

Phylogenetic Relationships of the Thynnine Wasp Tribe Rhagigasterini (Hymenoptera: Tiphidae)

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Abstract.—The thynnine tribe Rhagigasterini is reviewed, with an extensive reevaluation of generic groupings. Phylogenetic analyses of seven *Rhagigaster* species, two species of *Dimorphothynnus*, two *Aelurus* species, and fourteen species of *Eirone*, with Anthoboscinae and Thynnini s.s. as outgroups, reveal the relationships: Anthoboscinae + (Thynnini + [(*Aelurus* + *Eirone*) + (*Dimorphothynnus* + *Rhagigaster*)]). A consensus tree generated from all 27 taxa yielded a ci of 59. Analysis of only species representing genera (generic type species) resulted in a cladogram with the same topography and a ci of 73. *Rhagigaster* species were found to constitute a monophyletic unit despite suggestions that this genus may have been polyphyletic. The relationship between *Eirone* and *Aelurus* is problematic. *Aelurus*, the only South American genus, ends up embedded in *Eirone* in all of these analyses, and may indeed indicate that *Eirone* is a paraphyletic genus. However, derived features of the male terminalia in each group clearly separate them, and since females have been seen only for a few species in both genera, *Aelurus* will not be synonymized herein. Five new species of *Eirone* are described: *aquilonius* and *valokaensis* from New Britain, and *cheesmanae*, *schlingeri* and *speciosus* from Papua New Guinea.

INTRODUCTION

Thynninae is the largest and most diverse subfamily in the Tiphidae. Initially, Turner (1910b) treated this group as a discrete family, which he divided into three subfamilies, Diamminae, Rhagigasterinae and Thynninae, though the majority of genera and species were placed in the Thynninae. Subsequent studies (Pate 1947) and cladistic analyses (Brothers 1975, Brothers & Carpenter 1993, Kimsey 1991) clearly demonstrate that thynnines belong to the family Tiphidae. This conclusion was based on a suite of characteristics including the presence of mesopleural lamellae, a quadrate pronotum, the unciform male subgenital plate found in most genera, and winged forms having the posterior angle of the pronotum reach the tegula. Argaman and Özbek (1992) made a retrograde proposal to restrict the family Tiphidae to include only members of the Tiphinae. However, this proposal is completely unsupported by any apomorphic

characteristics or phylogenetic analyses, and is generally unaccepted.

The subfamily Rhagigasterinae was originally described by Turner (1910b) to include the genera *Rhagigaster* Guérin 1839, *Dimorphothynnus* Turner 1910b, *Eirone* Westwood 1844 and *Aelurus* Klug 1842. *Aelurus* is the only South American member of this group, all the rest are Australasian. This group is now treated as a tribe in the subfamily Thynninae (Given 1954, Salter 1954, Kimsey 1991).

Members of the Rhagigasterini lack a number of the derived features characteristic of other Thynninae, having instead the primitive character states as follow: 1. metasternum without simple medial ridge or truncation in both sexes, 2. male apical sternum apically rounded or with a linear uncus, 3. aedeagus simple and linear (except *Dimorphothynnus*), 4. female tergum I and II simple, without carinae or rugae (except *Dimorphothynnus*), and 5. female without discrete pygidial plate (except *Di-*

morphothynnus). Therefore they are treated as a basal lineage of the subfamily (Kimsey 1991). Derived features of rhagigasterines are: 1. male parameres with a dense apical row of elongate, often flattened setae, and 2. female mesopleuron with a discrete dorsal surface.

After examination of all of the rhagigasterine types in the British Museum (Natural History) it became apparent that the genera *Eirone* and *Aelurus* were very similar, and have very similar females, where known. There has also been the suggestion that the genus *Rhagigaster* is polyphyletic and should be further subdivided (G. Brown, personal communication). Finally, *Eirone* is a structurally diverse genus with some species groups apparently divergent enough to justify their separation into discrete genera. Therefore, previous treatments of the relationships among the Rhagigasterini are inadequate, and the entire group needed an objective reexamination.

MATERIALS

Specimens were borrowed for this study or studied in situ from the following institutions and individuals: Australian National Insect Collection, CSIRO, Canberra, ACT; California Academy of Sciences, San Francisco, USA, W. Pulawski; California Department of Food and Agriculture, Sacramento, USA, M. S. Wasbauer; Canadian National Insect Collection, Ottawa, Ontario, L. Masner; Carnegie Museum, Pittsburgh, Pennsylvania, USA, J. E. Rawlins; Cornell University, Ithaca, N. Y., USA, J. K. Liebherr; Florida State Collection of Arthropods, Gainesville, USA; L. Stange; Charles Porter, personal collection; Gainesville, Florida, USA; Museo ed Istituto di Zoologia Sistemica, Università di Torino, Italy, P. d'Entreves; Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA, J. M. Carpenter, and D. Furth; Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands, C. van Achterberg; The Museum of Natural History, London,

England, M. C. Day; U. S. National Museum, Washington, D. C., K. V. Krombein and A. S. Menke; Zoologisches Museum, Humboldt-Universität, Berlin, F. Koch; Zoologisk Museum, Copenhagen, Denmark, B. Petersen. The species examined for this study are indicated below by an asterisk (*).

The following abbreviations are used: F = flagellomere, MOD = midocellus diameter, PD = puncture diameter, S = gastral sternum, and T = gastral tergum.

Parsimony analyses of the generic relationships were performed using the Hennig86 software (Farris 1988). The data matrix generated by detailed examination of the species listed in Table 1 was analyzed using explicit enumeration with branch swapping. All characteristics were treated as unweighted, and multistate characters as additive. These species were chosen because they represent very different groups within each genus or are types of published generic names. They were specifically chosen to test the notion that the current generic categories were either para- or polyphyletic. Character states were polarized using the Thynnini and Anthoboscinae as outgroups. Character polarities are discussed below, and are given in the data matrix provided in Table 1.

RESULTS

Tribal Characters

Head.—In the Thynninae a transverse carina extending across the frons is found only in males of *Rhagigaster* and *Dimorphothynnus*. The majority of *Rhagigaster* have at least a trace of a transverse carina. In *Dimorphothynnus* the carina is well-developed and extends from eye to eye across the frons, with a dorsal branch that forms an almost heart-shaped enclosure (Fig. 8). This feature is clearly a uniquely derived characteristic of these genera.

Thorax.—The dorsally bulging mesopleuron in female Rhagigasterini is diagnostic for this tribe. A hindcoxal carina,

extending along the dorsum of the coxa from the base nearly to the apex, is present in all male thynnines, and is generally undeveloped or is elevated and broadly rounded basally in rhagigasterines. However, in *Rhagigaster* and *Dimorphothynnus* it is elevated and toothlike (Fig. 11). Unlike most other thynnines, female *Eirone* have greatly reduced mesopleural lamellae.

In the majority of tephid subfamilies, including Myzininae, Anthoboscinae, and Tephinae, the metapostnotum is obscured medially by the scutellum. In the Rhagigasterini the metapostnotum is clearly visible as a band dorsally. This feature is found in no other Tephidae, and the pattern seen in the rest of the Aculeata suggests that the presence of a visible metapostnotum in the form seen in these genera is derived.

Gaster.—Sculpturing of the female T-II is a prominent feature in members of the Thynnini and Scotaenini (Kimsey 1992). In Rhagigasterini only *Dimorphothynnus* have sculpturing on this or any other gastral terga. In Anthoboscinae the subgenital plate is simple and evenly rounded, although in a few species such as *Anthobosca chilensis* Guérin, the apex may be spine-rimmed and thickened medially (Fig. 27) as is seen in some species of *Eirone* and in *Aelurus* (Fig. 31). This simple and evenly rounded apical sternum is assumed to be the primitive form in the Rhagigasterini. Based on the condition seen in Anthoboscinae and American Thynnini and Scotaenini, the lack of penis valves is primitive for Rhagigasterini. All Thynninae have a highly derived and distinctive aedeagus. Further modification can be seen in the Scotaenini where the aedeagus is relatively short with membranous lateral lobes and no apical loop, an autapomorphy for that group (Kimsey 1992). Within the Rhagigasterini, the majority of genera have an aedeagus with a basal bulb and slender apical neck (as in Figs. 43–53).

