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Eugowra, A New Fly Genus from Australia (Empididae: Empidinae)

DANIEL J. BICKEL

Australian Museum, 6 College Street, Sydney NSW 2010, Australia
danb@austmus.gov.au

ABSTRACT. *Eugowra* n.gen. (Diptera: Empididae: Empidinae: Hilarini) from southeastern Australia and Tasmania comprises three new species: *E. colei, E. fusca*, and *E. uniseta*. Males have a distinctive genitalic structure, with the hypandrium reduced to a narrow curved channel that barely covers a mostly free aedeagus. Species fly during the cooler months, and *E. colei* was collected throughout the winter in Tasmania. This genus is part of the *Hilara-Hilarempis* complex of genera.

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This paper describes *Eugowra* (Diptera: Empididae: Empidinae), a new genus comprising three new species from southeastern Australia and Tasmania. The genus is within the *Hilara–Hilarempis* complex, characterized by having swollen male fore basitarsi, ostensibly used to produce silk for wrapping nuptial gifts. *Eugowra* is cool adapted, and species fly during the winter months. The hypandrium of the male genitalia is reduced to a narrow curved channel that is distally free from the epandrium, and which barely covers the aedeagus along its length.

Materials and methods

This study is based on material from Australian collections (see Acknowledgments for repositories and their abbreviations). Morphological terminology follows J.F. McAlpine (1981) except that of the male terminalia, which follows Cumming *et al*. (1995). Common features are listed in the introductory description and not repeated in species descriptions unless needing clarification. Measurements are in millimetres and based on representative dry specimens. The position of features on elongate structures such as leg segments is given as a fraction of the total length, starting from the base. The relative lengths of the podomeres are representative ratios and not measurements, and are presented in the following formula and punctuation: trochanter + femur; tibia; tarsomere 1/ 2/ 3/ 4/ 5.

The following abbreviations and terms are used: *FSSC*, female secondary sexual character(s), non-genitalic characters found only on female body; *MSSC*, male secondary sexual character(s), non-genitalic characters found only on male body; *I, II, III*, pro-, meso-, metathoracic legs; *C*, coxa; *T*, tibia; *F*, femur; *ac*, acrostichal setae; *ad*, anterodorsal; *av*, anteroventral; *dc*, dorsocentral setae; *dv*, dorsoventral; *pd*, posterodorsal; *pv*, posteroventral; *t*, tarsus; $t_{1–5}$, tarsomeres 1 to 5.

Genus *Eugowra* n.gen.

Etymology. *Eugowra*, the locale of the type species, is a geographic place name of Australian Aboriginal origin. The gender is feminine.

Type species. *Eugowra uniseta* n.sp.

Diagnosis. Subfamily Empidinae, tribe Hilarini, with the following tribal characters (Bickel, 1996): laterotergite bare; male basitarsus I enlarged or swollen; costa circumambient; vein R_1 distinctly swollen before joining costa; tibia I with anteroapical comb of 8–10 short even setae; male cercus small and desclerotized, and fused laterally with the surstylus and epandrium.

The genus is characterized by: mesonotum without distinct cuticular patterns or bands; vein Sc incomplete, not upturned to costa; hypandrium reduced to narrow curved channel, joined to epandrium only at base, and which barely covers aedeagus along its length; female TIII slightly flattened laterally, with posterior surface from ⅕ to ⅘ slightly concave and bare of normal short vestiture (FSSC).

