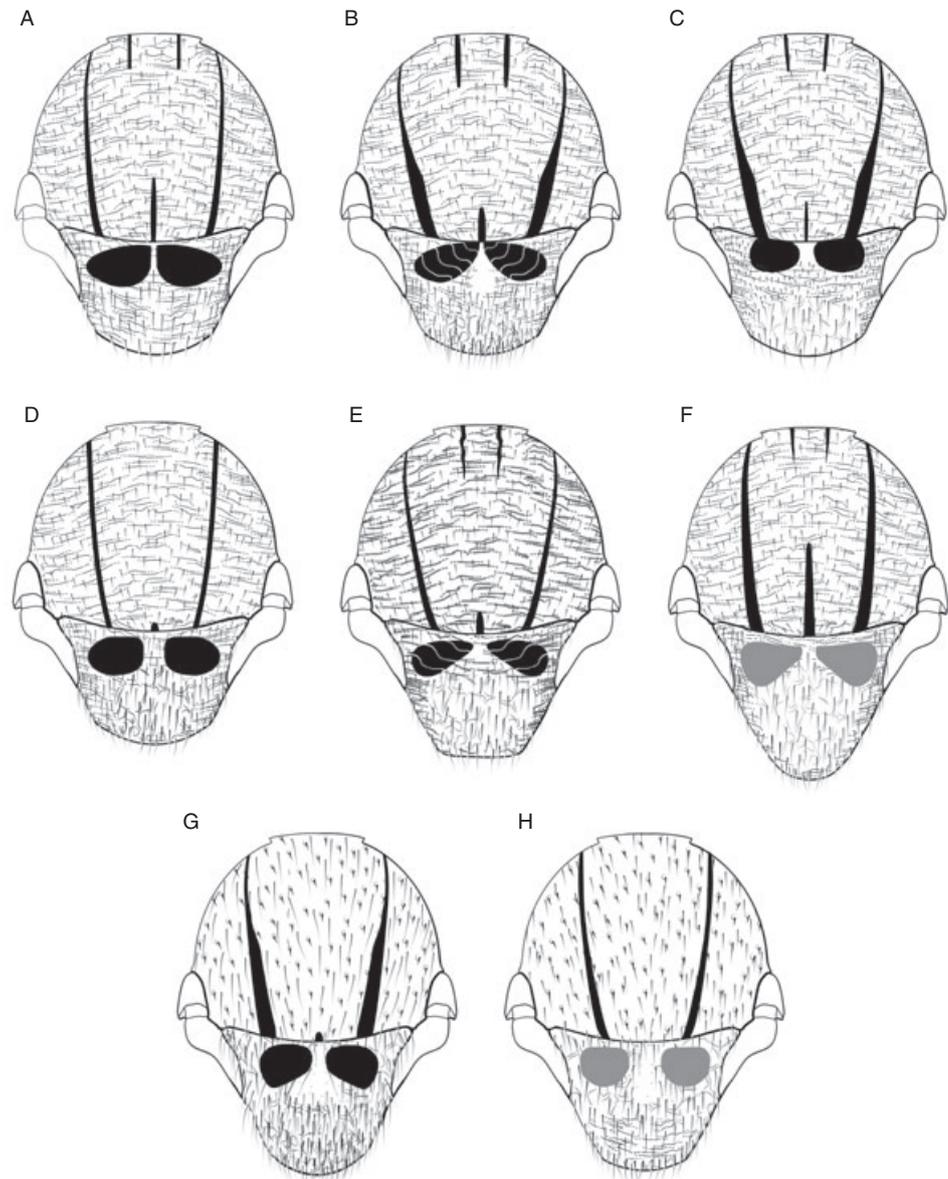


Fig. 3. Species of *Mikeius* and *Thrasorus*, dorsal view of mesosoma. (A) *Mikeius berryi* Buffington, n. sp.; (B) *M. gatesi* Buffington, n. sp.; (C) *M. hartigi* (Girault), n. comb.; (D) *M. grandawi* Buffington, n. sp.; (E) *M. neumanni* Buffington, n. sp.; (F) *M. schauffi* Buffington, n. sp.; (G) *T. pillosus* Weld; (H) *T. schmitdae* Buffington, n. sp. Drawings by M. Metz. Gray scutellar foveae in (F) and (H) indicate these impressions are shallow relative to the other species.