The following characters were used to

analyze phylogenetic relationships. The resulting matrix is given in Table 1. Polarity is indicated in parentheses, (0) is the primitive state, and (1) or (2) are derived.

1. **Male transverse frontal carina:** Absent (0), present (1) [*Rhagigaster*, *Dimorphothynnus*], joined by U-shaped dorsal carina forming a frontal enclosure (2) (Fig. 8) [*Dimorphothynnus*].
2. **Female maxillary palpus:** Four-segmented (0), three or two segmented (1). [*Aelurus* and *Eirone*]. Female *Aelurus* and *Eirone* have reduced palpi. Reduction in the number of palpal segments is common in aculeates; however, it appears to be a consistent generic feature in the Tephidae.
3. **Female labial palpus:** Five or six-segmented (0), four segmented (1). [*Aelurus* and *Eirone*].
4. **Female mesopleural development:** Tapering evenly toward scutum (0), strongly bulging toward scutum with distinct dorsal surface (Fig. 4) (1) [Rhagigasterini].
5. **Female mesopleural lamella:** Well developed and apically rounded (0), strongly reduced to small point-like process (1) [*Eirone*].
6. **Male hindcoxal carina:** Present but evenly curved from apex to base (0). Abruptly expanded and angulate basally (Fig. 11) (1) [*Dimorphothynnus* and *Rhagigaster*].
7. **Male metapostnotal development:** Highly reduced and sunken medially (0). Broadly exposed dorsomedially (1) [*Eirone* and *Aelurus*].
8. **Female metasternum** (first variable): With low medial ridge (0). Medial ridge modified into bilobate, apically flattened projection between midcoxae (1) [*Rhagigaster*].
9. **Female metasternum** (second variable): Flat or carinate (0). Strongly expanded ventrally, appearing triangular in profile, with ventral apex (which may be bilobate) located considerably

Table 1. Character matrix for the genera of Rhagigasterini (Tiphidae). Anthoboscinae (represented by *Anthobosca chilensis* (Saussure) and *A. crossicornis* Smith and Thynnini (represented by *Thynnus dentatus* Fabricius and *Zaspilothynnus interruptus* Westwood) are the outgroups used in this analysis

Taxon	Characters						
Anthoboscinae	00000	00000	00000	00001	00000	000	
Thynnini	00000	00010	00010	00000	00001	250	
<i>Aelurus nasutus</i>	01110	10101	00000	00002	01001	530	
<i>Aelurus septentrionalis</i>	01110	10101	00000	00002	01001	530	
<i>Dimorphothynnus apicalis</i>	21011	00012	10111	01110	21001	111	
<i>Dimorphothynnus morio</i>	21011	00012	10111	01110	21001	111	
<i>Eirone aliciae</i>	01110	10101	00000	00000	01001	320	
<i>Eirone aquilonius</i>	00??0	10101	00000	00101	01001	420	
<i>Eirone cheesmanae</i>	00??0	10102	00000	00101	01001	320	
<i>Eirone emarginatus</i>	00??0	10102	00000	00100	01001	320	
<i>Eirone ferrugineicornis</i>	01110	10101	00000	00100	01001	320	
<i>Eirone major</i>	01110	10101	00000	00100	01001	320	
<i>Eirone mutabilis</i>	00??0	10102	01000	00100	01101	420	
<i>Eirone parca</i>	01110	10101	00000	00101	01001	320	
<i>Eirone rufopictus</i>	01110	10101	00000	00001	01001	320	
<i>Eirone schizorhina</i>	00??0	10102	01000	00100	01101	430	
<i>Eirone schlingeri</i>	00??0	10101	00000	00101	01001	330	
<i>Eirone speciosus</i>	00??0	10101	00000	00101	01001	340	
<i>Eirone valokaensis</i>	00??0	10101	00000	00101	01001	430	
<i>Rhagigaster aculeatus</i>	00011	01012	00000	01110	11001	030	
<i>Rhagigaster ephippiger</i>	10011	01012	00000	01000	11011	030	
<i>Rhagigaster cinerellus</i>	00011	01012	00000	10110	11011	030	
<i>Rhagigaster laevigatus</i>	00011	01012	00000	10010	11001	030	
<i>Rhagigaster latisulcatus</i>	10011	01012	00000	00010	11011	030	
<i>Rhagigaster lyelli</i>	10011	01012	00000	11010	11011	030	
<i>Rhagigaster unicolor</i>	10011	01012	00000	01010	110?1	030	

- behind mesocoxae (Fig. 5) (1) [*Aelurus*, *Eirone*].

10. **Male hindcoxal cavities closed:** Contiguous with the petiolar insertion (Figs. 12, 15) (0). Enclosed by converging metasternal and metapleural lobes (Figs. 14, 16, 17) (Kimsey 1991) (1) [*Rhagigaster*, *Dimorphothynnus*]. The hindcoxal cavities are open with the petiolar socket in *Aelurus* and *Eirone* (Figs. 12, 13), resembling the condition in Anthoboscinae (Fig. 18) and the majority of other Tiphidae, but closed in *Rhagigaster* and *Dimorphothynnus* and Thynnini (Figs. 14, 16, 17).

11. **Male metasternal shape:** Apically flattened or medially emarginate (0). Projecting ventrally into two finger-like or conical lobes (1) [*Aelurus*, *Eirone*]. Metasternal lobes bending posteriorly
- and overlapping the hindcoxal bases (Fig. 9) (2) [*Rhagigaster*, some *Eirone* species, *Dimorphothynnus*].

12. **Male propodeal shape:** Evenly rounded posteriorly and laterally (0). Strongly angulate laterally (1) [*Dimorphothynnus*].

13. **Male propodeal sculpturing:** Sculpturing continuous from apex to base (0). Dorsal and posterior surfaces of propodeum differentially sculptured, dorsal surface smooth and impunctate or shagreened, posterior surface extensively cross-ridged and punctate (1) [some *Eirone* species].

14. **Male propodeal carina:** Without transverse carina (0). Dorsal surface separated from posterior surface by transverse carina (1) [*Dimorphothynnus*].

15. **Female tergum III sculpturing:** Dorsally smooth, without cross-ridging (0). Extensively cross-ridged (Fig. 4) (1) [*Dimorphothynnus*].
16. **Male epipygial plate:** Absent (0). Present and carinate (1) [*Dimorphothynnus*]. The absence of a pygidial plate is assumed to be the primitive state since the Anthoboscinae lack one.
17. **Male gastral tergum VII lobate:** Gasteral tergum VII evenly rounded (0). Tergum with apicomedial lobe (as in Fig. 26) (1) [some *Rhagigaster* species]
18. **Male gastral tergum VII carinate:** Tergum VII evenly rounded (0). Sublaterally carinate (1) [some *Rhagigaster* species]
19. **Male gastral sternum I** (first variable): Evenly rounded with a single basal carina or ridge (0). With medial hook-like ridge (Figs. 20, 21, 23) (1) [*Dimorphothynnus*, some *Rhagigaster* species, some *Eirone* species].
20. **Male gastral sternum I** (second variable): Sternum I simple basally (0). With shelf-like transverse carina, often connected to short but prominent medial longitudinal carina when the latter is present (Figs. 20, 21) (1) [most *Rhagigaster* species, *Dimorphothynnus*].
21. **Male subgenital plate** (first variable): Simple and evenly curved, or somewhat thickened apically and spinose (0). With discrete, flat, spine-rimmed apicomedial plate (1) [*Aelurus*].
22. **Male subgenital plate** (second variable): Simple, broadly and evenly curved (0). With long curved ventral spine (uncus) (Figs. 32–36) (1) [*Rhagigaster*, *Dimorphothynnus*]. Uncus protruding below broad flat shelf-like rim, fitting broad apical tergum in outline (Figs. 32, 33) (2) [*Dimorphothynnus*].
23. **Paramere setation:** Apical setae unmodified (0). Apical setae dense, elongate and most often flattened (Figs. 48, 52, 53) (1) [*Rhagigasterini*].
24. **Paramere shape** (first variable): Paramere simple and evenly rounded apically (0). Apically with awl-like lobe (Fig. 48) (1) [several *Eirone* species]
25. **Paramere shape** (second variable): Paramere simple and evenly rounded apically (0). Submedially with thumb-like lobe (Fig. 37) (1) [several *Rhagigaster* species]
26. **Digitus shape:** Digitus forming a setose, often small, rounded lobe (0). Digitus setose and C-shaped (1) [some *Rhagigaster* species]
27. **Penis valves:** Absent (0). Present, simple and foliaceous (as in Figs. 45, 46) (1) [*Rhagigaster*]. Elongate, spoon-shaped (2) [*Thynnini s.s.*]. Extremely bilobate, with elongate dorsal and ventral lobes (3) [*Eirone s. s.*]. Bilobate with ventral lobe secondarily bifid (4) [some *Eirone* species]. Multilobate, without one or two unusually elongate lobes (5) [*Aelurus*].
28. **Aedeagal form:** Aedeagus consisting of two separate, simple, elongate lobes (0). Lobes separate, forming robust, basally lobed or angulate structure (Figs. 41, 42) (1) [*Dimorphothynnus*]. Aedeagal lobes fused into a structure with a distinct basal bulb and short apical neck (Figs. 45–48) (2) [some *Eirone* species]. Apical neck greatly elongate and linear (Figs. 49–53) (3) [some *Eirone* species, *Aelurus*]. Neck flattened and coiled (4) [one species of *Eirone*]. Aedeagus with basal column and neck (apical loop) flattened and coiled (5) [one species of *Rhagigaster*].