Description. (based on three included new species); body length 3.0–3.7. *Head* (Fig. 1a): spheroidal with convex postcranium; row of pale postorbitals present, short ventrally, becoming longer dorsally; postcranium with scattered pale setae; post-occiput, vertex, frons and face mostly dark brown and covered with grey pruinosity; setae brown with yellowish reflections; ocellar triangle with 2–3 pairs of posterior setulae, and pair of diverging setae anteriad of lateral ocelli; frons with four strong setae along lateral margin; frons only slightly narrower than ocellar triangle; eyes notched laterad of antennae; face about as wide as frons, covered with grey pruinosity; palp yellow, elongate and curved, and with some long pale ventral setae; proboscis dark brown, slightly curved and stout; labrum brown with some yellow basal areas; scape and pedicel brown, subequal; postpedicel and style black; postpedicel flask-shaped with two-segmented style, and distal segment of style just slightly shorter than postpedicel. *Thorax* mostly uniform brown or black with grey pruinosity, without distinct mesonotal cuticular or pruinose patterns or bands; thoracic setae mostly yellowish; ac either biseriate or comprising band 3–4 setae wide; dc as row of short pale setae, with 4–6 longer setae along posterior mesonotal slope, and 12–15 setae anteriad; 1 short postalar (pa) seta and row of 4–5 short supra-alar (sa) setae present; 2–3 posterior notopleural (npl) setae, with 4–5 short setulae anteriad; strong sr seta and shorter humeral seta present; some additional setae present on anterior thorax just mediad of humeral callus; pronotum with two pairs of pale diverging setae; prosternum with group of pale hairs; scutellum with 4 pairs of marginal setae. *Legs* vestiture mostly yellow or brownish; CI with anterior and antero-lateral setae; CII with anterior setae; CIII with some weak anterior setae, and 2–3 short lateral setae, and 2–3 posterior setae; tibia I with distinct anteroapical comb of 8–10 short, equal length setae of both sexes; tibia I often with long dorsal setae; male It_1 greatly swollen (Figs 1b,d,g), female unmodified; femora II and III often with long dorsal and ventral setae; female TIII slightly flattened laterally, with posterior surface from ⅕ to ⅘ slightly concave and bare of normal short vestiture (FSSC). *Wing* (Fig. 1e) membrane hyaline; costa circumambient, although reduced in thickness along posterior margin; Sc incomplete, and straight, not upturned to costa; R_1 slightly swollen before join with costa; faint stigma present; costa haired, but other veins bare; R_{4+5} branched, R_4 in gentle curve; R_5 straight and ending at wing apex; M_1, M_2, and CuA_1 all joining margin; CuA_2, which closes cell cup, strongly recurrent; A_1 present distally only as fold, and arising midway along cell cup; A_2 present as trace; anal angle weak. *Abdomen* mostly brown or black with pruinosity; setae longer along posterior margins of each tergum; hypopygium (Fig. 1c,f); cercus distinct and divided into sclerotized short basal cercal plate and digitiform clasping cercus; epandrium with elongate posteriorly projecting setae; aedeagus elongate and conforming to curvature of hypandrium; hypandrium reduced reduced to narrow curved channel (and with median pointed projection), joined to epandrium only at base, and which barely covers aedeagus along its length; distinct surstylus not evident.

Female oviscapt relatively unmodified, with subequal terga and sterna on segments 9 and 10, and with pair elongate apical cerci projecting posteriorly.

Remarks. *Eugowra* has a southern temperate distribution in Australia, and is known from lowland sites in Tasmania, Victoria, and southern interior New South Wales. Moreover, adults are decidedly cool-adapted, with all known specimens collected between April and September. Further, mating pairs of *E. colei* were taken in July, mid-winter in Hobart, Tasmania. It should be noted that southern Australia and Tasmania have more winter-flying Diptera than commonly assumed. There is a distinct bias against winter collecting, and indeed, visible insect activity is much reduced during cold days and frosty nights, especially when compared with the peak activity period from October–January. However, samples from passive traps in western Tasmania (unpublished data), reveal a rich winter Diptera fauna with many undescribed taxa. Mackerras (1950) noted that cool-temperate Australian Diptera (often with Gondwanan affinities) emerge in winter to early spring in the northern part of their range, but later in montane or southern localities. In this light, truly winter fauna, such as *Eugowra*, are even more likely to be Gondwanan.

