

Review of the Australian Subfamily Pteryperginae (Hymenoptera: Symphyta: Pergidae)

STEFAN SCHMIDT, DAVID R. SMITH, AND JOHN MACDONALD

(SS) Australian National Insect Collection, CSIRO Entomology, GPO Box 1700, Canberra, ACT 2601, Australia [current address: State Museum of Natural History Stuttgart, 70191 Stuttgart, Germany], e-mail: s.schm@gmx.net; (DRS) Systematic Entomology Laboratory, PSI, Agricultural Research Service, U.S. Department of Agriculture, % National Museum of Natural History, Smithsonian Institution, Washington, DC, 20560-0168, USA, e-mail: dsmith@sel.barc.usda.gov; (JM) University of Sydney, Orange, PO Box 883, Orange, NSW 2800, Australia, e-mail: jmacdona@oac.usyd.edu.au

Abstract.—Pteryperginae are endemic to Australia where one genus and three species are known, *Pteryperga galla* Benson, *P. bifasciata* (Brullé), and *P. hyaloptera* Schmidt and Smith, n. sp. A key to species is provided, and each is described and illustrated. The male of *P. galla* is described for the first time. Larvae of *P. galla* (on *Elaeocarpus reticulatus* Smith, Elaeocarpaceae) and *P. hyaloptera* (host unknown) are illustrated.

The subfamily Pteryperginae was proposed by Benson (1938a, b) for two species from Australia, *Pteryperga galla* Benson 1938a and *P. bifasciata* (Brullé 1846). Specimens are scarce in collections, and little has been published on the subfamily since its recognition.

Prompting this review was the discovery of an unusual adult pterypergine collected in a temperate rainforest area in southeastern Queensland by the senior author. About a month after this adult was collected, and, at the same locality, the same author found a larva resting on a fern near the ground. The larva apparently was full grown and went into the ground for pupation the next day. The adult that later emerged was the same pterypergine species that was hand collected previously in the same area. These two specimens represent a new species of Pteryperginae and are very dissimilar from the two previously described species of *Pteryperga*. However, they conform to the generic definition of *Pteryperga*, and we prefer to place them as a third species of the genus.

We also have examined additional spec-

imens of *P. galla* and here describe the male for the first time, and we present illustrations of the larvae of *P. galla* and *P. hyaloptera*, n. sp. We did not find additional specimens of *P. bifasciata*, which remains unknown since its original description in 1846.

METHODS

The photomicrographs were obtained using a digital camera (ProgRes 3012, Jenoptic Laser, Systeme GmbH) and processed using the AutoMontage system, version 2.04 (Synoptics Ltd.) and a Sony Digital Photo Camera DKC-5000. The digital images were enhanced and the plates prepared using Adobe PhotoShopTM.

Acronyms used are as follows: Australian National Insect Collection, Canberra, Australia (ANIC); The Natural History Museum, London, U.K. (BMNH); Agriculture Scientific Collection Unit, Orange, Australia (ASCU); South Australian Museum, Adelaide, Australia (SAMA); National Museum of Natural History, Smithsonian Institution, Washington, DC, USA (USNM).

PTERYPERGINAE

The subfamily is characterized in the keys to subfamilies of Pergidae by Benson (1938b), Riek (1970), and Naumann (1991) as follows: Forewing without an anal cell (A), crossvein 2r-m absent, thus 2nd and 3rd radial cells (Rs and 1Rs2) joined, radial cell (R1) closed with apical accessory vein, costa swollen apically but basally much narrower than intercostal area; costal cell proximally with intercostal crossvein (Sc1); hind wing with radial cell (R1) open; pronotum without accessory furrow; mesoscutellum rounded behind, not lobed or produced posterolaterally and not carinate; cenchri large, nearly meeting at center; foretibia with two subequal apical spurs; mid- and hind tibiae each with preapical spine; propodeum sclerotized; labium 3-lobed; maxillary palpus 6-segmented, labial palpus 4-segmented; propleura medioventrally narrowly rounded or acute, far apart and not meeting medially.

