

nites, almost reaching lateral margin, S2 and S3 hair on either side of midline slightly posterolateral directed leaving small mesial gap, S5 with short, adpressed, plumose hair, S6 sparse with short, simple hair.

Genitalia and associated sterna (figs 39E-H). Gonobase sides slightly narrowed basally, gonocoxite setose on apical inner margin, dorsal surface striate, gonostyli long, weakly flanged apically, with short, branched hair, retrorse lobes setose, well developed, ventral flanges absent, S8 median process elongate, broadly truncate and bilobed apically, with several setae, S7 median process rounded, glabrous.

Distribution (fig. 39D). Carnarvon, Western Australia.

Etymology. The epithet, *anforticornum*, was the unpublished name for the species coined by Tarlton Rayment. It means "see the large horn" and refers to the female genital processes.

Floral Forage Record. None available.

Flight Phenology.

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Remarks. *Lasioglossum anforticornum* is one of five *L. (Chilalictus)* species which exhibit female macrocephalic development, but it is the only one in which the male is not macrocephalic. The macrocephaly is expressed as a large, apically pointed, spike-like process on each gena and broadening of the clypeus. Females without genital processes have a broad clypeus, due to the divergence of the lower inner orbits margins, and enlarged genae. Males exhibit unique characters, such as the juxtaposition of, and dense vestiture on, the mesoventral processes.

Lasioglossum (Chilalictus) appositum
(Rayment)

Figures 40A-H

Halictus erythrurus appositus Rayment, 1939: 281.
Homalictus appositus. — Michener, 1965: 179.
Lasioglossum (Chilalictus) appositum. — Walker, 1986: 167.

Material examined. Holotype. ♀, New South Wales, White Swamp (29°28'S, 152°48'E) (ANIC, missing left fore and hind wings.)

Other specimens examined (2594♀♀, 80♂♂). Queensland: Wallangarra, Texas, Stanthorpe, Yelarbon, Goondiwindi, Inglewood, Bybera Rd, Binna Burra, Lamington Nat. Pk, Warwick, Rathdowney, Warwick, Leslie Dam, Karara, Thargomindah, St George, Bolton, Leyburn, Sunnybank, Yowah, Mt Tambourine,

Leyburn, Oxenford, Jimboomba, Mutdapilly, Ipswich, Wacol, Brisbane, Capalaba, Murphys Creek via Helidon, Fernvale, Oakey, Samford, Glenmorgan, Dalby, Caboolture, Tibrogargan, Condamine, Mungalla, Bunya Mts, Miles, Dulacca, Jackson, Yuleba, Quilpie, Roma, Amby, Mitchell, Kingaroy, Morven, Charleville, Tansey, Gayndah, Biggenden, Maryborough, Mundubbera, Taroom, Windorah, Childers, Eidsvold, Monto, Biloela, Moura, Rolleston, Springsure, Gladstone, Edungalba, Emerald, Anakie, Longreach, Rubyvale, Rockhampton, Yeppoon, Marlborough, Clermont, Sarina, Mackay, Cape Hillsborough, Mt Isa, Bowen, Townsville, Bowen, The Lynd, Paluma, Hidden Valley, Paluma, Mt Lindsay, Gregory River at Gregory Downs, Forsyth, Einasleigh, Georgetown, Croydon, Mt Surprise, Mt Garnet, Ravenshoe, Herberton, Watsonville, Petford, Almaden, Irvinebank, Gordonvale, Tolga, Chillagoe, Mareeba, Walkamin, Cairns, Kuranda, Carr Creek, Southedge, Mt Molloy, Mt Carbine, Craiglie, Palmer River, Cooktown, Black Mt, Laura, Laura, Bald Hills Stn, Hope Vale Mission, Mt Webb Nat. Pk, Musgrave, Lakefield Nat. Pk, Coen, Silver Plains, McIlwrath Range, Bamaga.

New South Wales: Narromine, Cobar, Coonabarabran, Fowlers Gap Res. Stn, Narrabri, Moree, Deepwater, Tenterfield.