Phylogenetic Relationships

The tiphiid subfamily Anthoboscinae and thynnine tribe Thynnini, are included in this analysis as outgroups. The resulting 14 trees found by implicit enumeration had a ci of 59. A Nelson Consensus Tree, shown in Fig. 1, produced the following relationships: Anthoboscinae + (Thynnini + [(*Aelurus*/*Eirone*) + (*Dimorphothynnus* + *Rhagigaster*)]). The ci was so low because there was relatively little resolution of re-

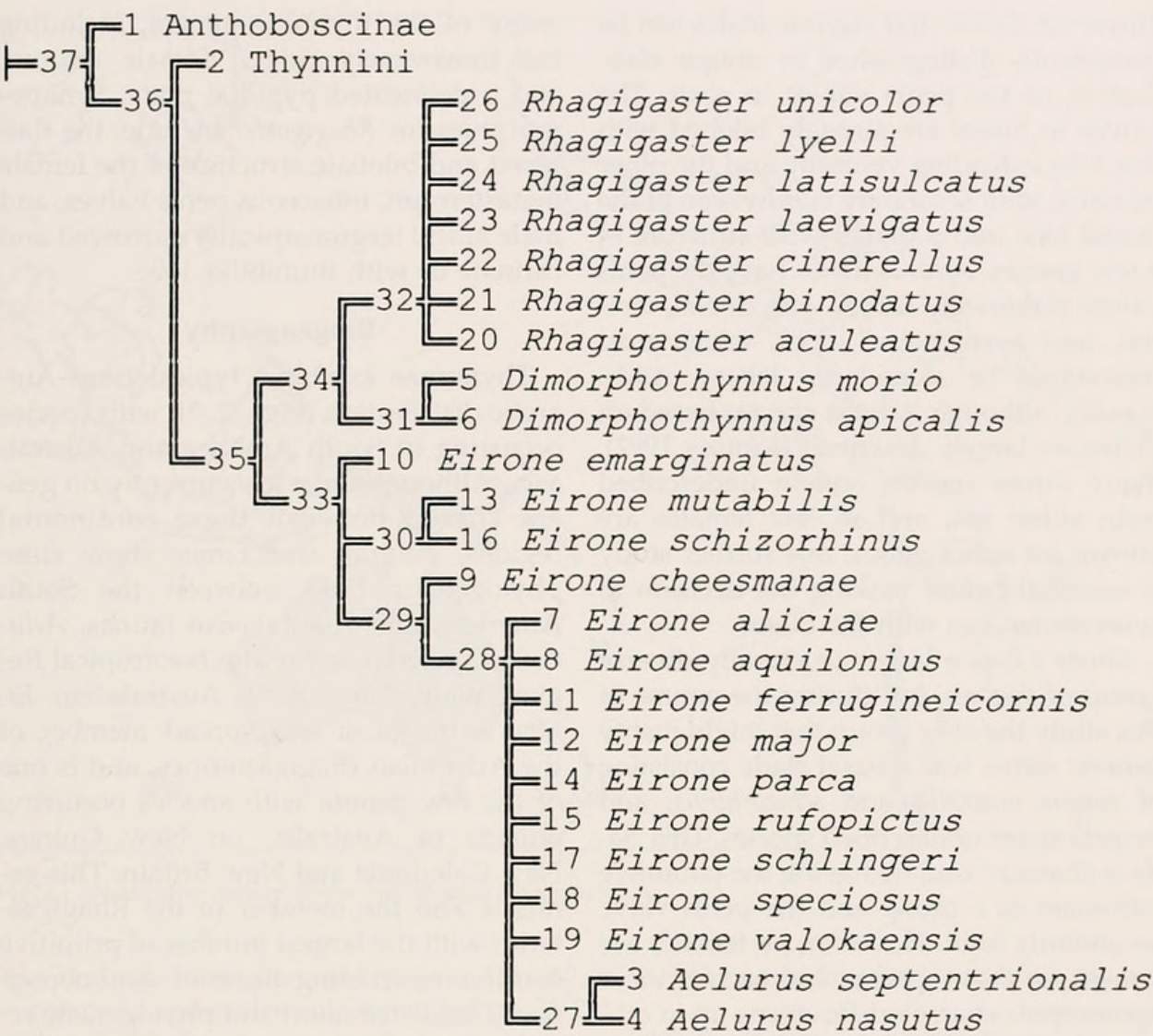


Fig. 1. Nelson Consensus Tree showing phylogenetic relationships of rhagigasterine species and generic groupings.

relationships among species of *Eirone* and *Rhagigaster*. However, implicit resolution of relationships among these species was less important than determining whether or not they actually represented sufficiently divergent groupings to constitute separate genera.

By eliminating all species but those with unique combinations of character states a single cladogram was generated with the same length and ci as the one using all taxa. This tree also had the same underlying topology as trees generated using all 27 taxa.

As discussed above, *Eirone* and *Aelurus* are very closely related groups sharing fe-

male palpal reduction, triangular female metasternum, and a broadly exposed metapostnotum and projecting lobate metasternum in males. In this analysis *Aelurus s.s.* fits readily within an assemblage of *Eirone* species. It is possible that *Aelurus s.s.* may represent a species group in this larger taxon. The females of both *Eirone s. s.* and *Aelurus s. s.* are thus far indistinguishable. In both groups the apical margin of the male subgenital plate varies from a thin, evenly curved, spineless rim to a discrete spine-rimmed apical platform. These modifications of the subgenital plate do not appear to correlate with any other modifications of the head or genitalia.

However, *Eirone* and *Aelurus* males can be consistently distinguished by unique elaboration of the penis valves in each. The valves in *Eirone* are strongly bilobed with one lobe extending ventrally and the other dorsally, with secondary subdivision of the dorsal lobe into a pincher-like structure in a few species. *Aelurus* males have the penis valves elaborately lobed, with dorsal, ventral, and even lateral lobes, which may themselves be secondarily lobate. Additionally, although *Aelurus* species based on males are largely described (Kimsey 1992), many *Eirone* species remain undescribed from either sex, and so few females are known for either genus, that further study is essential before making the decision to synonymize one with the other.

Eirone s.s. is a large structurally diverse group of species, but during the course of this study the only group that might justify generic status was a basal clade consisting of *Eirone mutabilis* and *schizorhinus*, and several as yet undescribed species. This clade is characterized by having the paramere terminate in a prong and the penis valve secondarily bifid. However, no females are known for these species, and each of these apomorphic characteristics turns up in other species of *Eirone*, for example, the penis valve structure also occurs in *cheesmanae*. As shown in the consensus tree this clade ends up embedded in *Eirone*, as it does in the majority of the iterations resulting from this analysis. Therefore there is no justification for treating this group of species as a discrete genus.