Pteryperginae share characteristics with both the Perginae and Pterygophorinae. With the Pterygophorinae, they share the similar reduced wing venation by lacking 2r-m and having a narrow costa basally in the forewing and cell R1 of the hind wing open apically; the medioventrally widely separated propleura; lack of posterior projections on the mesoscutellum; sclerotized first tergum of the abdomen; serrate antennae of the female; and pectinate antennae of the male. Pterygophorinae differ, however, by the absence of preapical spines on the mid- and hind tibiae; presence of an accessory furrow on the dorsal angle of the pronotum; smaller cenchri which are far apart; and the unipectinate antennae of the male (bipectinate in Pteryperginae).

With Perginae, Pteryperginae share the

presence of preapical spines on the mid- and hind tibiae; sclerotized first tergum; and the large cenchri, almost meeting at the center. Perginae are separated by the presence of 2r-m and swollen costal cell of the forewing; closed R1 of the hind wing; short, non-serrate antennae of both sexes with fewer than 9 segments; presence of an accessory furrow on the pronotum; propleura almost truncate medioventrally and meeting medially; and the mesoscutellum with posteriorly projecting lobes.

We believe the shared character states of the reduced wing venation, lack of posteriorly projecting lobes of the mesoscutellum, and similarly shaped antennae place Pteryperginae closest to Pterygophorinae. Preliminary results of a phylogenetic analysis of world Pergidae currently under way by SS and DRS support this hypothesis.

Pteryperga Benson

Pteryperga Benson 1938a: 623.—Smith 1978:148 (catalog).
Type species: *Pteryperga galla* Benson, by original designation.

Description.—Head in front view broader than long; labrum flat, slightly emarginate apically, about 2× longer than clypeus; clypeus small, its breadth less than half distance between eyes, its length equal to length of pedicel; eyes slightly converging below, far apart, lower interocular distance about 1.3× eye length; distance of antennae behind clypeus equal length of pedicel; malar space equal breadth of pedicel; antenna 12–20 segmented, central segments serrate in female, flagellar segments bipectinate in male with rami dorsoventrally flattened, clavate, and ramus of 3rd segment much larger and broader than rami of remaining segments.

KEY TO SPECIES OF PTERYPERGA

1. Female; flagellar segments simple 2
- Male; flatellar segments bipectinate 4

2. Almost entirely yellow brown; wings uniformly hyaline, slightly fuscous (Fig. 3); length, ca. 6.0 mm; antenna 10-segmented, subclavate (Figs. 2, 9), length shorter than head width, with segments 4–8 serrate (Fig. 9); Queensland *hyaloptera* Schmidt and Smith, n. sp.
– Black and reddish brown, dorsum of head, mesonotum, and legs largely black (Fig. 1); forewing patterned, subhyaline with dark brown at base and two dark brown bands (Figs 1, 8); length 7–11 mm; antenna 10 to 12 or 20-segmented, of almost uniform width, length longer than head width, with segments 3 to apex distinctly serrate (Figs. 1.b, 10) 3
3. Antenna 10–12 segmented (Fig. 10); inner band of forewing not reaching posterior wing margin (Fig. 8); first tergite partly black; New South Wales, Queensland *galla* Benson
– Antenna 20-segmented (Fig. 1.b); inner band of forewing reaching posterior wing margin (Fig. 1); first tergite reddish brown, concolorous with rest of abdomen; Tasmania
. *bifasciata* (Brullé)
4. Wings uniformly slightly dusky; mesopleuron black; length, 5.0 mm
. *hyaloptera* Schmidt and Smith, n. sp.
– Forewing patterned, subhyaline with dark brown at base and two dark brown bands (similar to Fig. 8); upper half of mesopleuron reddish brown; length, 8.0–9.0 mm
. *galla* Benson

Pteryperga bifasciata (Brullé)
(Fig. 1)