Mating behaviour is unknown. However, males have swollen fore basitarsi which probably produce silk for wrapping nuptial gifts, characteristic of the *Hilara-Hilarempis* complex of genera.

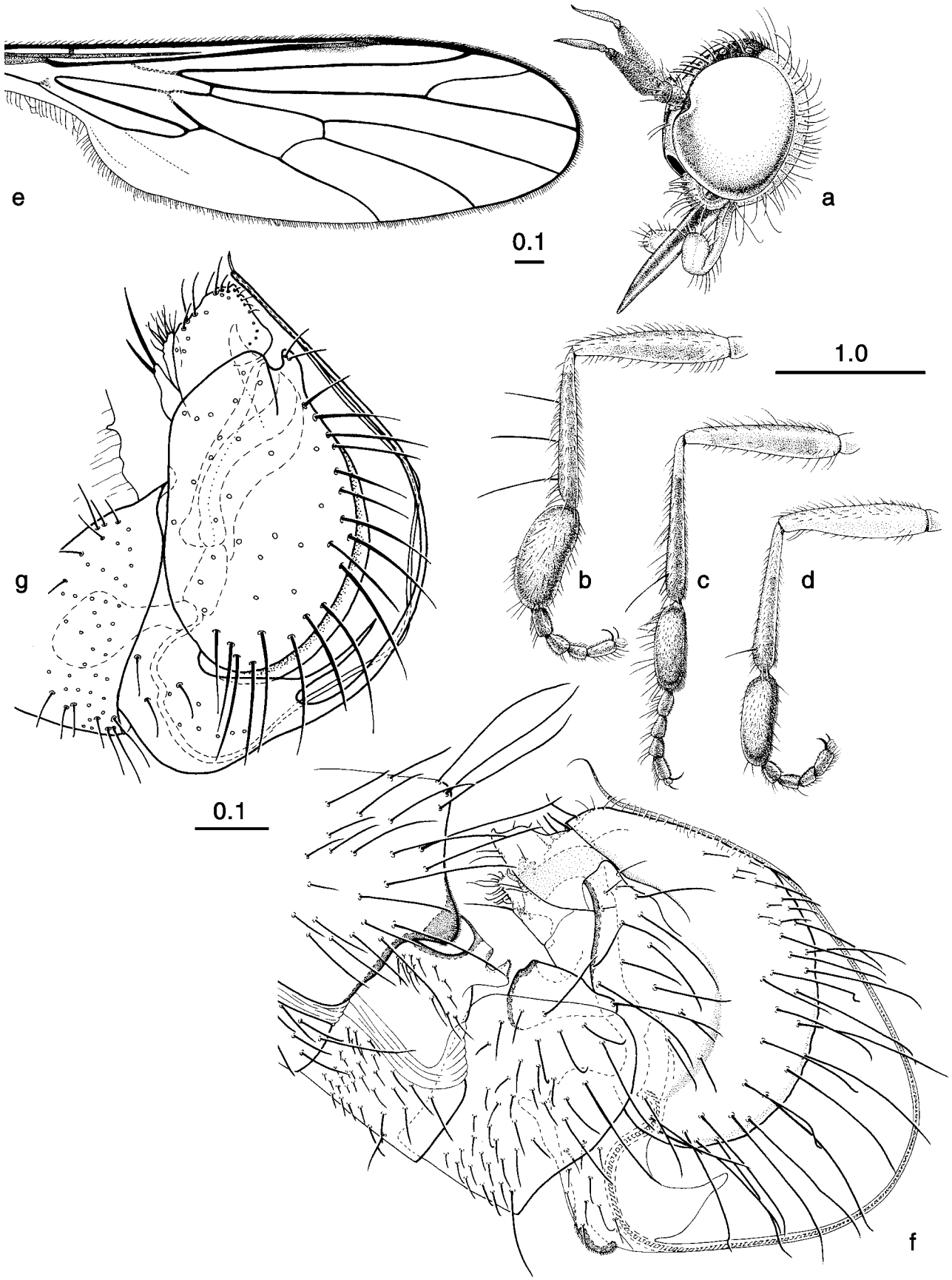

Fig. 1. *Eugowra uniseta*: (*a*) male head, left anterolateral; (*b*) male left leg I, posterior; (*c*) hypopygium, left lateral. *Eugowra colei*: (*d*) male left leg I, posterior; (*e*) male wing, dorsal; (*f*) hypopygium, left lateral. *Eugowra fusca*: (*g*) male left leg I, posterior.