Table 2 World species of Thrasorinae. Species of *Plectocynips* and *Pegascynips* are now included in Plectocynipinae (Ros-Farré & Pujade-Villar 2007) and not shown here

| Genus | Type species | Included species |
|---|--|--|
| <i>Mikeius</i> Buffington | <i>Amblynotus hartigi</i> Girault 1930: 2 (present designation) | <i>Mikeius berryi</i> Buffington <i>Mikeius gatesi</i> Buffington <i>Mikeius grandawi</i> Buffington <i>Mikeius hartigi</i> (Girault) <i>Mikeius neumanni</i> Buffington <i>Mikeius schauffi</i> Buffington |
| <i>Myrtopsen</i> Rübsaamen 1908: 136 | <i>Myrtopsen mayri</i> Rübsaamen (1908) (by monotypy) | <i>Myrtopsen luederwaldti</i> Dettmer (1930) <i>Myrtopsen mayri</i> Rübsaamen (1908) <i>Myrtopsen mimosae</i> Weld (1926) <i>Myrtopsen rodovolhoi</i> Dettmer (1930) |
| <i>Scutimica</i> Ros-Farré and Pujade-Villar (2007: 3) | <i>Scutimica flava</i> Ros-Farré and Pujade-Villar (2007) (original designation) | <i>Scutimica flava</i> Ros-Farré and Pujade-Villar (2007) (original designation) <i>Scutimica transcarinata</i> Ros-Farré and Pujade-Villar (2007) |
| <i>Thrasorus</i> Weld 1944: 59 | <i>T. pilosus</i> Weld (1944) (original designation) | <i>Thrasorus pilosus</i> Weld 1944: 59 <i>Thrasorus schmitdae</i> Buffington |

Metasomal T4 5× length of T3; remaining terga short, telescoped within T4; entire metasoma shiny and smooth (Fig. 1A); setae frequently present on terga 7 and 8.

Description (male). As in female except: antenna with 14 flagellomeres, flagellomere 1, two to three times as long as flagellomere 2, laterally excavated; apical and subapical flagellomeres distinct; metasomal T4 3× length of T3.

Diagnosis. Differs from *Thrasorus* by the horizontally strigate mesoscutum; from *Myrtopsen* and *Scutimica* by the lack of syntergum; from *Euceroptres* by lacking an aerolet in the forewing, and having a broken hairy ring at the anterior end of metasoma; from *Pegascynips* by the relatively short metatibial spur.

Distribution. Australia: A.C.T., Queensland (Qld), New South Wales (NSW), Northern Territory and Western Australia.

Etymology. Aside from *M. hartigi*, all species epithets refer to people whose first name is 'Mike', hence *Mikeius*, a Latinized form of Mike. The gender is masculine, ruled by second declension.

Mikeius berryi sp. n. (Fig. 3A)

Description. As in generic description with frons smooth, striate only near malar space; male antennal F1 three times longer than F2; lateral aspect of pronotum smooth; anterior of mesopleuron umbilicate; mesopleural carina present as series of weak strigae; notauli of uniform width; median mesoscutal impression present, one-third length of scutellum; scutellar fovea oval, smooth, lacking posterior rim; anterior one-fourth of metapleuron glabrous, remainder setose; metasoma orange.

Diagnosis. Differs from *M. gatesi* and *M. hartigi* by the more complete mesopleural carina and the presence of umbilicate sculpture at the anterior end of the mesopleuron; from *M. neumannii* and *M. grandawi* by the elongate median mesoscutal impression; from *M. schauffi* by the smooth lateral aspect of the pronotum.

Type material. HOLOTYPE. (first label) AUSTRALIA: Wanaaring, NSW, 29 October (19)49, E.F. Riek; (second label) holotype designation label. The holotype is a female, point mounted, in good condition. Deposited in ANIC. PARATYPES. AUSTRALIA: NSW. Wanaaring, 29 October (19)49, E.F. Riek (4 ♀, 2 ♂, one female missing head), one specimen labelled 'ex Eucalypt gall'; 40 mL W. Bourke, 28 October (19)49, NSW, E.F. Riek (1 ♀), second label reads 'ex Eucalypt gall'; Ryde, NSW, *E. robusta* (*E. robusta*) 28.12.29 (28 December 1929), L. Gull . . . (remainder of name illegible); 'swollen stem galls #2' (3 ♂); Sydney Harbour, 6.11.30 (6 November 1930), '2030 leaf stalk gall *Acacia longifolia* (1 ♀); New England National Park, NSW, 19 March 1954, E.F. Riek (1 ♀, ANIC). Qld. Bald Mountain area, 3500–4000', Via Emu Vale, 27–31.i.1972, S.R. Montieth. Victoria. 'Melb' (Melbourne), 'Univ. C.', II.96 (February 1894), bred 20.II.94 (February 20, 1894) (1 ♀, 1 ♂).