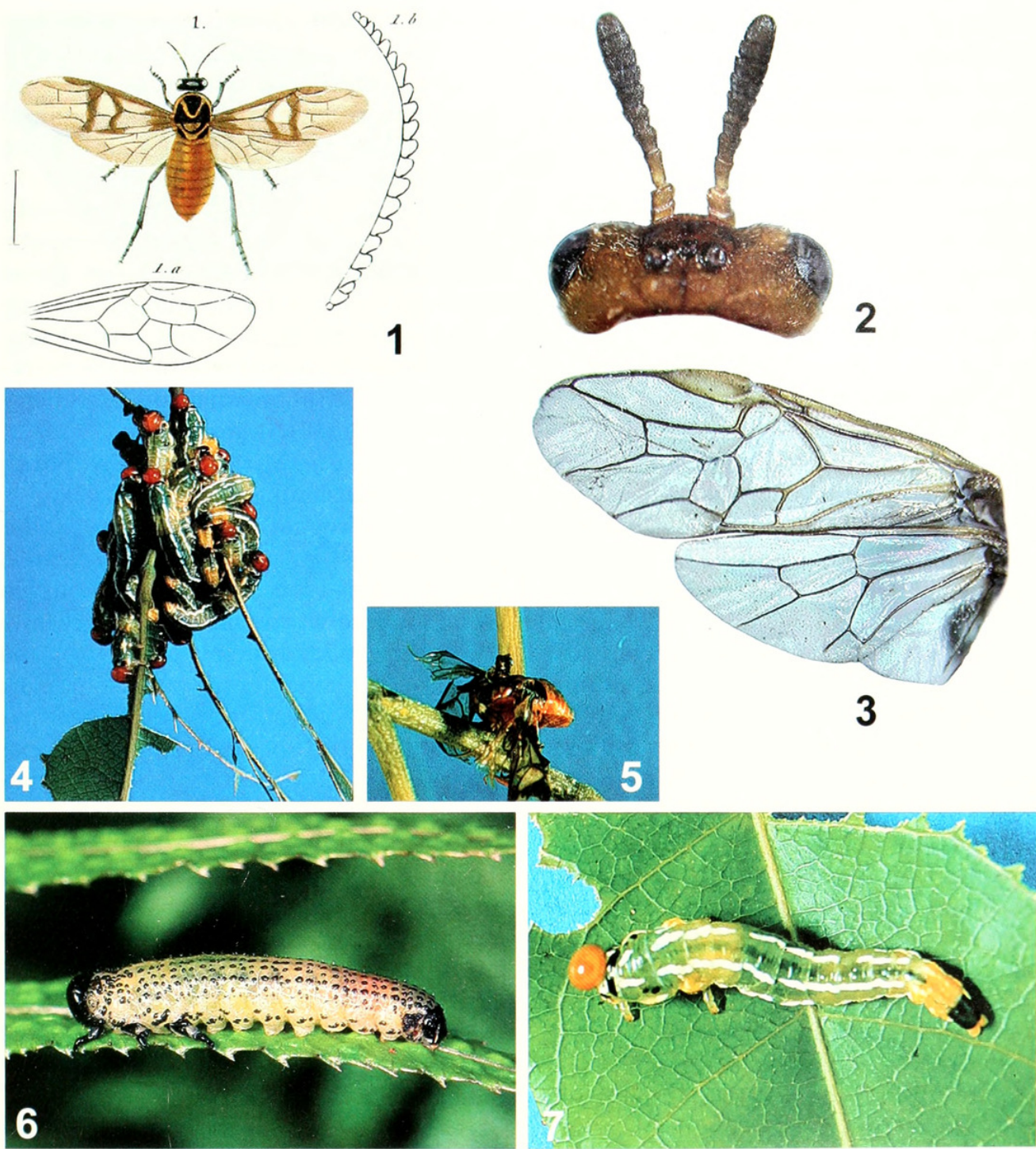
Pterygophorus bifasciatus Brullé 1846: 660–661, pl. 46, fig. 1, ♀ (here reproduced as Fig. 1); la Terre de Van Diemeni [Tasmania]; type lost.—Konow 1905: 37.
Pteryperga bifasciata: Benson 1938a: 625 (n. comb.).—Smith 1978: 148 (catalog).

