

BEES FROM THE HIGH LANDS OF NEW SOUTH WALES AND VICTORIA.

By TARLTON RAYMENT.

(Plates xxiii. and xxiv.)

For several years small collections of bees have been coming to hand from various localities in the mountainous portions of New South Wales. The Apidae of these high lands have not hitherto received much attention, consequently, it is of interest to receive not only new species, but also forms varying at the higher altitudes from the types. The distribution of some of the species is remarkable, since the *Stenotritus* is identical with one described from Rottnest Island, W.A.

A surprising amount of material has been gathered by John Hardcastle, White Swamp, Macpherson Range. Wilson's Peak, on the borderline of Queensland, rises 4,500 ft. above sea level. He was fortunate enough to discover the nidus, hitherto unknown, of *Meroglossa* and *Allodapula*, and the complete life-histories of these, and several other bees, are awaiting publication.

Another correspondent, Phillip Whiteley, Orange, Western Slopes, made several ascents of Mount Canobolas, which is twelve miles from Orange, and rises to 4,610 ft. He discovered the nidus of *Euryglossimorpha*, hitherto unknown, and the biology of this bee is awaiting publication; the difficulty is finding suitable media to accept such papers.

The other records have been made by either myself or the persons whose names are included in the notes; a number came from the Gosford district, which includes Woy Woy. Although I visited these places several times I was not very successful in collecting owing to the dryness of the season.

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Order HYMENOPTERA.

Suborder HETEROPHAGA.

Division COLLETIFORMES.

Superfamily APOIDAE.

Family HYLAEIDAE.

HYLAEUS ARNOLDI, *sp. nov.*

Female: Length, 10 mm. approx. Black, yellow markings.

Head transverse, oily-bright; face-marks limited to one minute yellow spot at apex of supraclypeal area; frons with a fine carina reaching the median ocellus, closely punctured; clypeus and supraclypeal area finely aciculate, with a few scattered shallow punctures; vertex roundly developed, closely punctured, a few white hairs; compound eyes black, reniform, converging below; genae minutely lineate, with close puncturing; a distinct malar space; labrum black, with a median circular elevation; mandibulae short, stout, obscurely brown; glossa broad and short; antennae with black scapes, flagellum amber beneath.

Prothorax black, more minutely punctured; tubercles large, convex, chrome-yellow, a fringe of white hair, a crescentic dusky mark at apex; mesothorax bright, minutely tessellate, with close coarse puncturing, and

minute appressed white hairs; scutellum and postscutellum chrome-yellow, dull, close punctures; metathorax with a large area having a scale-like sculpture, surrounded by close puncturing, a few pale hairs laterally; abdominal dorsal segments closely punctured, with minute appressed pale hairs, the posterior margins very narrowly polished and impunctate, apex with a little black and white hair; ventral segments similar.

Legs black, the white hair conspicuous only on posterior tibiae; tarsi black; claws bifid, reddish; hind calcar dark-brown, finely spined, like a Cycad leaf; tegulae black, tessellate, a few punctures anteriorly; wings dusky, nervures dark-brown, first recurrent well beyond first intercubitus, second recurrent meeting the second intercubitus; cells: the second cubital large; pterostigma dark-brown; hamuli eight, of medium development.

Male: Length, 8 mm. approx.

Head long, lateral face-marks excavated in a semicircle around insertion of antennae, and again at apex, points of which are away from orbital margin; frons densely and closely punctured, with a fine carina; clypeus and supraclypeal area ivory-yellow, weakly aciculate, indistinct punctures; vertex closely punctured; compound eyes converging strongly below; genae closely punctured; a distinct malar space; labrum blackish, a median elevation; mandibulae short and stout, obscurely brown; glossa acute; antennae with dilated scapes, yellow anteriorly, flagellum long, ferruginous beneath, darker above.

Prothorax, tubercles, mesothorax, scutellum, postscutellum and metathorax as in the female; abdominal dorsal segments somewhat constricted posteriorly; ventral segments simple.