Dimorphothynnus and *Rhagigaster* are sister groups based on the presence of a frontal carina on the face, unciform subgenital plate, and toothlike hindcoxal carina. However, *Dimorphothynnus* is highly modified and shares a number of features with

many of the thynnine genera, including the transversely ridged female tergum, and a delineated pygidial plate. Synapomorphies for *Rhagigaster* include: the flattened and bilobate structure of the female metasternum, foliaceous penis valves, and male apical tergum apically narrowed and carinate or with thumblike lobe.

Biogeography

Thynninae exhibit a typical trans-Antarctic distribution (Figs. 2, 3), with species occurring in South America and Australasia. Although there are currently no genera shared between these continental regions, *Aelurus* and *Eirone* show close phylogenetic links between the South American and Australasian faunas. *Aelurus* s.s. is restricted to the Neotropical Region, while *Eirone* s.s. is Australasian. *Eirone* is the most widespread member of the Australian rhagigasterines, and is one of the few genera with species occurring outside of Australia, on New Guinea, New Caledonia and New Britain. This genus is also the member of the Rhagigasterini with the largest number of primitive features resembling those of Anthobosciinae. The distribution and phylogenetic relationships of these genera suggest that the Thynninae evolved after the breakup of Gondwanaland, during the period when Australia and South America were connected to one another via Antarctica, between 70 and 30 mya (Fig. 3). Members of other thynnine tribes show no close phylogenetic relationships between the two regions, and in fact are divergent enough to suggest that the Australasian genera belong to one or more tribes and the South American genera in two other tribes (Kimsey 1991), with none of these occurring in both regions.

KEY TO THE GENERA OF RHAGIGASTERINAE

- 1. Winged, with 7 gastral segments, and elongate slender antennae; males 2
- Wingless, and ant-like, with 6 gastral segments, and short coiled antennae (as in Fig. 4); females 5



Fig. 2. World distribution of the tephritid tribe Rhagigasterini.

- 2. Apical abdominal sternum unciform (Figs. 32–36), apical tergum broad and shovel-like or narrowed and sublaterally carinate (Figs. 25–26) 3
 - Apical abdominal sternum evenly rounded, unmodified or with a narrow platform margined with short spine (Fig. 31); apical tergum evenly rounded, or slightly indented and otherwise unmodified (Figs. 29, 30) 4
- 3. Apical abdominal tergum broadly rounded apically and shovel-like (Fig. 25), apical sternum with broad dorsal platform above elongate curved apical spine (uncus) (Figs. 28, 32, 33) *Dimorphothynnus* Turner
 - Apical abdominal tergum strongly narrowed or almost trilobate apically, often with accompanying sublateral carinae (as in Fig. 26); apical sternum with dorsal tooth or narrow rim above uncus (Figs. 34–36) *Rhagigaster* Guérin
- 4. Neotropical; apical abdominal sternum apically thickened with a discrete, narrow, spine-rimmed platform (Fig. 31), and penis valves elaborately pronged without an elongate dorsal lobe (Figs. 52, 53) *Aelurus* Klug
 - Australasian; apical abdominal sternum usually without a discrete apical, spine-rimmed platform (as in Figs. 29, 30), and penis valves strongly bi- or trilobed with well-developed apical lobe and single or bilobed dorsal one (Figs. 45–51) *Eirone* Westwood
- 5. Tergum III with numerous transverse carinae (Fig. 4); tergum VI with discrete, carinate pygidial plate; genal bridge strongly bulging in profile (Fig. 6); sternum I ventrally simple *Dimorphothynnus* Turner
 - Tergum III without carinae; tergum VI smooth, without carinae or discrete pygidial plate; genal bridge not bulging in profile; sternum I ventrally dentate 6
- 6. Hindtarsal claws dentate; metasternum medially projecting, with an apically flattened and strongly bilobate structure *Rhagigaster* Guérin



Fig. 3. Projection of continents in southern polar view 60 million years ago, with modern distribution of Rhagasterini indicated by shading.

- Hindtarsal claws edentate; metasternum expanded and triangular in profile, apex of the triangle sharp apically (Fig. 5) 7
- 7. Mesopleural lamella well developed, apically rounded; neotropical; propodeum usually with one or two ovoid depressions medially (Fig. 10); four maxillary and three or four labial palpal segments *Aelurus* Klug
- Mesopleural lamella reduced to small pointed process; Australasian; four or fewer maxillary and three or fewer labial palpal segments; propodeum without ovoid medial depressions *Eirone* Westwood

Aelurus Klug
(Figs. 10, 15, 31, 52, 53)

Aelurus Klug 1842:42. Type: *Aelurus nasutus* Klug 1842:43. Orig. desig.

Cophothynnus Turner 1908:79. Unnecessary replacement name for *Aelurus* Klug 1842.

Male.—Mandible simple, bidentate, or

rarely tridentate; labrum broadly ovoid with narrowed base; maxillary palpus with 6 articles, labial palpus with 4; occipital carina faint dorsally; frons smooth without ridges or carinae; metasternum medially projecting and bilobate; propodeum evenly rounded, ecarinate; abdominal segments weakly punctate, without

subapical constriction, with anterior zone of coarse punctation; apical sternum thickened apically, with marginal row of spines along apex (Fig. 31); parameres generally broad, with row of long flattened setae on apical margin (as in Fig. 53); volsella usually apically bilobate; penis valves long, well developed; aedeagus basally bulbous and apically long and slender (Figs. 52, 53).

Female.—Head as long as broad or longer; eyes slightly larger than pedicel; mouthparts reduced, maxillary palpus with 4 or fewer articles and labial palpus with 3 or fewer; pronotum longer than broad; mesopleuron with clearly developed dorsal surface; propodeum with long flat sloping dorsal surface, often with 1 or 2 medial depressions (Fig. 10); terga relatively smooth without differentiated areas, carinae or rugosities; apical tergum smooth without carinae or defined pygidium; apical sternum with U-shaped apical lip having 2 infolded flaps.

Distribution.—*Aelurus* species have a patchy distribution in the Neotropical Region, occurring in Costa Rica, Panama, Colombia, Ecuador, Peru, Argentina, Chile and Brazil (Kimsey 1991).

Discussion.—*Aelurus* and *Eirone* are closely related genera, so much so that the females are virtually indistinguishable, except for the development of the mesopleural lamellae. There are other subtle differences, but whether these would separate all species in both genera is uncertain. *Aelurus* females have 5 maxillary and 4 labial palpal segments, the mesopleuron is strongly convex medially, and the propodeum is usually dorsally flattened with one or two medial depressions. In *Eirone* females there are usually 4 or fewer maxillary and 3 or fewer labial palpal segments, and the propodeum is dorsally gently convex without depressions. *Rhagigaster* females are also similar but they can be immediately separated from those of *Aelurus* and *Eirone* by the dentate hindtarsal claws.