Northern Territory: Emily Gap, Alice Springs, Aileron, Barrow Creek, Tennant Creek, Elliott, Dummarra, Daly Waters, Borroloola, Cape Crawford, Borroloola, Caranbirini Waterhole, Goose Lagoon, Mataranka, Katherine, Pine Creek, Mary River, Darwin, Nourlangie Rock, Mt Cahill, Oenpelli Hill.

Western Australia: Irrunytju Rockhole, Hinckley Range, Newman, Winning HS, Millstream, Broome, Kununurra.

Diagnosis. Most like *L. veronicae* and *L. victoriae* but with dull mesoscutum surface. Female with head and mesoscutum metallic green, latter suffused with gold, metasoma red-brown except posterior half of T1 dark green, frons striate, mesoscutum shining, densely punctate along midline and laterad of parapsidal line, mesially and in parapsidal areas openly to closely punctate, dorsal surface of propodeum ruguloso-striolate, defined by posterolateral carinae set well below dorsal level, fore tibial spur fan-shaped, metasomal tomentum absent. Male with head metallic green/blue, mesoscutum dark green, metasoma dark brown, antennae moderately short (FL 1.08 × UID), AS4:AS2 + 3 = 1, sternal vestiture sparse, forewings with 2nd r-m weaker than 1st r-m.

Description of female. Body length 4.31–4.85 mm (\bar{x} = 4.63 mm, SD = 0.20, n = 10), head width 1.36–1.51 mm (n = 10), forewing length 1.10–1.22 mm (\bar{x} = 1.16 mm, SD = 0.04, n = 10). Relative dimensions: HW 100, HL 80–82, UID

61–62, LID 58–60, AOD 18–20, IAD 13–14, OAD 31–32, IOD 21–22, OOD 14–15, CL 19–20, GW 18–19, EW 24–25, SL 32–34, FL 65–67.

Structure. Head broad, inner orbits slightly converging below, median frontal carina reaches median ocellus, upper portion weak, eyes with sparse cover of minute setae. Scape reaches just short of median ocellus. Clypeus short (0.33 × LID), almost flat, weakly convex laterally, basal half shining, mesially closely punctate with large, deeply impressed punctures and grooves running along midline, posteriorly dull, openly punctate with small, shallow, rounded punctures, supraclypeal area convex, shining, openly punctate. Frons (fig. 40A) striate above antennal bases, sculpture laterally weakens to punctate, extends vertically to anterior margin of lateral ocelli. Labrum (fig. 40B) median basal area raised forming V-shaped tubercle, anterior margin bluntly obtuse, margin raised forming lip, distal process triangular, widest at base, median keel broad, extends beyond distal margin, lateral ridges large, dorsally smooth, recurved towards median keel processes, setae not present across distal margin, lateral teeth small, straight. Pronotum dorsolaterally rounded, barely projected. Mesoscutum (fig. 40C) anterior margin weakly bilobed though not to form a mesial projection, surface with a dull sheen anteriorly, shining posteriorly, punctation moderately coarse, anteriorly impunctate, dull with conspicuous transverse lines, along midline and laterad of parapsidal line densely punctate, mesially and in parapsidal areas openly to closely punctate. Scutellum length equal to dorsal surface of propodeum, surface polished, almost impunctate, a few punctures along midline. Dorsal surface of propodeum (fig. 40C) defined by posterolateral carinae set well below dorsal level, carinae angular, posterovertical carinae reach dorsal carinae, dorsal sculpture ruguloso-striolate with a few striae laterally, sculpture almost reaches dorsal rim mesially, rim dull, rounded onto vertical surface. T1 densely punctate, posterior marginal area impunctate. Mesepisternum and metepisternum striate. Fore tibial spur fan-shaped, BP rounded.

Colour. Head and mesoscutum metallic green, latter suffused with gold, metasoma red-brown except posterior half of T1 dark green, mandibles amber, apically red-brown, basal half of clypeus black, posterior half and supraclypeal area metallic green/blue, antennal flagellum light brown underneath, legs with coxae, trochanters and basal two-thirds dark brown to black, remainder light red-brown.