Legs black, except the anterior pair, which have brownish tarsi and a yellow stripe anteriorly; tarsi black, with white hair; hind calcar blackish; hamuli five, very weak.

Locality: Black Sands, Yarra Valley, Victoria (March, 1936, A.d'H.G.).

Type and allotype in the collection of the author.

Allies: *H. aureomaculatus* Ckll., which is larger, with a tiny supra-clypeal mark, and smaller scapes; size of puncturing on abdominal segment I much larger, and a yellow spot on median tibiae. *H. nubilosellus mediotinctus* Ckll., has a minute spot on supraclypeal area (absent on some specimens) and exceedingly fine yellow lateral face-marks.

Species dedicated to Arnold d'Henzil Gosewinckle for his assistance in collecting. Copulating on flowers of *Hakea* ? species.

SPHAERHYLAEUS PROCURVUS, *sp. nov.*

(Plate xxiii.)

Male: Length, 6 mm. approx. Black.

Head slightly longer than wide; face-marks yellow, truncated at apex on a fine transverse line; frons minutely punctured on a tessellated sculpture; clypeus entirely yellow, close fine punctures, a few white hairs; supra-clypeal area black, very long, finely striate; vertex more or less striate, a few punctures and a few white hairs; compound eyes appear emarginate, viewed from the front, they look like a wasp's, being overlapped by huge polished black rims, unique among bees; genae finely striatopunctate; labrum black, oval; glossa excessively short; mandibulae long, acute, bidentate, black at base, amber, and red apically; antennae with huge sub-

circular black scapes, with one margin yellow, second segment dilated, others submoniliform, black above, red beneath.

Prothorax black, a few white hairs, striate; tubercles yellow, with a white fringe; mesothorax dull, minutely striate, densely punctured, from certain angles, the sculpture as shown in the plate; scutellum similar; postscutellum rougher; metathoracic area large, with the peculiar sculpture shown in the plate; abdominal dorsal segments black, sparse punctures among the fine striae, hind margins lighter and depressed, with a small cluster of white hair laterally; ventral segments similar, 3 and 4 each having a pair of low mammiform nodes.

Legs black, apices of tibiae yellow, anterior tibiae ferruginous in front; a few white hairs; basitarsi yellow at apex, other segments dark, hair yellow; claws reddish, anterior and median simple, posterior bifid; hind calcar pallid, finely spined like a Cycad leaf; tegulae dull, piceous, with a yellow spot; wings dusky, radial cell darker, and pointed on the costal margin; nervures: arched basal just short of nervulus, second recurrent meeting the intercubitus; cells: second cubital half the size of the first, and contracted at apex, receiving the first recurrent at one-fifth of its length; pterostigma small, brown; hamuli five, very weak.

Locality: Bogong High Plain (6,000 ft.), Victoria (January, 1928, F. E. Wilson).

Type in the collection of the author.

Allies: *S. globuliferus* Ckll., which is much larger, with teeth on the gaster, but lacks the eye rims.

The remarkable polished processes, on the anterior orbital margins, appear to be developed at the expense of the lower portion of the frons, so that two excavations accommodate the large scapes as Professor Cockerell explained in his description.

When the head is viewed laterally, the thick rims project sufficiently to guard the scapes from injury. The emarginate eyes distinguish many wasps, and the structures here described undoubtedly have an ancestral relationship to the peculiar orbits of the wasps, and provides another stage in the evolutionary scale.

One postulates that similar rims in a PROTOHYMENOPTERON caused a suppression of certain cornules in the compound eyes, the rims have disappeared, but the emarginate shape remains. In this genus of bees the rims remain, because they are small, and sufficiently distant from the cornules to have no effect on the function of the eye.

Though published as a subgenus of *Gnathoprosopis*, the remarkable structures warrant generic rank.

HYLAEUS NUBILOSUS MEDIOSTICTUS Ckll.

Two females, typical in every character. One female lacking the minute supraclypeal yellow dot.

Gladesville, October, 1936 (Ian Dutton).