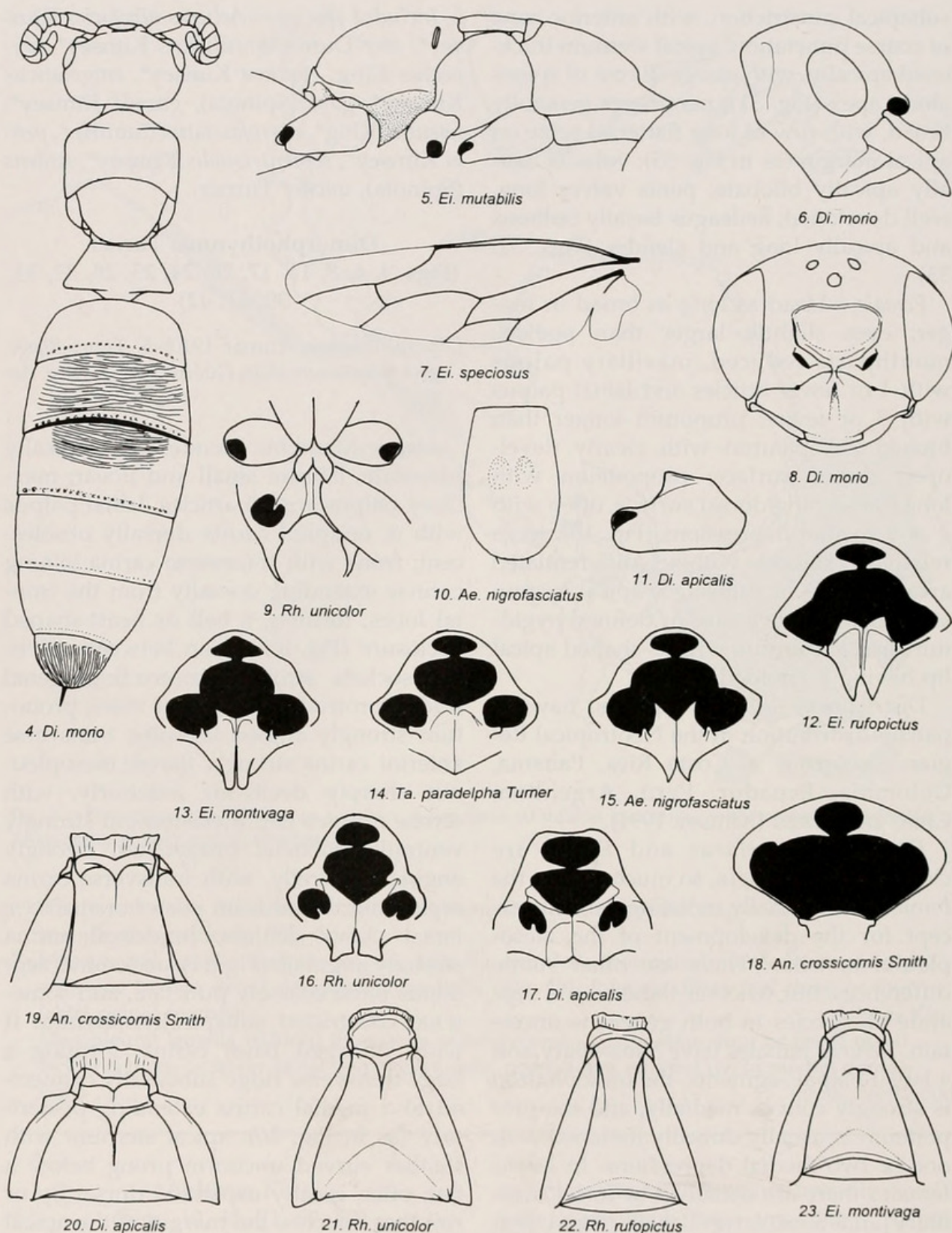
Included species.—*Aelurus albofacies* Kimsey*, *ater* Duran, *brasiliensis* Kimsey*, *clypeatus* Klug, *concava* Kimsey*, *enigmaticus* Kimsey*, *gayi* (Spinola), *grande* Kimsey*, *nasutus* Klug*, *nigrofasciatus* (Smith) *, *penai* Kimsey*, *septentrionalis* Kimsey*, *tridens* (Spinola), *uncifer* Turner.

Dimorphothynnus Turner

(Figs. 4, 6, 8, 11, 17, 20, 24, 25, 28, 32, 33, 39, 41, 42)

Dimorphothynnus Turner 1910b:5. Type: *Rhagigaster haemorrhoidalis* Guérin 1842:2. Orig. designation.

Male.—Mandible slender and apically bidentate; labrum small and linear; maxillary palpus with 5 articles, labial palpus with 4; occipital carina dorsally obsolescent; frons with transverse carina joining carinae extending dorsally from the frontal lobes, forming a bell or heart-shaped enclosure (Fig. 8); region between antennal sockets strongly protruding; genal bridge protruding in lateral view; pronotum strongly angled laterally, transverse anterior carina strongly flared; mesopleuron sharply declivous anteriorly, with scrobe obsolescent; metasternum strongly ventrally bilobate; propodeum strongly angulate laterally, with transverse carina separating dorsal from posterior surfaces; tarsal claws dentate; hindcoxal carina strongly angulate (Fig. 11); abdominal segments often coarsely punctate, and somewhat constricted subapically; sternum II with Y-shaped basal carina, forming a large transverse ridge subbasally connected to a medial carina extending posteriorly (as in Fig. 20); apical sternum with slender curved unciform prong below a flat, often greatly expanded dorsal lip or rim that matches the margin of the apical tergum (Fig. 32); apical tergum apically broadly rounded and sometimes medially weakly indented as well, with short lateral carina (Fig. 25); parameres long and slender with elongate flattened apical setae (Fig. 39); volsella elaborately foliaceous,



Figs. 4-23. Fig 4. Dorsal view of female head, thorax and abdomen. Fig 5. Lateral view of female thorax. Fig 6. Lateral view of female head, antennae removed. Fig 7. Hindwing. Fig 8. Front view of male face, antennae removed. Fig 9. Ventral view of male metasternum, with one hindcoxa removed. Fig 10. Dorsal view of female propodeum. Fig 11. Male hindcoxa. Figs. 12-18. Arrangement of petiolar socket and hindcoxal cavities in males. Fig. 19-23. Ventral view of male gastral sternum I. Abbreviations: *Ae.* = *Aelurus*, *An.* = *Anthobosca*, *Di.* = *Dimorphothynnus*, *Ei.* = *Eirone*, *Rh.* = *Rhagigaster*, *Ta.* = *Tachynomia*.

with small setose lobe (Fig. 39); penis valves short, spoon-like and closely appressed to aedeagal base; gonobase short and broadly, closely appressed to parameres; aedeagal lobes separate, basally broadly angulate with slender, slightly curved apical neck (Figs. 41, 42).

Female.—Head considerably broader than long in front view; genal bridge protruding in lateral view (Fig. 6); eyes ovoid, one-half or more as long as head; mouthparts unmodified, labial palpus with 6 articles and maxillary palpus with 4; pronotum subquadrate, wider than long; mesopleuron flattened or slightly convex medially, somewhat angulate ventrally above midcoxa; scutum absent; metasternum with medial process short, subtriangular and apically bidentate, not widely separating the mid and hindcoxae; propodeum gently sloping posteriorly, sharply angled laterally and narrowed anteriorly (Fig. 4); tarsal claws dentate; terga broadly joined, not narrowed between segments; tergum III with numerous (about 8–15) cross ridges (Fig. 4); apical tergum descendingly carinate with marginally carinate pygidial plate (Fig. 24); apical sternum with broadly U-shaped apical lip.

Distribution.—Members of this genus are found only in Australia.

Discussion.—This genus is the most divergent and highly derived in the Rhagigasterini. Certain features including the development of penis valves and the female pygidium are more characteristic of the Thynnini and do not occur in the other Rhagigasterini. Other diagnostic features include the foreshortened female head and transversely carinate tergum III, and in males the carinate frontal enclosure on the face, angulate and carinate propodeum, and laterally angulate pronotum. In addition the females have dentate tarsal claws.

Included species.—*barnardi* (Turner)*, *conjugatus* (Turner)*, *deceptor* (Smith)*, *haemorrhoidalis* (Guerin), *integer* (Fabricius),

morio (Westwood)*, *ottonis* (Dalla Torre)*, *simillimus* (Smith), *testaceipes* (Turner), *trunciscutus* Turner*.