Vestiture. Body sparse, lower paraocular areas with some adpressed, plumose hair, mesoscutum with conspicuous cover of short, simple, adpressed hair, metasomal tomentum absent.

Description of male. Body length 3.70–4.24 mm (\bar{x} = 3.94 mm, SD = 0.19, n = 10), head width 1.25–1.36 mm (n = 10), forewing length 0.87–0.94 mm (\bar{x} = 0.93 mm, SD = 0.03, n = 10). Relative dimensions: HW 100, HL 78–80, UID 61–62, LID 54–56, AOD 15–16, IAD 17–18, OAD 30–31, IOD 24–26, OOD 19–20, CL 19–20, GW 16–17, EW 30–31, ML 46–48, SL 23–25, FL 65–67.

Structure. Head broad though triangular, inner orbits converging below, median carina reaches median ocellus, clypeus weakly concave mesially, highly polished, impunctate, basal half bright yellow, remainder black to dark brown, supraclypeal area almost flat, smooth, impunctate. Antennae moderately short (FL 1.08 × UID), AS4:AS2 + 3 = 1. Remainder similar to female, frons striate, pronotum dorsolateral angles not projected, mesoscutum distinctly convex, shining, sparsely to openly punctate with minute punctures, scutellum highly polished and impunctate, dorsal surface of propodeum not defined by carinae, dorsal sculpture weakly striolate, with a few interconnectives, sculpture not reaching rim, dorsal rim polished. Colour of head metallic green/blue, mesoscutum dark green, metasoma dark brown, mandibles bright yellow, antennal flagellum light brown underneath, legs with tibiae and tarsi light yellow, remainder dark brown, forewings with 2nd r-m weaker than 1st r-m.

Vestiture. Lower paraocular areas with short, adpressed, plumose hair forming a mat, frons and mesoscutum with sparse cover of short, minutely branched hair, sternal vestiture sparse, S2–S6 with short, adpressed, branched hair, S2 with a few longer, erect hairs.

Genitalia and associated sterna (figs 40E-H). Gonobase sides parallel, gonocoxite without setae, gonostyli long, with moderate cover of long, simple hair, retrorse lobes glabrous, well developed, ventral flanges present, S8 median process elongate, apically broadly rounded and setose, S7 median process elongated, apically rounded, with a few setae.

Distribution (fig. 40D). Northern half of Australia, with a few specimens recorded from central New South Wales.

Floral Forage Record. Families visited = 11. Catch total = 253: Anacardiaceae (1 catch),

Combretaceae (2), Fabaceae (1), Loranthaceae (1), Meliaceae (1), Myrtaceae (235), Orchidaceae (2), Proteaceae (2), Rutaceae (1), Sapindaceae (4), Xanthorrhoeaceae (3). Genera visited=21: *Amyema* (1), *Angophora* Cav. (9), *Atalaya* (4), *Boronia* Sm. (1), *Caladenia* R.Br. (1), *Callistemon* R.Br. (1), *Calytrix* Labill. (1), *Dendrobium* Sw. (1), *Eucalyptus* (203), *Eugenia* L. (1), *Grevillea* (1), *Leptospermum* J.R. & G. Forst. (1), *Melaleuca* (16), *Owenia* Hilsenb. ex Meissn. (1), *Parkinsonia* L. (1), *Persoonia* Sm. (1), *Schinus* L. (1), *Terminalia* L. (2), *Thryptomene* Endl. (1), *Tristaniopsis* Brongn. & Gris. (2), *Xanthorrhoea* Sm. (3).

Flight Phenology.

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Remarks. *Lasioglossum appositum* and *L. immaculatum* are the only metallic species with a predominantly northern distribution. *L. appositum* is the common *Lasioglossum* s.l. species collected throughout most of northern Queensland, including Cape York Peninsula. Several males displayed macrocephalic development.

Lasioglossum (Chilalictus) aquilonium sp. nov.