Brullé’s type is lost, and it is difficult to place this species from his description. It was described from a female from Tasmania. Froggatt’s (1918, 1919) references to *Pterygophorus bifasciatus* belong to *P. galla* according to Benson (1938a), and this is confirmed here from Froggatt’s specimens we have examined (see Dungay records for *P. galla*). It is unlikely Brullé’s species is the same as *P. galla* or the other species described here, and, according to Benson (1938a), probably represents a distinct species of *Pteryperga*. *Pteryperga galla* females have a very distinctive colour pattern on the mesonotum and wings that is not found in any other known Australian pergid species. *Pteryperga bifasciata* shows a very similar colouration (Fig. 1), although the wing pattern does not quite agree with *P. galla* in that in the latter species the proximal band of the forewing does not reach the posterior wing margin (Fig. 1).

Furthermore, Brullé described and illustrated the antenna as 20-segmented, whereas in *P. galla* the female antenna is 10–12 segmented. Brullé did not mention preapical tibial spurs. Based on Brullé’s description and illustrations we agree with Benson’s opinion that *P. bifasciata* represents a distinct species, although this can be verified only when material is collected from Tasmania that may correspond to Brullé’s description. Unfortunately, recent search of entomological collections in Tasmania for previously unrecorded material were unsuccessful (D. Bashford, pers. comm.)

Pteryperga galla Benson
(Figs. 4, 5, 7, 8, 10, 11)

Pterygophorus bifasciatus: Froggatt 1918: 670 (biological note, ♀ ♂); Froggatt 1919: 112 (biological note); Morice 1919: 290 (brief description in key) [misidentifications].
Pteryperga galla Benson 1938a: 623–5. Holotype ♀, Australia, New South Wales, Tweed River, bred from cocoons collected by H. Brooks (ANIC, examined); condition of holotype: left foreleg, right middle leg, left hind tarsus, and left forewing missing, other wings partly damaged. Paratypes: 1 ♀, same data as holotype (ANIC); 2 ♀, same data as holotype (BMNH), 1 ♀, same data as holotype (ASCU), 3 ♀, New South Wales, Dorriggo (W.



Figs. 1–7. 1, *Pteryperga bifasciata*, reproduction of *Pterygophorus bifasciatus*, fig. 1 in Brullé, 1846, adult female in dorsal view, forewing (1.a) and antenna (1.b). 2, 3, 6, *P. hyaloptera*. 2, Head of female in dorsal view. 3, Female wings. 6, Larva. 4, 5, 7, *P. galla*. 4, Cluster of larvae. 5, Dead adult female in guarding position. 7, Larva. Figs. 4, 5, 7, photographs by JM; Fig. 6, photograph by SS.

Heron) (SAMA).—Riek 1970: 891, 892 (host).—Smith 1978: 148 (catalog).—Macdonald and Ohmart 1993: 494 (biology).

Female.—Length 8.0–11.0 mm. Head reddish brown with postgena, lower gena, vertex except more or less ocellar furrows, epicranial suture, and frontal area dark

brown to black. Dark colouration sometimes more extensive with head mostly black and only face reddish brown. Thorax reddish brown with side lobes of mesoscutum, a broad median band on mesoscutal midlobe sometimes not reaching posterior end of midlobe so that reddish