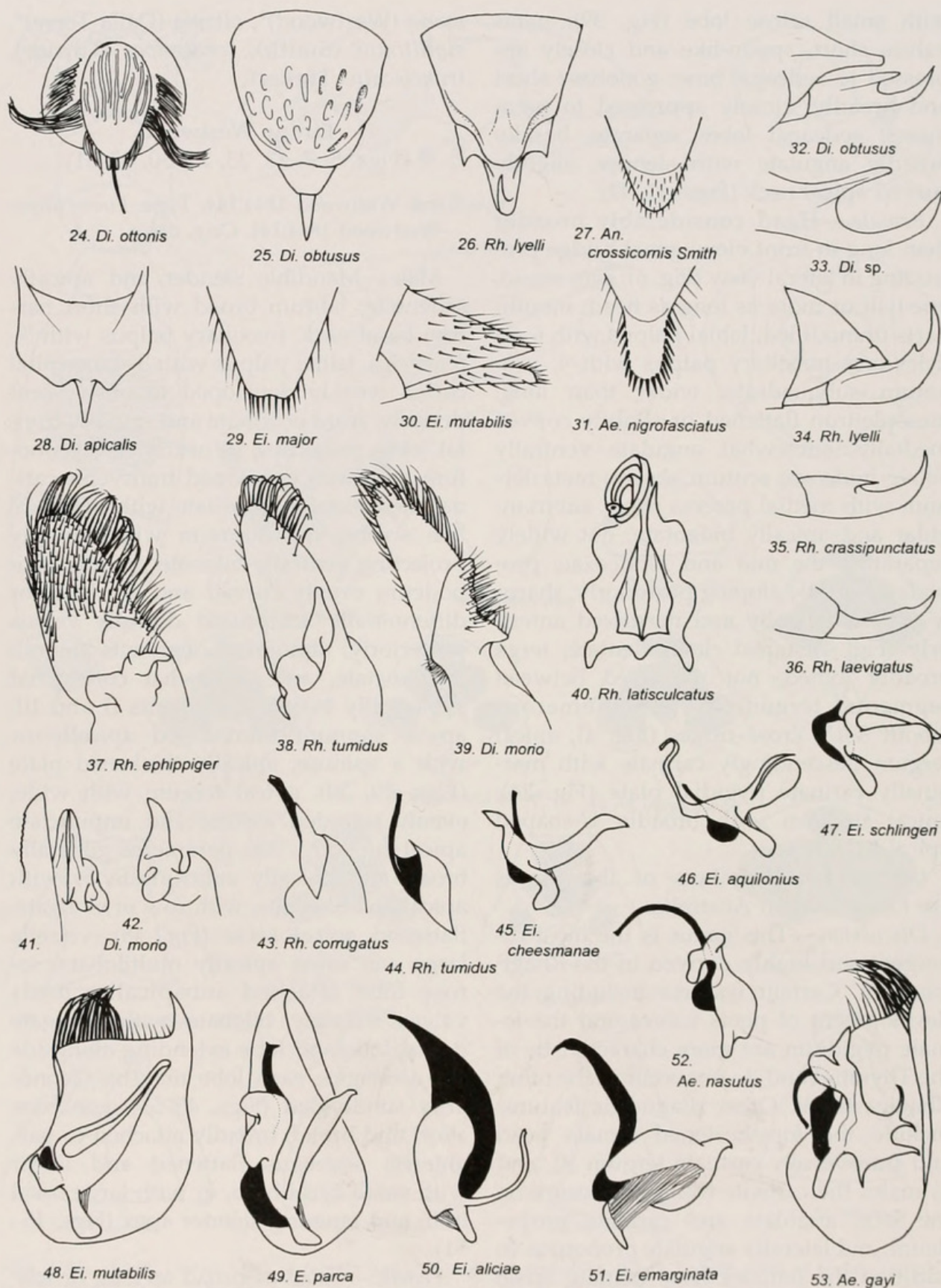
Eirone Westwood

(Figs. 5, 7, 13, 23, 29, 30, 45–51)

Eirone Westwood 1844:144. Type: *Eirone dispar* Westwood 1844:144. Orig. design.

Male.—Mandible slender and apically bidentate; labrum broad with short narrow basal neck; maxillary palpus with 5–6 articles, labial palpus with 3–4; occipital carina weakly developed to obsolescent dorsally; frons ecarinate and smooth, frontal lobes projecting to nearly flat; pronotum with well developed transverse carina; mesopleuron ecarinate with puncture like scrobe; metasternum with strongly projecting ventrally bilobate process; propodeum evenly curved and ecarinate or differentially sculptured dorsally versus posteriorly; abdominal segments smooth to punctate, and somewhat constricted subapically between segments II and III; apical sternum unmodified apically or with a spinose, apically thickened plate (Figs. 29, 30); apical tergum with wide, evenly rounded asetose and impunctate apical rim (Fig. 30); parameres generally broad and apically subtruncate or with apical awl-like lobe, with row of elongate, flattened apical setae (Fig. 48); volsella large and often apically multilobate, setose lobe attached subapically; penis valves strongly bilobate with elongate dorsal lobe and lobe extending alongside the aedeagus, each lobe may be secondarily subdivided (Figs. 45–51); gonobase short and broad, broadly attached to parameres; aedeagus flattened and linear with small basal bulb, or with large basal bulb and tapering slender apex (Figs. 45–51).

Female.—Head as broad as long or longer; eyes small and ovoid, usually less than one-fourth as long as head; mouthparts reduced, labial and maxillary palpi with 4 or fewer articles, maxillary palpus



Figs. 24–53. Fig. 24. Posterior view of female abdominal apex. Figs. 25–26. Dorsal view of male abdominal apical segment. Figs. 27–29, 31. Male hypopygium. Figs. 30, 32–33. Lateral view of male abdominal apex. Figs. 34–36. Lateral view of male hypopygium. Figs. 37–39. Inner view of paramere and volsella. Fig. 40. Ventral-view of aedeagus and penis valves. Fig. 41. Ventral view of aedeagus. Fig. 42. Lateral view of aedeagus. Figs.

difficult to see without extending the tongue; pronotum subquadrate, evenly and shallowly convex dorsally; mesopleuron laterally flattened and usually angulate ventrally above midcoxa; mesopleural lamella represented by small pointed process; midcoxae widely separated from hindcoxae by elongate metasternum, which appears ventrally triangular in profile, and is apically bidentate or bilobate (Fig. 5); propodeum narrowed anteriorly, lateral margin compressed and somewhat sharp-edged; tarsal claws edentate; sternum II with one or two ventromedial denticles; tergum II with abrupt anterior declivity; terga without transverse striations, rugosities or carinae; apical tergum generally unmodified; apical sternum with U-shaped apical lip with two infolded flaps.

Distribution.—*Eirone* species occur throughout Australia and Tasmania, as well as in New Guinea, New Britain and New Caledonia.

Discussion.—Species of *Eirone* most closely resemble those of *Aelurus*, as discussed under that genus. Females are virtually indistinguishable except by the development of the mesopleural lamellae. Additionally, female *Eirone* never have the propodeal depressions seen in most female *Aelurus*. Males can be separated by a combination of features. *Eirone* have a relatively simple volsella and generally have strongly bilobate penis valves. In addition, most, but not all, species have the apical abdominal sternum simple or apically thickened, without a flat, thickened apical platform, or distinct row of marginal apical spines. In all *Aelurus* males, sternum VIII has a flattened and subtriangular apical platform, that is margined by a row of short spines. *Eirone* males also have elab-

orate penis valves, as in Figs. 45–51. Male *Eirone* appear to be divisible into several groups based on whether there is an indication of this apical platform, or at least marginal spines, and on features of the genital capsule. This difficulty is further enhanced by the utter lack of equivalent diagnostic features in the females. Without further study it appears to be impossible to further subdivide *Eirone* into additional genera, without creating paraphyletic groupings.

Included species.—*Eirone abdominalis* Westwood, *alboclypeata* Turner*, *aliciae* Turner*, *aquilonius* Kimsey*, *arenaria* (Turner)*, *basimaculata* Turner, *brumalis* Montet, *caroli* (Turner)*, *castaneiceps* Turner*, *celsissima* Turner*, *cheesmanae* Kimsey*, *colorata* Brown, *comes* Turner*, *crassiceps* (Turner)*, *cubitalis* (Turner), *denticulatus* Montet (*brumalis* ssp.), *dispar* Westwood*, *emarginata* Brown, *exilis* Turner*, *fallax* (Smith)*, *ferrugineiceps* Turner*, *ferrugineicornis* Turner*, *fulvicostalis* Turner*, *grandiceps* (Turner)*, *ichneumoniformis* (Smith), *impunctata* Brown, *inconspicua* Turner*, *leai* Turner*, *lucidus* (Smith)*, *lucidula* Turner*, *major* Turner, *marginata* Brown*, *marginicollis* Turner*, *mutabilis* Turner, *montivaga* Turner, *neocaledonica* Williams, *nigra* Brown, *obscurus* (Klug), *obtusidens* Turner*, *opaca* Turner*, *osculans* Turner*, *parca* Turner*, *pseudosedula* Turner*, *ruficornis* (Smith)*, *ruficrus* Turner*, *rufodorsata* Turner*, *salteri* Brown, *schizorhina* Turner, *schlingeri* Kimsey, *scutellata* Turner*, *speciosus* Kimsey, *subacta* Turner*, *subpetiolata* Turner*, *subtuberculata* Brown, *superestes* Cockerell, *tenebrosa* Turner*, *tenuipalpa* Turner*, *transversa* Brown*, *tristis* (Smith)*, *tuberculata* (Smith), *valokaensis* Kimsey*, *vitripennis* (Smith).