Figures 41A–D

Material examined. Holotype, ♀, Queensland, Bellenden Ker Range, Summit TV Stn (17°16'S, 145°51'E), 1560m, 17 Oct–6 Nov 1981, Earthwatch/Qld Museum, malaise trap in rainforest (QM T11683, eyes have collapsed after removal from alcohol).

Paratypes, 2♀, same data as holotype (QM T11689, one paratype gold coated.)

Diagnosis. Most like *L. bicingulatum* but with openly to closely punctate mesoscutum and dark brown legs. Female with body black, frons recessed and weakly reticulate, labrum distal margin recessed on either side of median keel, mesoscutum dull, densely punctate along midline and parapsidal areas, mesially openly to closely punctate, dorsal surface of propodeum alveolate, defined by posterior carinae curved to form lip.

Description of female (male unknown). Body length 8.09–8.32 mm (\bar{x} =8.20 mm, SD=0.17, n=3), head width 2.23–2.35 mm (n=3), forewing length 2.40–2.54 mm (\bar{x} =2.47 mm, SD=0.10, n=3). Relative dimensions: HW 100, HL 81–82, UID 60–61, LID 57–58, AOD 20–21, IAD 10–11, OAD 25–26, IOD 16–17, OOD 16–17, CL 20–21, GW 18–20, EW 23–24, SL 47–48, FL 81–83.

Structure. Head broad, inner orbits converging below, median frontal carina not reaching median ocellus, eyes with sparse cover of minute setae. Scape elongate, reaches beyond posterior margin of lateral ocelli. Clypeus short (CL 0.36 × LID), convex, shining though not polished, anterior margin dull and coarsely roughened with deeply impressed punctures, densely punctate, punctures smaller and shallower towards posterior margin, supraclypeal area dull, well projected posteriorly, openly to closely punctate. Frons (fig. 41A) recessed, not continuing contours of paraocular areas, sculpture weakly reticulate above antennal bases, sculpture laterally smooth, extends vertically to level of anterior margin of lateral ocelli. Labrum (fig. 41B) basal median area raised, surface irregularly ridged, anterior margin gently convex, not forming a curved lip, lateral areas slightly recessed, distal process not tapered, widest at base, median keel extends well beyond margin, distal margin recessed on either side of median keel, lateral ridges large, serrate, extend to margin, margin without setae across, distal setae distinctly longer than penultimate setae, with two large setae laterad of median keel, lateral teeth large, distally hooked. Pronotum dorsolateral angles obtuse, well projected. Mesoscutum (fig. 41C) anterior margin with rounded mesial projection, punctation moderately fine, surface dull except two small shining areas laterad of midline, punctures small and shallow, densely punctate along midline and parapsidal areas, mesially openly to closely punctate. Scutellum length equal to dorsal surface of propodeum length, surface dull, openly punctate except densely punctate around margins. Dorsal surface of propodeum (fig. 41C) defined by posterior carinae set at dorsal level, carinae curved posteriorly forming small sharply defined lip, posterovertical carinae reach dorsal carinae, dorsal sculpture smooth, surface alveolate, a few weak striae laterally. T1 densely punctate basally, posterior marginal area impunctate, with minute transverse lines. Mesepisternum and dorsal half of metepisternum striate, remainder smooth. BP obtuse; forewings tinged brown, with dense cover of macrotrichia.

Colour. Body black, antennae and metasoma dark brown.

Vestiture. Body sparse, frons above antennal bases with long, branched hair, paraocular areas and clypeus with shorter, simple hair; mesoscutum with distinct cover of minute hair, metanotum with dense, light brown tomentum; dorsal surface of metasoma almost bare, tomentum

almost absent, one paratype with weak lateral bands on T2–T4.

Distribution (fig. 41D). A single, high altitude (1560m) locality of Bellenden Ker Range, north Queensland.

Etymology. The epithet *aquilonium* means "northern" and refers to the distribution of the species.

Floral Forage Record. None available.

Flight Phenology.