brown pattern forms a V-shaped pattern (cf., Fig. 1), mesoscutellum anteriorly and posteriorly, mesosternum and lower $1/3$ or less of mesopleuron, and occasionally 3 basal tarsal segments black. Abdomen reddish brown except first tergite with 2 black patches, and apex of sawsheath black. Wings fuscohyaline with a dark brown band across forewing from under basal part of stigma to hind margin and a second band from apex of costa along vein M, but not reaching hind margin of wing (Fig. 8); patches of dark brown fill intercostal area to some extent, cover basal and anal veins, and fill base of forewing (Fig. 8); hind wing with a slightly fuscous band from stigma and a fuscous patch covering anal veins; stigma and veins of wings black. Antenna 10–12 segmented, of almost uniform width, length slightly greater than head width, segments 3–10 distinctly serrate (Fig. 10). Postocellar area about $2.5\times$ broader than long; distance between hind ocelli slightly greater than distance of a hind ocellus to posterior margin of head. Propleura narrowly rounded mesally. Foretibial spines subequal in length and width. Length of hind basitarsus equal length of following $1\frac{1}{3}$ tarsal segments. Length of longest hind tibial spur less than apical width of hind tibia. Head and body smooth, impunctate, shining. Sheath in dorsal view bifid, with long, posteriorly projecting scopae. Lancet (Fig. 11) and fig. 11 of Benson (1938a), with low, flat serrulae, serrulae on apical half or more not differentiated from each other.

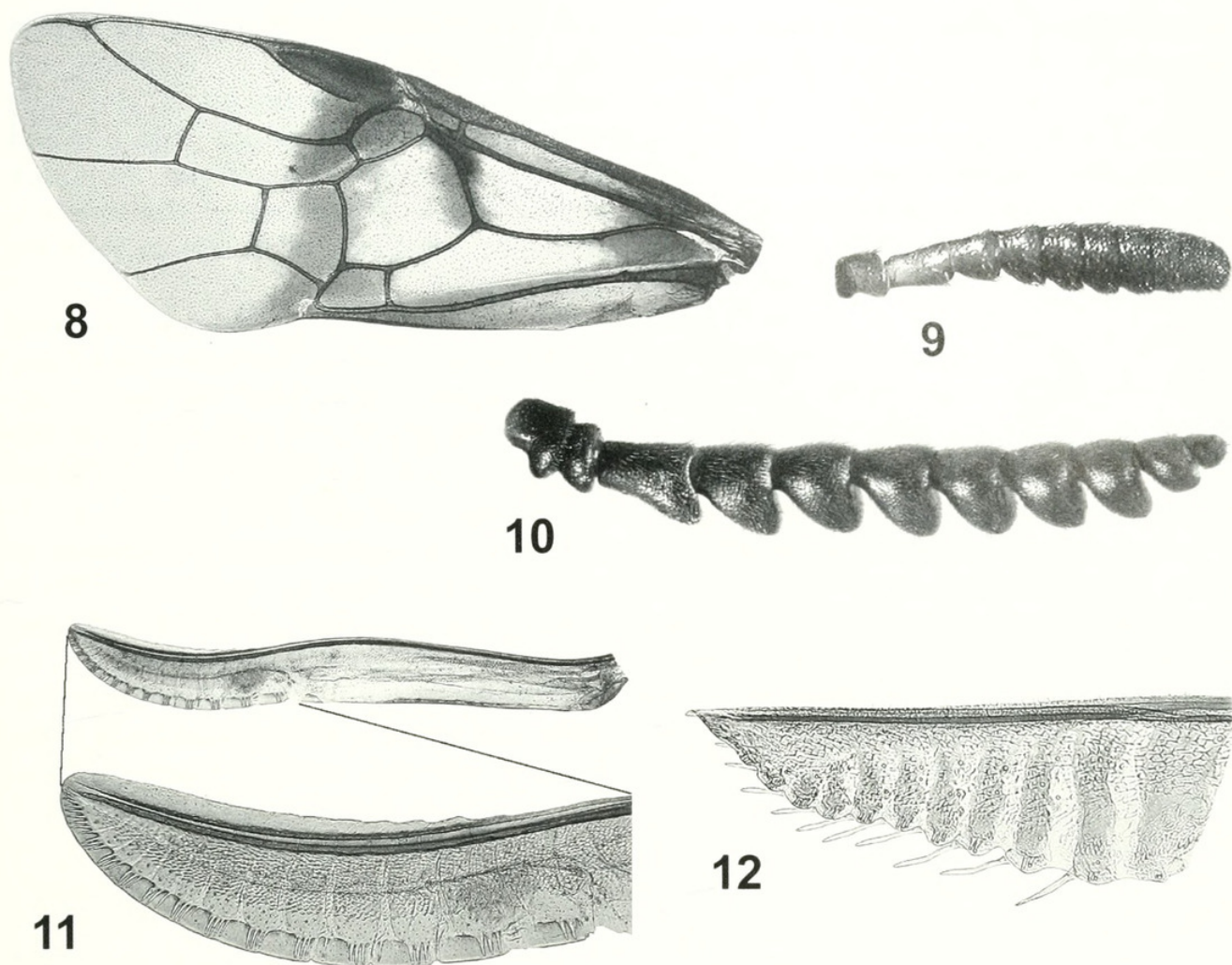
Male.—Length 8.0–9.0 mm. Head black. Body predominantly black with pronotum except occasionally with black spot laterally, mesonotal midlobe laterally more or less, upper half of mesopleuron, and tegula reddish brown; forefemur apically, foretibia anteriorly, abdomen except most of basal 4 tergites, and tergites 5–6 medially black. Dark wing colour pattern similar to female, but less extensive. Antenna 15–16 segmented, slightly shorter than