←

43–47, 49–52. Lateral view of penis valve and aedeagus (black). Figs. 48, 53. Lateral view of aedeagus (black), penis valve and paramere, volsella omitted. Abbreviations: Ae. = *Aelurus*, An. = *Anthobosca*, Di. = *Dimorphythynnus*, Ei. = *Eirone*, Rh. = *Rhagigaster*.

***Eirone aquilonius* Kimsey, new species**
(Fig. 46)

Holotype male.—Body length 11 mm; forewing length 7 mm. Face with impunctate medial stripe above antennal sockets, punctures shallow and 0–0.5 PD apart, shallower and less distinct on clypeus; clypeus flattened, apical margin broadly truncate; F-I length $2.3\times$ breadth; F-II length $3\times$ breadth; pronotum nearly impunctate, punctures shallow and indistinct, 4–5 PD apart; mesopleural punctures 0.5–1 PD apart, becoming further separated ventrally; scutal punctures nearly contiguous; scutellar punctures large, shallow and 1–2 PD apart; propodeum impunctate with dense fine transverse wrinkles or striae; S-I with short medial ridge; epipygium broadly rounded, apical rim thin and transparent, punctation and sculpturing the same as previous tergum; hypopygium slightly thickened apically, and bilobate, apical margin with a few long setae; paramere short and broadly rectangular, without apical row of flattened setae, instead apex with setae and 3–4 long spines; volsella without distinct basal lobe, dorsal part bilobate, broadest of the two dorsal lobes setose; penis valves with elongate, slender, apically hooked dorsal lobe extending outside of capsule, and elongate bilobate ventral structure extending alongside volsella (Fig. 46); gonocoxa without slender digitate lobe ventromedially. Hindwing anal lobe without enlarged basal lobe. Body black with pale yellow W-shaped mark on clypeus and transverse medially broken pale yellow band on anterior pronotal carina. Wing veins dark brown, membrane clear.

Type material.—Holotype male, New Britain, Mosa Palm Oil Plantation, near Hoskins, 25 Jan.-1 Feb. 1969, J. E. Benson (LONDON).

Etymology.—This species has one of the most northerly distributions in the genus, thus the name *aquilonius* = northern (L.).

Discussion.—This species can be distin-

guished from other species of *Eirone* by the black body color with few pale whitish markings, simple and apically truncate clypeus, hypopygium apically slightly bilobate, and peculiar genital capsule. The male genitalia in this species is remarkable --the paramere is unusually short and ear-like and the dorsal lobe of the volsella is very slender with an abrupt hook apically. This species appears to be closely related to *valokaensis* on the basis of overall similarity.

***Eirone cheesmanae* Kimsey, new species**
(Fig. 45)

Holotype, male.—Body length 12 mm; forewing length 8 mm; facial punctures external to antennal sockets and lower frons dense and small, nearly contiguous, punctures on upper frons and vertex 2–3 PD apart and highly polished between, rest of head with punctures 0.5–1 PD apart; clypeus broadly trilobate; flagellomere I twice as long as broad; flagellomere II length $2.4\times$ breadth; pronotal punctures 2–3 PD apart; mesopleural punctures contiguous to 1 PD apart, further separated toward venter; scutal and scutellar punctures 1–2 PD apart; propodeum impunctate, and densely and finely shagreened; epipygium unmodified; hypopygium apically broadly rounded with thickened apical rim fringed with an even row of short spines; paramere broadly rhomboid with truncate apex rimmed with elongate flattened setae; volsella with long slender apical lobe and broader subapical one; penis valves with short, slender dorsal lobe and longer ventral apical one (Fig. 45); aedeagus with rounded basal bulb and short linear apical neck. Body black with yellow markings on lower half of clypeus, base of mandible, pronotal lobe and transverse pronotal carina; wing membrane clear, except brown stained in costal, marginal and submarginal cells; veins brown.

Type material.—Holotype, male, "Dutch New Guinea", Waigeu Camp Nok., 2500 ft, May 1938, L. E. Cheesman (LONDON)

Etymology.—The species is named after the collector, L. E. Cheesman.

Discussion.—*Eirone cheesmanae* can be distinguished from other *Eirone* by the flat medially pointed clypeus with an obtusely trilobate apex, broadly rounded and thickened apical rim of the hypopygium, which is margined by a row of stout spines, and principally black body color with few yellow markings. This species does not closely resemble any other.

***Eirone schlingeri* Kimsey, new species**
(Fig. 47)

Holotype, male.—Body length 10 mm; forewing length 8 mm. Facial punctures 1–2 PD apart, smallest on clypeus, becoming large and shallow on frons and vertex; clypeus flattened, apical margin broadly truncate; F-I length $2.6\times$ breadth; F-II length $3.8\times$ breadth; pronotal punctures 0.5–1 PD apart; mesopleural punctures dorsally contiguous to 0.5 PD apart, becoming 0.5–1 PD apart ventrally; scutal and scutellar punctures 0.5–1 PD apart; propodeum densely transversely scratched or striate, punctures shallow and nearly contiguous; terga finely shagreened with punctures shallow and obscure, 2–4 PD apart; S-I with short medial ridge; epipygium broadly rounded, apical rim thin and transparent, punctation and sculpturing the same as previous tergum; hypopygium apically thickened with narrow subtriangular platform, and apical rim margined with row of short spines; paramere broadly rectangular, apical row of flattened setae, with setae about as long as apical margin; volsella with large narrowly rounded and setose basal part, and bilobate dorsal part, the broader of the two dorsal lobes setose; penis valves bilobate, dorsal lobe slender and strongly bending ventrally, ventral lobe wider and broadly rounded (Fig. 47); gonocoxa without slender digitate lobe ventromedially. Hindwing anal lobe without enlarged basal lobe. Body black with few bright yellow markings; pronotum with transverse yellow band on anterior carina broken medially; legs yellow,

except coxae black. Wing veins dark brown, membrane yellow becoming darker in marginal cell.

Type material.—Holotype male, Papua New Guinea: Mt Kaindi, 8000 ft., 21 Feb. 1978, E. I. Schlinger (SAN FRANCISCO).

Etymology.—This species is named after the collector, Everett I. Schlinger.

Discussion.—The coloration of *E. schlingeri* is distinctive. It is the only New Guinean species with yellow legs and entirely black face. Additionally, the hypopygium ends in a thickened and narrowly rounded apex rimmed with short spines, the aedeagus is highly reduced and the penis valve lobes both project dorsally.

***Eirone speciosus* Kimsey, new species**
(Fig. 7)

Holotype, male.—Body length 13 mm; forewing length 12 mm. Clypeal punctures 1–2 PD apart, densest and becoming nearly contiguous laterad of antennal socket and along posterior eye margin, punctures larger and deeper and much further apart on rest of head; frons and vertex highly polished; medial facial sulcus depressed above antennae; antennal lobes forming transverse platform; clypeus flattened, apicomediaally slightly trilobate; F-I length twice breadth; F-II length $2.6\times$ breadth; pronotal punctures 2–3 PD apart; mesopleural punctures contiguous dorsally becoming 2–3 PD apart ventrally; scutellar punctures contiguous to 1 PD apart outside of notauli, between notauli 1–3 PD apart; propodeum highly polished, and nearly impunctate; terga finely shagreened with punctures 1–3 PD apart; S-I with short slightly hooked medial ridge; epipygium broadly rounded, apical rim thin and transparent, punctation and sculpturing the same as previous tergum; hypopygium very broadly and bluntly rounded with apical rim margined with row of short spines; paramere curved, narrowest medially with broadly rounded base and apex, apical row of flattened setae, with setae shorter than apex width;

volsella forming floor of capsule, with short heavily sclerotized basal lobe extending toward midline of capsule, and elongate apically setose lobe protruding from paramere side and protruding from capsule dorsally; gonocoxa with slender digitate lobe ventromedially. Hindwing anal lobe with enlarged basal lobe (Fig. 7). Body black with bright yellow markings: clypeus yellow, with darker margin; frons with broad, transverse yellow band; pronotum with transverse yellow band on anterior carina and around posterolateral lobe; scutum with large posteromedial spot between notauli and along lateral margin; tegula yellow; mesopleuron with large yellow spot below wing fossa; scutellum with large yellow spot medially; metanotum with broad posteromedial spot narrowly separated from lateral one; forefemoral apex yellow, midfemur basally brown, apically yellow, hindfemur and all tibiae and tarsi yellow; propodeum with large transverse medial spot, narrowed medially; T-I-III with broad transverse yellow stripe; T-IV with large lateral yellow spot; T-V with smaller lateral yellow spot; apical tergum grading from black to amber posteriorly; S-II with lateral yellow spot; S-III with small lateral yellow spot; apical sternum yellow, darker basally; paramere amber with bright yellow apical third. Wing veins brown, membrane yellow becoming dark amber in costal and marginal cells.