HYLAEUS GRACILICAUDIS Ckll.

One female, with a minute yellow spot on the postscutellum; punctures of the mesothorax of two sizes. I conclude this is only a race, but it is a new record for the State, the species being described from King George's Sound, W.A.

Gosford, January, 1934 (H. Cambourne).

HYLAEUS ASPERITHORAX (Raym.).

One female, differing from the type by having the flagellum ferruginous beneath, and the pale narrow face-marks very obscure.

Woy Woy, February, 1934 (R. Willey).

HYLAEUS PHILOLEUCUS Ckll.

One female, typical.

Gosford, December 12, 1934 (H. Cambourne).

Two females, larger than the type.

Gunbower, V., February 20, 1934 (Rayment).

New records for both States. Described from Mackay, Queensland.

HYLAEUS RUFICEPS (Sm.).

Several females, not typical, having no black on the frons; antennae entirely bright-fulvous (scapes black in type); no yellow mark near tubercles; yellow obscure on prothorax; black mandibles (fulvous in type); clypeus deeply suffused with black; abdomen bright-red, or obscure red.

Gunbower, Vic., March, 1934 (Rayment).

Described from Adelaide. Taken on flowers of *Callistemon* sp.

HYLAEUS CHRYSOGNATHUS Ckll.

Males and females indistinguishable from Sandringham, Vic., specimens. I have worked out the complete biology of this bee, and it is awaiting publication.

White Swamp, April, 1939 (J. Hardcastle).

Sandringham, Vic., September to April, 1939 (Rayment).

HYLAEUS GOSFORDENSIS, sp. nov.

Male: Length, 9 mm. approx. Black, abdomen purple.

Head long, shining; face-marks yellow, excavated around base of scape, and truncated at an angle of 45°; frons rugoso-punctate, extremely short; clypeus yellow, finely aciculate, scattered punctures, anterior half of margin finely lined with black; supraclypeal area yellow, roughly truncate, at apex almost reaches the median ocellus, with upper half black; vertex rugoso-punctate; compound eyes converging slightly below; genae coarsely punctured, a few white hairs; labrum yellow; mandibulae blackish-blue at base, reddish apically, bidentate; antennae black, submoniliform, flagellum ferruginous beneath.

Prothorax black; tubercles large, yellow; mesothorax dull, with large punctures well spread over a tessellate sculpture; scutellum and post-scutellum with a half-circular yellow mark, punctures not so close; metathorax with an inclosed area formed like a Moorish arch, coarsely rugose at base, and shining; abdominal dorsal segments polished, brilliant bluish-purple, large close puncturing, near the narrowly depressed hind margins the puncturing is denser and finer; hair at apex black; ventral segments similar.

Legs purplish-black, anterior femora and tibiae, and median tibiae yellow in front, a yellow spot on median femora at apex; tarsi blackish; claws dark-red; hind calcar pallid; tegulae rufo-piceous, with a yellow

spot; wings hyaline; nervures black; first recurrent meeting first intercubitus; second cubital cell very long, somewhat contracted on radial; pterostigma blackish; hamuli five, weak.

Locality: Gosford, January, 1934 (H. Cambourne).

Type in the collection of the author.

Allies: *H. chrysognathus* Ckll., which has yellow on mandibles, and a more closely punctured black abdomen and thorax.

HYLAEUS WOYENSIS, sp. nov.

Male: Length, 4 mm. approx. Black.

Head transverse, shining, closely punctured; face-marks creamy, diverging from half-way up the clypeus to end acutely on the orbital margin; frons closely and coarsely punctured; a large polished area, with a conspicuous pit, on each side of the supraclypeal area; clypeus creamy, apex cut off squarely, aciculate, closely punctured; supraclypeal area similar, but black; vertex closely punctured; compound eyes converging below; genae punctato-striate; labrum cream; mandibulae cream, reddish tips; antennae black, an obscure cream stripe on the slightly thickened scapes.