Key to males of *Eugowra* species

Eugowra is a member of the tribe Hilarini with the following characters: mesonotum without distinct cuticular patterns or bands; male basitarsus I swollen; Sc incomplete, and not upturned to costa; hypandrium reduced to narrow band, leaving aedeagus almost free.

1 Face (Fig. 1a) with pair of fine setae between antennal base and clypeal margin (both sexes); tibia I (Fig. 1b) with single strong black dorsal seta at ⅞ (NSW, Vic.) ..... *E. uniseta* n.sp.

—— Face bare of setae; tibia I with at least 3 strong dorsal setae 2

2 TI (Fig. 1d) with 3 black dorsal setae at ⅖, ⅗, and ⅞, which distally increase in size; basitarsus I swollen with some scattered short dorsoapical setae (Tas., Vic.) ..... *E. colei* n.sp.

—— TI (Fig. 1g) with row of dorsal setae with some outstanding longer setae on distal half, especially at ⅞; It_1 swollen with shaggy appearance from dorsal and lateral hairs (Vic.) ..... *E. fusca* n.sp.

Eugowra uniseta n.sp.

Type material. HOLOTYPE ♂ ANIC, PARATYPES 7♂♂, 5♀♀, all New South Wales, 2.4 km NE of Eugowra, 24.iv.1971, Z. Liepa (ANIC).

Additional material. New South Wales: 3♂♂, 4♀♀, Conargo, Billabong Ck., 23–30.iv.1978; 1♀ Gerogery, 14.vi.1961. Victoria: 1♂, 2♀♀, 7 km W of Dimboola, 8.viii.1968 (ANIC).

Description. *Male* length: 3.0–3.1; wing: 3.3× 1.2. *Head* (Fig. 1a); frons and face dark brown and covered with uniform grey pruinosity; black pruinosity on ocellar triangle, ending as triangle on dorsal postcranium, and as stripe along lateral frons; face with pair pale setae between antennal base and clypeal margin. *Thorax* dark brown with grey pruinosity; thoracic setae yellow; ac comprising band 3–4 setae wide extending to anterior margin of posterior slope; dc as row of pale setae, with 5 longer setae along posterior mesonotal slope, and 15 setae anteriad; field of short pale seta present from mesonotal suture to humeral callus. *Legs* CI mostly yellow but infuscated basally; CII and CIII mostly brown with grey pruinosity, but yellow distally; femora and tibia are mostly yellow (some specimens with tibiae infuscated); tarsomeres dark brown; coxae with pale setae; I: 3.7; 3.2; 1.8/ 0.7/ 0.4/ 0.3/ 0.5; TI (Fig. 1b) with single strong black dorsal setae at ⅞ (MSSC); It_1 swollen with some short distal setae; II: 3.5; 3.7; 1.2/ 0.4/ 0.3/ 0.2/ 0.5; TII with pale dorsal and ventral setae, and stronger pale dorsal seta at ⅞; III: 4.5; 4.7; 1.5/ 0.5/ 0.4/ 0.3/ 0.5; FIII with row of pale av and pv setae, becoming longer and slightly curved towards apex; TIII with pale dorsal and ventral setae, with strong subapical dorsal seta. *Wing* hyaline, without infuscation; stigma faint yellow; lower calypter yellow with pale setae; halter yellow with brownish club. *Abdomen* mostly brown with pale vestiture; setae longer along posterior margins of each tergum; hypopygium (Fig. 1c) mostly brown; median basal projection of hypandrium needle-like.