Type material.—Holotype male, Papua New Guinea: East Highlands, Kainantu, Yabunka, Feb. 1975, malaise trap (OTTA-WA).

Etymology.—The species name refers to the spectacular coloration of the male. No other species of *Eirone* is colored like this one.

Discussion.—In the type male the apical four flagellomeres on one side, and seven on the other are lost. Despite this damage this species is described because it represents several remarkable structural departures from other *Eirone* species, including

the hindwing jugal lobe having a large basal lobe, the bright coloration and the aedeagus having an elongate elaborately coiled apical loop. The body is bright black and yellow banded; a very different color pattern than all other species of *Eirone*. There do not appear to be any other described species similar to this one.

***Eirone valokaensis* Kimsey, new species**

Holotype male.—Body length 7 mm; forewing length 5 mm. Facial punctures around antennal sockets and on clypeus 0–1 PD apart, punctures on frons and vertex widely separated, 1–4 PD apart; clypeus flattened, apical margin broadly truncate; F-I length $1.5 \times$ breadth; F-II length $2.4 \times$ breadth; pronotal and scutellar punctures 2–3 PD apart; mesopleural punctures separated by 0.5–1 PD, becoming slightly further apart ventrally; scutal punctures 0.5–1 PD apart; propodeum densely and finely wrinkled or striate, with dense nearly contiguous punctures between striae and increasing in density laterally; S-I with trace of medial ridge; epipygium broadly rounded, apical rim thin and transparent, punctation and sculpturing the same as previous tergum; hypopygium slightly thickened apically, margined with short spines; paramere short and broadly rectangular, without apical row of flattened setae, instead with setae and three long spines; volsella without distinct basal lobe, dorsal part bilobate, broader of the two dorsal lobes setose; penis valves with elongate, slender, apically hooked dorsal lobe extending outside of capsule, and elongate bilobate ventral structure extending alongside volsella; gonocoxa without slender digitate lobe ventromedially. Hindwing anal lobe without enlarged basal lobe. Body black with cream-colored markings; lower half of clypeus, basal half of mandible and transverse anterior pronotal band cream-colored; legs dark brown; apex of forefemur, external surface of foretibia, base of mid- and hindtibiae and base of hindbas-

itarsus all cream-colored. Wing veins dark brown, membrane clear.

Type material.—Holotype male: New Britain, Valoka, 8 Jul. '962, Noona Dan Exp., malaise trap (CANBERRA). Paratype male, same data as holotype.

Etymology.—This species of *Eirone* is named after the collection site Valoka, in New Britain.

Discussion.—Superficially *valokaensis* resembles the other species described from New Britain, *aquilonius*. Both have the same markings and basic coloration, a simple, apically truncate clypeus, short almost ear-like parameres, and penis valves with a very slender, hooked apical lobe. However, *valokaensis* is smaller, F-I and II are shorter, and the propodeum is coarsely punctate posteriorly, compared to *aquilonius*.

Rhagigaster Guérin

(Figs. 9, 16, 21, 22, 26, 34–38, 40, 43, 44)

Rhagigaster Guérin 1839:213. Type: *Rhagigaster unicolor* Guérin 1839:214. Orig. desig.

Rhytidogaster Turner 1907:229. Type: *Rhagigaster aculeatus* Saussure 1867:113. Orig. desig.

Male.—Mandible slender and apically bilobate; labrum small and linear, broadly attached; maxillary palpus with 6 articles, labial palpus with 4; occipital carina dorsally obsolescent; frons generally smooth, although some species with transverse carina or welt; pronotum with well-developed transverse carina; mesopleuron evenly rounded, ecarinate, scrobe obsolescent; scutum narrow and linear; metasternum strongly bilobate medially, with lobes somewhat overlapping hindcoxae (Fig. 9); propodeum evenly rounded, ecarinate; tarsal claws dentate; hindcoxal carina strongly angulate; abdominal segments often coarsely punctate, and somewhat constricted subapically; basal abdominal sternum with transverse subbasal ridge joining a short medial carina (Fig. 21); apical sternum with long slender curved unciform prong below at most a

small notch or lip dorsally (Figs. 34–36); apical tergum with narrowed apical lobe (Fig. 26); parameres broad and tapering with interior lobe; volsella broad, covering floor of genital capsule and bending up laterally, with digitate setose dorsal lobe (Fig. 37); basal ring, dorsally elongate and broadly joined to genital capsule; penis valve a simple lobe adjacent to aedeagus (Figs. 43, 44); aedeagus short and blunt with short discrete apical neck (Figs. 43, 44).

Female.—Head as broad as long or broader; eyes ovoid, one-third as long as head or less; mouthparts unmodified, maxillary palpus with 6 articles and labial palpus with 4; pronotum subquadrate; mesopleuron flattened medially and angulate ventrally above midcoxa; metasternum with broadly bilobate projection between mid and hindcoxae; propodeum narrowed anteriorly, evenly sloping posteriorly and angulate laterally; terga smooth and ecarinate; tergum II declivous anteriorly; sternum II with small basal tooth, and constricted posteriorly; apical tergum evenly rounded; apical sternum broadly U or V-shaped apically.

Distribution.—Members of this genus are known only from Australia.

Discussion.—*Rhagigaster* appears to be somewhat intermediate between *Dimorphothynnus* and *Aelurus*+*Eirone*. Males superficially resemble those of *Dimorphothynnus*, having a heavily sclerotized body, long slender abdomen, unciform apical sternum, and traces of a transverse frontal carina in many species. However, females most closely resemble those of *Aelurus*+*Eirone*, having the metasternum projecting, although strongly bilobate apically, a long slender head, and sternum II ventrally dentate. There is a tendency toward palpal reduction in *Rhagigaster* females, but not to the extent seen in *Aelurus* and *Eirone*. *Rhagigaster* females can also be distinguished from these genera by the dentate tarsal claws.

Included species.—*Rhagigaster aculeatus*

Saussure, *alexius* Turner*, *approximatus* Turner*, *aruensis* Turner*, *auriceps* Turner*, *bidens* Saussure, *breviusculus* (Turner)*, *burnsi* Given, *castaneus* Smith*, *cinerellus* Turner, *comparatus* Smith*, *connectens* (Smith)*, *corrugatus* Turner*, *crassipunctatus* Turner*, *decembris* Montet, *deductor* Turner*, *demattioi* (Dalla Torre)*, *denticulatus* Turner*, *depraedator* Turner*, *discrepans* Turner*, *emarginatus* (Fabricius)*, *ephippiger* Guérin, *fulvipennis* Turner*, *fuscipennis* Smith*, *hammerlei* (Dalla Torre)*, *heideri* (Dalla Torre), *interstitialis* Turner*, *iracundus* Turner*, *jubilans* Turner, *kian-drensis* Given, *laevigatus* Smith*, *laticulcatus* Turner*, *lecheri* (Dalla Torre)*, *lyelli* Turner, *mammeus* Montet, *mandibularis* Westwood*, *montanus* Given, *neptunus* Turner*, *nigritulus* Turner*, *obtusus* Smith*, *picticollis* Turner*, *pinguiculus* Turner*, *prothoracicus* Turner*, *pugionatus* Saussure, *reflexus* Smith*, *rugifer* Turner*, *rugosus* Smith, *scalae* (Dalla Torre), *stradbokensis* Given, *thymetes* Montet, *unicolor* (Guerin), *wolframii* (Dalla Torre).

ACKNOWLEDGMENTS

This study was made possible by the assistance of all of those who loaned me specimens, and in particular Mick Day and Graham Brown who provided information as well as many fruitful discussions. This research was supported by NSF grants No. RII-860062 and BSR-9107479.

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