Prothorax hardly visible from above, black; tubercles black, a few whitish hairs; mesothorax coriaceous, but closely punctured; scutellum and postscutellum similar; metathorax with coarser sculpture, and short rugae basally; abdominal dorsal segments black, slightly depressed apically, a few white hairs; ventral segments similar.

Legs black, knees and a stripe on anterior femora creamy; tarsi more or less amber, hind basitarsi cream; claws reddish-amber; hind calcar amber; tegulae black; wings dusky; nervures brown; the recurrents at equal distance inside the intercubiti; second cubital cell like a trapezium; pterostigma large, brown.

Locality: Woy Woy, February, 1933 (R. Willey).

Type in the collection of the author.

Allies: Collected at the same time and place as females of *H. asperithorax* (Raym.), to which it is very close.

EURYGLOSSA MACULATA TUBERCULATA, subsp. nov.

Six females, with dark flagellum and legs, and only median and anterior knees, stripe on anterior tibiae, and tubercles butter-yellow; tegulae piceous, but axillae yellow; nervures and pterostigma dark-amber.

Gosford, December, 1933 (H. Cambourne).

EURYGLOSSA PERDITIFORMIS Ckll.

One female, differing from the type by having a black macula laterally on the second abdominal segment; two triangular black marks on the mesopleura; no supraclypeal mark; postscutellum entirely yellow; scutellum with a large black oblong mark; abdomen with numerous long black coarse hairs on dorsal plates. The numerous black and yellow markings on this bee cannot be accurately described in lucid language. If this specimen be distinct from the species it might have the name *hirsuta*.

Gosford, December, 1933 (H. Cambourne).

EURYGLOSSA LEPTOSPERMI Ckll.

Two females, not quite typical, having more green.
White Swamp, June, 1939 (J. Hardcastle).

EURYGLOSSA BRACHYCERA Ckll.

One female, quite typical.
Wentworth, January, 1934 (T. Clarke).

EURYGLOSSA HALICTOIDES, *sp. nov.*

Female: Length, 6 mm. approx. Green and red.

Head dark prismatic-green; very broad; frons with a scale-like sculpture and large scattered punctures; clypeus and supraclypeal area bright, bronze-green, scattered punctures, delicate sculpture; vertex with two lateral dark marks along foveae; compound eyes with anterior margins parallel; genae green; labrum light-amber; mandibulae yellow, with amber tips; antennae black above, ferruginous beneath.

Prothorax not visible from above; tubercles amber; mesothorax bronze-green, bright, with well-defined sculpture and scattered large shallow punctures; scutellum bluer, but sculpture similar to mesothorax; postscutellum bronze-green; mesothorax similar, but minus punctures; abdominal dorsal segments light-ferruginous, each with a narrow darker suffusion transversely and a black macula laterally; ventral segments with a few white hairs.

Legs ferruginous, with dark coxae and femora; tarsi amber; claws reddish; hind calcar reddish; tegulae amber; wings clear; nervures dark-amber; cells: second cubital receives both recurrents just inside; pterostigma large, reddish-amber; hamuli five, very weak.

Locality: Frankston, Victoria (March 16, 1939, Rayment).

Type in the collection of the author.

Allies: *E. subinconspicua* Raym., is smaller, with dark labrum and antennae. The new species looks just like *Halictus tarltoni* Ckll.

Entering galleries in pure beach-sand a few feet above high-water mark.

EURYGLOSSA CALLIOPSIFORMIS Ckll.

One male, typical in all characters. One female, not typical, the abdomen having a wide yellow band on segments two and three, and the frons a larger quadrate yellow mark. Observed to enter shafts in the ground.

Described from Mackay, Queensland.

Mount Canobolas, February, 1936 (P. Whiteley).

EURYGLOSSA VARIABILIS Perk. var. *A.*

Typical females of the four known forms of this species, and identical with specimens which I collected at Gunbower, Vic. Flagellum black on Gunbower specimens.

White Swamp, January, 1939 (J. Hardcastle).

EURYGLOSSA RUBRICATA Sm.