Biology. According to specimen data labels, one series was reared by E.F. Riek from stem galls on *E. robusta*; a label on another specimen, collected and reared by an unknown person,

reads that the specimen was reared from a stalk-leaf gall on *A. longifolia*. Without actual plant material, galls or host remains, the association of these specimens with these species needs confirmation.

Comments. This species appears to be rather widespread throughout Eastern and South-eastern Australia.

Etymology. Named in honour of my good friend and pilot Mike Berry.

Mikeius gatesi sp. n. (Fig. 3B)

Description. As in generic description with frons smooth dorsally, ventral one-third striate; male antennal F1 two times longer than F2; lateral aspect of pronotum smooth; anterior of mesopleuron smooth; mesopleural carina absent, occasionally with very faint strigae; notauli widened slightly posteriorly; median mesoscutal impression present, hardly impressed, short, at most one-eighth length of mesoscutum; scutellar fovea subtriangular to oval, ribbed, posterior rim present; anterior one-fourth of metapleuron glabrous, remainder setose; metasoma black.

Diagnosis. Differs from *M. hartigi* by having a more developed scutellar fovea that is centrally ribbed and from all other species of *Mikeius* by the lack of a distinct mesopleural carina.

Type material. HOLOTYPE. (first label) 36.12S 148.43E, Dainers Gap, NSW, 6 February 1974, P. Morrow; (second label) ex *E. pauciflora*; (third label) 1585 m. *E. pauciflora*, stellulata and perriniana forest; (fourth label) holotype designation. The holotype is a male, point mounted, in good condition. Deposited in ANIC. PARATYPES. AUSTRALIA. NSW. 36.12S 148.43E, Dainers Gap, NSW, 9 January 1974, P. Morrow; ex *E. pauciflora*; 1585 m. *E. pauciflora* forest. (1 ♀, metasoma missing); 36.12S 148.43E, Dainers Gap, NSW, 21 February 1974, P. Morrow; ex *E. perriniana*; 1585 m. *E. pauciflora*, stellulata and perriniana forest (2 ♀); Rutherford Creek, Brown Mountain, NSW, 15 January 1969, J.C. Cardale & S.R. Curtis (2 ♂); Brown Mountain, NSW, 8 March 1963, D.H. Colless (1 ♂); Nimmitabel, NSW, 8 March 1963, D.H. Colless (1 ♀). Australian Capital Territory. Canberra, 5 February 1960, E.F. Riek (1 ♀). Qld. Mt. Glorious, 21 December 1961, R. Lindsay (1 ♀). Northern Territory. 23.32S 133.38E, 30 km NW by W of Alice Springs, Northern Territory, 7 October 1978, J.C. Cardale (1 ♂).

Biology. Two labels of the type series indicate the specimens were 'ex' from either *E. perriniana* or *E. pauciflora*. As in the case of *M. berryi*, there are no host remains, plant material or galls to confirm the accuracy of this host association.

Comments. One specimen in the type series bears a label by Riek indicating that he believed this species to be *M. hartigi* (Girault). Riek, also working with the manuscript genus name 'Pelimnas', labelled several specimens as such, but this name was never published, and therefore, is not available.

Etymology. Named in honour of my friend and colleague, Mike Gates (Systematic Entomology Laboratory, USDA/ARS).

***Mikeius grandawi* sp. n. (Fig. 3D)**

Description. As in generic description with frons smooth in very centre, sides and ventral one-third with horizontal strigae; lateral aspect of pronotum smooth; anterior of mesopleuron umbilicate; mesopleural carina present, distinct; notauli of uniform width; median mesoscutal impression present, short, at most one-tenth length of mesoscutum; scutellar fovea round, smooth along bottom, posterior rim present; metapleuron completely setose; metasoma black. Male unknown.