Female: similar to male except as noted: tibia I lacks strong dorsal seta at ⅞; female also with pair of setae on face between antennae and clypeal margin.

Remarks. *Eugowra uniseta* is distinguished from congeners by the single strong subapical dorsal seta on tibia I and the paler colouration, the legs being more yellow, and the wing hyaline, not smoky. This species is apparently widespread in the Murray River drainage of southern New South Wales and western Victoria. All specimens were collected in cool months, late April to July. Both sexes have a pair of short pale setae between the antennal base and clypeal margin.

Eugowra colei n.sp.

Type material. HOLOTYPE ♂, PARATYPES, 30♂♂, 4♀♀, Tasmania: Hobart, 1.vii.1917, C.E. Cole; PARATYPES, same as holotype but as noted: 3♂♂, 3.vi.1917; 1♂, 2♂–♀ mating pairs, 12.viii.1916; 2♂♂, 1♀, 29.viii.1916; 4♂♂, 26.viii.1916; 2♂♂, 12.v.1917; 3♂♂, 13.v.1917; 2♂♂, 20.v.1917; 2♂♂, 3♀♀, 25.vi.1916; 1♀, 1.x.1916 (MVM).

Additional material. Tasmania: 2♂♂, Ridgeway, 3.ix.1916, C.E Cole (MVM). Victoria: 2♂♂, Bayswater, iv.1928, 1♀, Ferntree Gully, 15.iv.1928, 2♂♂, Ringwood, iv.1928 (all F.E. Wilson, MVM).

Description. *Male* length 3.6–3.7; wing: 3.8. *Head* frons, postcranium face mostly black with grey pruinosity, but darker around ocellar triangle; face bare of setae. *Thorax* mostly dark brown with brownish pruinosity dorsally and greyish pruinosity on pleura, but no distinct patterns present; ac biseriate and extending to posterior slope of mesonotum. *Legs* CI yellow but infuscated basally; CII and CIII mostly brownish but distally yellow, and with grey pruinosity; femora and tibiae mostly yellow, but appearing darker and brownish in some specimens; tarsi dark brown; vestiture pale yellow except where noted; I 3.7; 3.3; 2.1/ 0.5/ 0.4/ 0.3/ 0.4; TI (Fig. 1d) with 3 black dorsal setae at ⅖, ⅗, and ⅞, which distally increase in size, with distalmost seta ⅔ length of TI (MSSC); It_1 greatly swollen, and with some short dorsoapical setae (MSSC); II: 4.0; 4.3; 1.3/ 0.4/ 0.3/ 0.2/ 0.5; TII with outstanding dorsal setae at ¾ and ⅞ (MSSC); IIt_1 setose; III 5.2; 5.0; 1.8/ 0.7/ 0.4/ 0.3/ 0.5; FIII with some long dorsal and av setae. *Wing* (Fig. 1e) membrane slightly smoky; halter yellowish with distinctly

brown club. *Abdomen* almost entirely dark brown with yellow to brownish setae; setae on tergum I and posterior margins of remaining terga relatively long; male postabdomen (Fig. 1f); median basal projection of hypandrium broadly triangular.

Female: similar except as noted. femora with only short pale ventral setae; TI and TII without strong dorsal setae; It_1 unmodified; TIII only weakly flattened laterally.

Remarks. *Eugowra colei* is readily distinguished from congeners by the three strong dorsal setae on tibia I. This species is known from Tasmania and southern Victoria. All specimens were collected in cool months, from April to October, and mating pairs were captured during July in Hobart. This species is named for C.E. Cole, whose extensive collections of Tasmanian Diptera are deposited at the Museum of Victoria.

Eugowra fusca n.sp.

Type material. HOLOTYPE ♂, PARATYPE ♀, Victoria: Darriman, 22.vii.1952, G.W. Douglas (MVM).