maximum width of head, bipectinate, longest rami about half length of antenna or slightly longer; postocellar area about $4\times$ broader than long, distance between hind ocelli slightly greater than distance of one of them to hind margin of head.

Larva (Figs. 4, 7).—Typically pergid-like with 3-annulate abdominal segments. Body smooth, ground colour green, apical segments yellow; head orange, shining; 10th tergum black; first and second segment of thorax dorsally with black markings; body with submedial and lateral broken longitudinal white stripes.

Distribution.—Australia: New South Wales, Queensland.

Biology.—Froggatt (1918, 1919), under the name *Pterygophorus bifasciatus* Brullé, recorded this species from cocoons in wood, "a colony, containing about twenty cocoons imbedded in soft wood from the stem of an undetermined tree." Riek (1970) recorded the host plant, *Elaeocarpus reticulatus* Smith (= *cyaneus* Aiton, Elaeocarpaceae), and Naumann (1991) mentioned that the larvae are on *Elaeocarpus* sp. Macdonald and Ohmart (1993) gave the most complete report of the biology, and JM here adds further observations. In summary, the female oviposits into the leaf margins of young *Elaeocarpus reticulatus* foliage and then takes up a "guarding position" on the associated leaf petiole remaining with her eggs and newly emerged larvae until her death (Fig. 5). Larvae are gregarious and development is synchronized. Sexual dimorphism is apparent in that female larvae are larger than males. Feeding is nocturnal, and larvae form aggregations during daylight hours (Fig. 4). Following larval development, the larvae move as an aggregation to find a suitable pupation site, off the host and usually in leaf litter. They make silken lined pupal cocoons in leaf litter or decaying timber. Adult emergence is synchronized; indications from larval collections suggest that the species is multivoltine.



Figs. 8–12. 8, 10–11, *Pteryperga galla*. 8, Forewing. 10, Antenna in lateral view. 11, Mandible. 9, 12, *P. hyaloptera*. 9, Female antenna in lateral view. 12, Mandible.

Material examined.—New South Wales: Holotype ♀; 1 ♀, Dungay, 1917 (H. Brooks) ex larva; 1 ♀, Dungay (H. Brooks) (ANIC); 1 ♀, Dungay, 10.1917, from larva (Brooks) (USNM); 43 ♀, 10 ♂, Cromelin Field Station, Pearl Beach, 11.xii.1988 (J. Macdonald) ex larvae on *Elaeocarpus* sp. (ASCU). The specimens from Dungay were originally determined by Froggatt as *P. bifasciata* and subsequently used as the type series for *P. galla* by Benson.