Diagnosis. Differs from *M. hartigi* and *M. gatesi* by the presence of a distinct mesopleural carina; from *M. berryi* by the short median mesoscutal impression; from *M. neumanni* by the round, smooth-bottomed scutellar fovea; and from *M. schauffi* by the smooth lateral aspect of pronotum.

Type material. HOLOTYPE. AUSTRALIA: (first label) 37 mi N of Ajana, W(estern) A(ustralia), 16 October 1970, D.H. Colless; (second label) holotype designation label. The holotype is a female, point mounted, in good condition. Deposited in ANIC. PARATYPE. AUSTRALIA: 37 mi N of Ajana, Western Australia, 16 October 1970, D.H. Colless (1 ♀, ANIC).

Biology. Unknown.

Comments. This is the only recorded species from Western Australia. As with the other species of *Mikeius*, additional collecting likely will yield substantial range extensions.

Etymology. Named in honour of my good friend and artist Mike Grandaw.

Mikeius hartigi* (Girault), new combination (Figs 1A–F,3C)**Amblynotus parvus* Girault 1929: 1–2. (not Hartig 1840)*****Amblynotus hartigi* Girault 1930: 2. Replacement name**

Redescription. As in generic description with frons smooth, strigate only near malar space; male antennal F2 two times longer than F3; lateral aspect of pronotum smooth; mesopleural carina absent; notauli slightly wider posteriorly; median mesoscutal impression present, one-fourth length of mesoscutum; scutellar fovea with smooth bottom, lacking posterior rim; metasoma completely black.

Diagnosis. Similar to *M. gatesi* in that both species lack a complete mesopleural carina (complete in all other species); differs from *M. gatesi* having most of the frons smooth (lower one-third of frons in *M. gatesi* horizontally strigate), bottom of scutellar fovea smooth, not rimmed posteriorly (ribbed and slightly rimmed posteriorly in *M. gatesi*); differs from all other species of *Mikeius* by the lack of a mesopleural carina.

Type material. HOLOTYPE. AUSTRALIA. (first label) Bright, Victoria, F.E. Wilson, September 1928; (second label) bred from *Eucalyptus* gall; (third label) holotype label (pink); (fourth label) *Pelimnas hartigi* (Gir) E.F. Riek, det 1953 (in Riek's hand); (fifth label) *A. parvus* Girault, female, type (in

Table 3 Hymenoptera associated with *Ophelimus* galls on *Eucalyptus cineraria* (J. La Salle & I.-K. Kim, pers. comm.)

| Species | Family | Subfamily/Tribe |
|--------------------------------------|--------------|-------------------|
| <i>Ophelimus</i> sp.1 (gall inducer) | Eulophidae | Ophelimini |
| <i>Ophelimus</i> sp.2 | Eulophidae | Ophelimini |
| Tetrastichinae sp.1 | Eulophidae | Tetrastichinae |
| Tetrastichinae sp.2 | Eulophidae | Tetrastichinae |
| Pirenini sp.1 | Pteromalidae | Pireninae |
| <i>Ditropinotella</i> sp. | Pteromalidae | Ditropinotellinae |
| <i>Megastigmus</i> sp. | Torymidae | Megastigminae |
| <i>Bootanellus</i> sp. | Torymidae | Megastigminae |
| <i>Eurytoma</i> sp. | Eurytomidae | Eurytominae |
| <i>Mikeius hartigi</i> | Figitidae | Thrasorinae |

Girault's hand). The holotype is a female (based on the original description), in poor condition, missing the antennae, metasoma and most legs. Deposited in QM (Qld Museum, Brisbane, Australia).

Additional material. NON-TYPES. AUSTRALIA. Australian Capital Territory. Canberra, CSIRO Black Mountain Laboratories outside herbarium, coll 19.IX. 2002J. La Salle, N. Fisher. (13 ♂, 10 ♀, ANIC; 12 ♀, 13 ♂, NMNH: National Museum of Natural History, Washington, DC, USA).

Image depository. Collection of images of this species located at <http://morphbank.net/Show/?id=110362>.

Biology. *M. hartigi* emerged from *Ophelimus* sp. galls on *E. cinerea* from the middle of October to the middle of November (Fig. 1F). The species is biparental, producing almost equal numbers of females and males (J. La Salle & I.-K. Kim, pers. comm.). A total of 10 other species of Hymenoptera emerged from the galls on *E. cinerea* (Table 3). The biology of all these species has not been resolved, and species could be parasitoids, inquiline or even gall formers within or adjacent to the galls induced by the *Ophelimus* sp.