Additional material. Victoria: ♂, Ocean Grove, 5.viii.1960, J. Martin (MVM).

Description. *Male* length 2.7; wing 3.7× 1.3. *Head* mostly black with some grey pruinosity; orbitals short, becoming longer dorsally; face bare of setae. *Thorax* dorsally black, mostly shiny with some grey/brownish pruinosity; pleurae covered with grey pruinosity; ac short, biseriate. *Legs* Coxae yellowish to brownish and covered with grey pruinosity; femora mostly yellowish; TI and TII yellowish basally but becoming dark brown distally, TIII dark brown; tarsi dark brown or black; I: 3.5; 3.2; 1.8/ 0.4/ 0.3/ 0.3/ 0.5; (Fig. 1g) TI with row of dorsal setae with some outstanding longer setae on distal half, especially at ⅞ (MSSC); It_1 swollen with shaggy appearance from dorsal and lateral hairs (MSSC); II: 4.3; 4.0; 1.2/ 0.3/ 0.3/ 0.2/ 0.5; FII with rows of av and pv hair-like setae; TII with some dorsal setae, slightly increasing in size towards the apex; IIt_1 not swollen but with some dorsal setae; III: 4.7; 4.7; 1.5/ 0.7/ 0.4/ 0.3/ 0.6. *Wing* distinctly smoky; brownish stigma present; halter with brownish stem and brown club. *Abdomen* dark brown with brown to dark brown setae and the posterior margins of the terga have longer hairs; hypopygium not figured, but median basal projection of narrow and pointed, similar to Fig. 1c. *Female* similar except as noted; TI and TII without strong dorsal setae; It_1 unmodified.

Remarks. *Eugowra fusca* is known from two locales in southern Victoria: Gippsland, and the Geelong district. Specimens were collected in winter months, July and August.

Notes on morphology and systematic position of *Eugowra*

With the large number of undescribed hilarine taxa, both in Australia and throughout the world, it is premature to attempt any phylogenetic analysis of the tribe. However three morphological characters related to *Eugowra* should be discussed.

1 Vein Sc: complete/ incomplete. The plesiomorphic condition is considered to be Sc complete and fusing with the costa, with varying degrees of reduction ("incompleteness") being derived. However, this character is variable throughout the Empidinae, and the incomplete Sc is probably homoplasious, and possibly is subject to reversal.

2 Female tibia III: unmodified/ flattened laterally, and with posterior surface from ⅕ to ⅚ faintly concave and bare of normal vestiture, but with fine pile. This modification also occurs in many species of Australian *Hilara s.l.*. This modification functions in aerial display and species recognition, as the fine hairs of the pile appear to have a reflective function, and on some of the *Hilara* species the hairs are silvery.

3 Hypandrium: forming curved hood joined to epandrium and completely covering aedeagus/reduced to a narrow curved channel which is distally free from the epandrium, and which barely covers the aedeagus along its length.

In the Hilarini, the hypandrium usually forms a curved convex hood covering the aedeagus along the distal hypopygial margin to the surstylus. By contrast, in the tribe Empidini the hypandrium is often highly reduced and covers only the aedeagal base, leaving body of the aedeagus exposed and free (e.g., see figures of *Empis* species in Chvála, 1994).

At first glance, *Eugowra* also appears to have a free aedeagus. However, closer examination shows the hypandrium has been reduced to a narrow curved gutter which follows and barely covers the aedeagus along its length parallel to the distal hypopygial margin. This unique autapomorphy defines *Eugowra* as a monophyletic group.

Needless to say, the relationship of this genus to the rich and disparate *Hilara-Hilarempis* complex of species is not clear. I have decided to give these three species generic status rather than assigning them to a species group or subgenus in either of the two poorly defined genera, *Hilara* or *Hilarempis*. At least *Eugowra* is clearly defined by a distinct suite of synapomorphies, and its ultimate phylogenetic position can be defined in the future.

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