***Pteryperga hyaloptera* Schmidt and Smith, new species**
(Figs. 2, 3, 6, 9, 12)

Type.—Holotype ♀, "6–7.11.1998, Bunya Mtns N.P., 26° 51'S, 151° 33'E, Australia, QLD, leg. S. & O. Schmidt," "Holotype *Pteryperga hyaloptera*, Schmidt & Smith."

Condition of holotype: perfect. Type deposited in ANIC. Paratype 1 ♀, 1–7.xii.99, Bunya Mts, Qld., Australia, S. Schmidt (ANIC) (last larval skin of this specimen preserved in ethanol together with paratype).

Other specimen.—1 ♂, 18 mls. N. of Gympie, Queensland, 23 April 1964, I.F.B. Common & M. S. Upton (ANIC).

Female.—Length, 6.0 mm. Yellow brown with apical 5–6 antennal segments, lateral lobes of mesonotum, lateral depressed areas of mesoscutellum, metathorax lateral to cenchri, abdominal terga (laterally yellow brown), and apical 3–4 tarsal segments dark brown to black. Mandible reddish brown. Metascutellum whitish. Wings uniformly slightly dusky; costa and stigma pale brown, rest of veins dark

brown to black (Fig. 3). Antenna subclavate, thickened toward apex (Figs. 2, 9), serrate with segments 4–8 in side view widened toward apices (Fig. 9), 10-segmented, length about $0.75\times$ head width. Postocellar area about $2\times$ broader than long; distance between ocelli much shorter than distance from ocellus to hind margin of head (Fig. 2). Propleura medioventrally acute on meson. Inner apical foretibial spur only slightly shorter and more slender than outer spur. Length of hind basitarsus shorter than following 2 tarsal segments combined. Length of hind apical tibial spurs less than apical width of hind tibia. Head and body smooth, shiny, almost impunctate. Sheath in dorsal view broad, triangular, not bifid. Lancet short, triangular (Fig. 12), serrulae low and rounded, each with a long posteriorly directed projection from anterior margin.

Male.—Length, 5.0 mm. Head black with antenna, clypeus, and labrum orange brown; mandible reddish. Thorax black with pronotum, perapterum, and narrow streak on lateral margin of mesonotal lateral lobes reddish brown. Legs black with apices of fore- and midtrochanters, apices of femora, and most of tibiae and tarsi orange yellow. Abdomen black. Wings uniformly slightly dusky, veins and stigma black. Antenna 16-segmented; length less than maximum width of head; bipectinate with longest rami more than half length of antenna. Postocellar area $3.5\times$ broader than long; distance between hind ocelli $2\times$ greater than distance of one of them to hind margin of head.

Larva (Fig. 6).—None preserved for study. Typically pergid-like with 3-annulate abdominal segments. Ground colour of body yellowish; head, most of thoracic legs, 10th tergum, and low tubercles on body black; tubercles forming longitudinal rows on body.

Etymology.—The name of the species refers to the wings which, unlike the other species of the genus, lack dark markings.

Remarks.—The paratype emerged from

a cocoon spun by the larva in Fig. 6; it is in poor condition but is obviously the same species as the holotype. The male described is from a separate collection and is not included as a paratype. Although not positively associated, we believe it is this species because of its similarity to the two females.

Biology.—Unknown. Though the larva was found on fern, it did not feed on any of the offered plants from the same locality, including several species of ferns. An extensive search for larvae on plants in the lower vegetation was not successful. Feeding marks that indicate the presence of sawfly larvae were not detected. Fern is probably not the host plant of *P. hyaloptera*, and the larva was probably on its way to the ground for pupation. It is possible that larvae of this species feeds in the canopy area. The locality where this species was collected is characterized by a high diversity of different species of trees and vines typical of subtropical rainforests in that region.

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