***Mikeius neumanni* sp. n. (Fig. 3E)**

Description. As in genus description with frons densely setose in very centre, sides and ventral one-third with horizontal strigae; lateral aspect of pronotum moderately crenulate with long setae; anterior of mesopleuron striate; mesopleural carina present, distinct; notauli of uniform width; median mesoscutal impression present, short, notch-like; scutellar fovea subtriangular, ribbed along bottom, posterior rim present; metapleuron completely covered by long setae; metasoma black.

Diagnosis. Differs from *M. hartigi* and *M. gatesi* by the presence of a distinct mesopleural carina (reduced in males); from *M. berryi* and *M. schauffi* by the short median mesoscutal impression; and from *M. grandawi* by the triangular, ribbed scutellar fovea.

Material examined. HOLOTYPE. AUSTRALIA (first label) Mt. Nebo, S.E. Qld, 24.xi.1970, S.R. Monteith; (second label) holotype designation. The holotype is a female, point mounted, in good condition. Deposited in ANIC.

Additional material. None.

Biology. Unknown

Etymology. Named in honour of my good friend Mike Neumann.

***Mikeius schauffi* sp. n. (Fig. 3F)**

Description. As in generic description with frons densely setose in very centre, sides with horizontal strigae; lateral aspect of pronotum with moderate striae along ventral one-third; anterior of mesopleuron umbilicate; mesopleural carina present, distinct; notauli of uniform width; median mesoscutal impression present, moderately long, reaching to near middle of mesoscutum; scutellar fovea oblong, smooth along bottom, posterior rim weakly present; metapleuron completely covered by medium length setae; metasoma orange.

Diagnosis. Differs from *M. hartigi* and *M. gatesi* by the presence of a distinct mesopleural carina; from *M. neumanni* and *M. grandawi* by the relatively long mesoscutal impression; and from *M. berryi* by oblong, weakly bordered scutellar fovea.

Type material. HOLOTYPE. AUSTRALIA: (first label) 23.36S 133.35E, 32 km West-Northwest of Alice Springs, N(orthern T(erritory)), 8 October 1978, J.C. Cardale; (second label) ex alcohol collection; (third label) holotype designation label. The holotype is a female, point mounted, in good condition. Deposited in ANIC.

Additional material. None.

Biology. Unknown

Etymology. Named in honour of Mike Schauff, Plant Sciences Institute, USDA.

***Thrasorus Weld* (Figs 2A–E, 3G–H)**

***Thrasorus pilosus* Weld 1944: 59. Type species by original designation**

Redescription (female). *Head.* Polished on frons, malar space and gena; setose around toruli, ocelli, and occiput (Fig. 2B,C). Antennae orange, scape 1.5× length of radicle, short appressed setae on all flagellomeres, 12 flagellomeres present, moniliform.

Mesosoma. Lateral surface of pronotum polished; sparsely covered in moderately long setae (Fig. 2B). Mesopleuron polished; mesopleural carina present; mesopleural triangle deeply impressed, setose, clearly defined along all edges (Fig. 2B). Mesoscutum lightly pitted with small punctures and moderately setose; cuticle between punctures shiny; notauli complete, originating at anterior end of parascutal impression; (Figs 2C, 3G–H). Disk of scutellum moderately rugose posteriorly, smooth anteriorly; scutellar ridge separating scutellar fovea short; entire disk sparsely covered in long, thin setae (Figs 2C, 3G–H).

Metapleural-propodeal complex. Entire metapleuron and propodeum covered in long, thin setae such that surface sculpture is entirely obscured (Fig. 2B); cuticle deeply rugulose across entire propodeum. Nucha short, deeply striate.

Metasoma. Petiole obscured by anterior margin of T3. Metasomal T4 4× length of T3; remaining terga short, tele-

scoped within T4; entire metasoma shiny and smooth (Fig. 2A). Setal band at base of metasoma incomplete dorsally.

Wings. Marginal cell closed along anterior margin (Fig. 2D); short setae present on wing surface and along margins.

Legs. Femora, tibiae orange; long, sparse setae present. Tarsomeres orange, covered in short, appressed setae (Fig. 2A).

Redescription (male). As in female with first flagellomere of antennae slightly longer, laterally excavated; length of metasoma slightly smaller than female.