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Remarks. Only three specimens are known but the unusual character states displayed warrant species status. The high altitude areas of several North Queensland ranges and mountain tops contain a uniquely diverse insect fauna. In terms of halictid bees, several recent (unpublished) high altitude collections, made at Bellenden Ker Range and Mt Lewis, have revealed a number of unusual species. Halictid species from these sites show affinities with high altitude species found in New Guinea. These include the first Australian record of *Homalictus (Papualictus) Michener*, which occurs in the highlands of New Guinea and females of an undescribed metallic *L. (Parasphecodes)* species. The only known metallic species, *L. (P.) permetallicum*, was described by Michener (1965) from the New Guinea highlands (Mafulu, at 4000 feet).

Lasioglossum aquilonium is the most northern representative of a species-group, characterised by a number of unusual features, that occurs throughout the Bassian province. The distribution of this species is well beyond the established limits of the Bassian province and the species was collected in rainforest, a habitat not usually frequented by halictids.

Lasioglossum (Chilalictus) argopilatum sp. nov.

Figures 22D, 42A–H

Material examined. Holotype, ♂, New South Wales, Scone (32°03'S, 150°52'E), 13 Jan 1967, JCC, on *Wahlenbergia* (QM T13775).

Paratypes (5♂♂). Queensland, 2♂♂, 13 mi (21 km) N Stanthorpe (28°40'S, 151°56'E), 29 Dec 1958, C.D. Michener, on *Wahlenbergia* (SEM).

New South Wales, 1♂, 25 mi (40 km) W Tenterfield (29°03'S, 151°48'E), 25 Jan 1968, TFH, on *Wahlenbergia* (SAM); 2♂, same data as holotype (UQIC).

Other specimens examined (2♀♀). Queensland: Warwick, Oakey.

Diagnosis. Most like *L. aureopilatum* (see **Remarks** below) but differs by characters listed in key (couplet 121). Both sexes black. Female with frons finely striate, mesoscutum dull, closely to densely punctate, dorsal surface of propodeum micro-alveolate, not defined by carinae, mesoventral area with hair branched on anterior surface of hair shaft only. Male with antennae moderately long (FL 1.61 × UID), AS4:AS2+3=0.7, mesoventral area with two apically rounded processes, S2–S4 with rows of erect, apically curved, posteriorly directed, plumose hair, forewings with 2nd r-m weaker than 1st r-m.

Description of female. Body length 4.47–4.62 mm (n=2), head width 1.46–1.48 mm (n=2), forewing length 1.18–1.20 mm (n=2). Relative dimensions: HW 100, HL 81–82, UID 65–66, LID 52–54, AOD 18–19, IAD 12–13, OAD 27–28, IOD 20–21, OOD 19–20, CL 19–20, GW 14–16, EW 27–28, SL 34–35, FL 67–69.

Structure. Head broad, inner orbits converging below, median frontal carina reaches median ocellus eyes with sparse cover of minute setae. Scape reaches at least anterior margin of median ocellus. Clypeus short (CL 0.37 × LID), weakly convex, entire surface shining, openly punctate with shallow, rounded punctures, anterior margin impunctate, supraclypeal area almost flat, weakly raised mesially, sparsely punctate with minute, indistinct punctures. Frons (fig. 42A) finely striate above antennal bases, sculpture continues laterally almost to eyes except weakly punctate along inner orbits, extends vertically to anterior margin of lateral ocelli. Labrum (fig. 42B) basal median area raised, nodulated, nodules forming weak tubercles, anterior margin rounded mesially, distal process not widest at base, distally flanged, median keel extends to distal margin, lateral ridges absent, setae not present across distal margin, distal setae originating submarginally, lateral teeth small, partially hooked distally. Pronotum dorsolaterally rounded, well projected. Mesoscutum (fig. 42C) anterior margin rounded, surface dull with fine reticulate pattern, punctation moderately fine, anteriorly impunctate, mesially and in parapsidal areas closely to densely punctate with small, shallow rounded punctures. Scutellum 1.4 × longer than dorsal surface of propodeum, surface dull, openly to closely punctate. Dorsal surface of propodeum (fig. 42C) not defined by carinae, posterovertical carinae extend less than halfway to dorsal level, dorsal sculpture smooth to micro-alveolate except a few weak striae along