Diagnosis. Differs from *Mikeius* by the smooth mesoscutum; from *Myrtopsen* and *Scutimica* by the lack of a syntergum; from *Euceoptres* by lacking an aerolet in the forewing and having a broken hairy ring at anterior end of metasoma; and from *Pegascynips* by lack of relatively long metatibial spur.

Distribution. Australia: NSW, Tasmania, A.C.T. and Victoria.

***Thrasorus pilosus* Weld (Figs 2A–E, 3G)**

Redescription. As in generic description with head and metasoma orange, mesosoma black; notauli noticeably wider posteriorly; mesoscutal impression reduced to a distinct notch in posterior margin of mesoscutum; anterior margin of mesopleuron heavily to moderately setose.

Diagnosis. Differs from *T. schmidtae* Buffington n. sp. by the presence of setae along anterior margin of mesopleuron and a distinct notch-like remnant of the mesoscutal impression.

Type material. HOLOTYPE. AUSTRALIA: (first label) NSW; (second label) Sydney, November 1915; (third label) J.C. Bridwell, collector; (fourth label, red) Type no. 56813 USNM (NMNH); (fifth label, in Weld's hand) *T. pilosus* Weld (1944). The holotype is a point mounted female, in moderate condition, deposited in NMNH. PARATYPES. AUSTRALIA: NSW. Sydney, November 1915, J.C. Bridwell collector (3 ♂, NMNH). All paratypes have their metasomata disarticulated from the rest of the body.

Additional material. NSW. Yallingup, November 1913, R.E. Turner 1914–190 (1 ♂, NMNH); Coonabarabran, 24 November 1936, Carter, 2473, small oval gall on *E. robusta* (1 ♀, ANIC); Sydney, Sydney Harbor, W. WF., 29 October 1930, 2136, large round gall, *E. robusta* (1 ♀, ANIC); Sydney, Sydney Harbor, W. WF., 19 November 1930, 2036, round stem, *E. robusta* (1 ♀, ANIC); 40 mi W. Burke, 28 October 1949, E.F. Riek, on eucalypt gall (1 ♂, ANIC); Nimmitabel, 8 March 1963, D.H. Colless (1 ♂, ANIC); 36.12S 148.4E, Dainers Gap, NSW, 21 February 1974, P. Morrow, ex *E. perriniana*, 1585 m. *E. pauciflora*, stellulata and perriniana forest (1 ♀, 1 ♂, ANIC); Brown Mtn., NSW, 15 January 1969, J.C. Cardale & S.R. Curtis (1 ♂, ANIC). Australian Capital Territory. Canberra, 27 December 1960, E.F. Riek (1 ♀, ANIC). Victoria. Melbourne University, 10-12-94 (12 October 1894?) (4 ♀, 2 ♀, ANIC); Melbourne, on *Eucalyptus*, 11-94 (November 1894?) (2 ♂, 1 ♀, ANIC); Tambo Crossing, January 1936, F.E. Wilson, bred from sticks of *A. dealbata* (1 ♂, ANIC). Tasmania. Bicheno, Tasm., 1-19 December 1981, H.J. Elliott, *E. sieberi* stem galls, ex ethanol (4 ♂, ANIC).

Biology. According to label data, several specimens were reared from *E. robusta* and *E. sieberi*. Other specimens were simply associated with *Eucalyptus* (on or 'ex') and *A. dealbata*. As with other species discussed in this paper, no host remains are associated with any of these records.

Image depository. A collection of images of this species is located at <http://morphbank.net/Show/?id=110363>.

Thrasorus schmidtae sp. n. (Fig. 3H)

Description. As in generic description with head, mesosoma, metasoma dark brown; notauli entirely of equal width; mesoscutal impression completely absent; anterior margin of mesopleuron glabrous.

Diagnosis. Differs from *T. pilosus* by the glabrous anterior margin of the mesopleuron and by the total lack of a mesoscutal impression.

Type material. HOLOTYPE. AUSTRALIA. (first label) Woombye, near Nambour, Qld, 11–16 October 1965, D.H. Colless; (second label) holotype designation label. The type is a female, point mounted, in good condition. Deposited in ANIC.

Additional material. None.

Biology. Unknown.

Etymology. Named in honour of Hazel Schmidt (Plant Sciences Institute, USDA) who played a critical role in obtaining the imaging equipment used to illustrate the species in this paper for the Systematic Entomology Laboratory.

DISCUSSION

Weld (1944, 1952) placed *T. pilosus* Weld within the entomophagous figitid subfamily Figitinae. The species remained in Figitinae until Riek (1970) transferred it to the inquiline Cynipidae (referred to as Cynipinae and not Synergini *sensu* Ronquist (1999)). Riek (1970) suggested that, based on the association of *T. pilosus* with galls, as well as features of the mesoscutum and hypopygium, the taxon was not a figitid. The first published host record for *Thrasorus* was that of Riek (1971), which listed the host as a Melanosomellini (Brachyscelidiphagini) (Pteromalidae) chalcidoid, but offered no references or data on the source of this record.

Upon further examination of specimens housed in ANIC, it is clear that the specimens used in the present study were the very same as those used by Riek (1971). Unfortunately, as stated earlier in this work, there are no host remains (plant material or galls) that allow for any confirmation of the label data. Specifically, the reference to Melanosomellini as the host on *Acacia*, is based on a series of both figitids and pteromalids, all mounted together on large cards, with 'host' data recorded on the reverse side as '*Acacia* gall'; the handwriting is far from legible, and the only other information I was able to obtain from these labels was 'Qld'. One of the two large cards may have, at one point, contained some form of host remains, likely a gall, judging from a large glue spot on the larger of the two cards. Riek had placed a determination label on one of the two large card samples, stating that taxon was '*T. berleseii* (Grlt)';

my investigations indicate that this name was never published by Girault (or Riek), although there is a specimen in the QM labelled as '*A. berleseii* Girault'. This specimen also bears a holotype label, and aside from the label by Girault (in Girault's hand), the specimen bears no other information, not even locality data. It is not clear why Girault never published this name, but it is possible that he was awaiting more specimens with complete data. This specimen should not be considered a holotype, and the name '*A. berleseii*' is considered unavailable because the name has never been published.

Based on the gall-associated biology, Riek (1970) transferred this taxon to Cynipidae. Conversely, Kovalev (1994) used these same data to remove *Thrasorus* from Cynipidae and erect Thrasoridae, a new family group name that also included *Riekcynips australis* (Kovalev 1994). Kovalev (1994) further suggested that thrasorids were among the most basal of microcynipoids, hinting that they were closely related to the gall-inducing Cynipidae.

Ronquist (1999) considered *Riekcynips* a *nomen nudum* because no type specimen was designated for this species. Although no type specimen was designated, a type species was selected and, according to the code under which the genus was originally described (ICZN 1985, Art. 73.1.4), no type specimen was required. Despite that the name is available, this genus cannot be placed confidently within Thrasorinae. Therefore, I follow Ros-Farré and Pujade-Villar (2007) and consider *Riekcynips australis* Kovalev *incertae sedis* (Table 4).

Ronquist (1999) reclassified *Thrasorus* within the Thrasorinae, a subfamily of Figitidae, and included five genera formerly referred to as the figitoid inquilines (Ronquist 1994, 1995); these taxa are *Euceroptres*, *Myrtopsen*, *Pegascynips*, *Plectocynips* and *Thrasorus*. Ronquist (1999) supported this move by citing that these genera all possessed the two synapomorphies of figitids, i.e. base of ovipositor with a distinct point of weakness (*viz.* Fig. 6A,B, Ronquist 1995) and the $R_2 + M$ forewing vein issuing from a point close to Cu_1 at the posterior end of the basal vein (*viz.* Fig. 11, Ronquist 1995). Ronquist (1999) further characterised members of the Thrasorinae as all possessing a 'distinctly swollen metacoxa'. The phylogenetic utility of this last character has yet to be critically evaluated (F. Ronquist, pers. comm.; M.L. Buffington, pers. obs.). It should be noted that Kovalev (1994) recognised the discrepancy in the forewing venation of thrasorids and cynipids, which appears to be the chief reason for their removal from Cynipidae (along with biological data). More recently, Buffington and Liljeblad (2008) erected Euceroptrinae to accommodate *Euceroptres* since this genus renders Thrasorinae paraphyletic (Buffington *et al.* 2007).

Table 4 Species *incertae sedis* previously classified as Thrasorinae

| Genus | Type species | Included species |
|-------------------------------------|---|-------------------------------------|
| <i>Riekcynips</i> Kovalev (1994) | <i>Riekcynips australis</i> Kovalev (1994) (original designation) | <i>Riekcynips australis</i> Kovalev |

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