Three females, quite typical. These, and the two preceding species, were observed digging together in the cultivated red volcanic soil of the garden. Species widely spread.

White Swamp, January, 1939 (J. Hardcastle).

EURYGLOSSA INCONSPICUA Ckll.

A series of males and females having blackish suffusions on legs like specimens from Orange, N.S.W. (Victorian specimens have the legs clear red). The sexes were taken *in cop.* on flowers of *Banksia* sp.

Taronga Park, Sydney, April 29, 1938 (Rayment).

A smaller female, with the head and thorax quite blue, and only tarsi and base of tibia ferruginous; second cubital cell receiving the recurrent nervures well inside.

Orange, N.S.W., December, 1936 (P. Whiteley).

EURYGLOSSA SCHOMBURGKI Ckll.

A female, 10 mm. in length, looking like a large form of *E. sericea*, with darker legs, and deeper-yellow wings.

Dobroyd Point, Sydney, December 14, 1925 (T. G. Campbell).

EURYGLOSSA DEPRESSA Sm.

Two females, indistinguishable from specimens collected by me at Emerald, Vic.

Gosford, January 3, 1935 (Rayment).

EURYGLOSSA SUBSERICEA Ckll.

One female, typical in all characters.

Gosford, January 3, 1935 (H. Cambourne).

EURYGLOSSA EPHIPPIATA PUNCTATA, *subsp. nov.*

Five females, differing from the Adelaide type by darker wing neu-iation; postscutellum black; flagellum bright ferruginous beneath; clypeus with numerous coarse and fine punctures (scattered large ones in species); first recurrent vein received farther in second cubital cell; hind margins of dorsal segments of abdomen depressed.

Gosford, December, 1934 (H. Cambourne).

A series of females from Victoria have light-amber wing nervures; coarsely rugose clypeus. A variable species. One female, quite typical.

Dandenong, Vic., February, 1935 (Rayment).

Two females, typical in every character.

White Swamp, January, 1939 (J. Hardcastle).

EURYGLOSSA RHODOCHLORA SCUTELLATA, *subsp. nov.*

One female, differs from type (Yarrawin, N.S.W.), by scutellum and postscutellum suffused with red; abdomen ferruginous, basal basin of seg. one dark-green; segs. five and six dark-green; no median depression on clypeus; a dense post-occipital fringe of golden hair; flagellum dark-red beneath; wing nervures pale-amber; pterostigma dark brown.

Gunbower, Vic., February, 1934 (Rayment).

EURYGLOSSA DEPRESSA SPARSA Ckll.

One female, quite typical.

Gosford, December, 1934 (H. Cambourne).

EURYGLOSSA NEGLECTULA Ckll.

One female, quite typical.

Gosford, December, 1934 (H. Cambourne).

EURYGLOSSA CAMBOURNII, *sp. nov.*

Female: Length, 8 mm. approx. Black.

Head very wide, shining; broad face-marks yellow, squarely truncate at insertion of scapes; frons tessellate, dull; clypeus yellow, two minute short black lines laterally, bright sparse punctures; supraclypeal area with a wide, more or less oval, yellow mark; vertex sharply developed, a few black hairs; compound eyes with anterior orbital margins parallel; genae with scattered punctures; labrum black; mandibulae black, reddish apically; antennae submoniliform, black, flagellum ferruginous beneath.

Prothorax black, very small; tubercles yellow, large; mesothorax with two large yellow patches on anterior corners, dull, minute linear sculpture, scattered punctures, each with a short black curved spiny hair; scutellum and postscutellum entirely yellow, dull; metathorax with an ill-defined area like a moorish arch, minutely lineate; abdominal dorsal segments dull, obscurely purple, two and three impunctate, others with piliferous punctures, and scattered appressed hairs, apex with black hair, and a small red plate; ventral segments brownish, simple.

Legs black, a few white hairs; tarsi black, hair yellower; claws blackish; hind calcar pallid, with six strong teeth like *Paracolletes*; tegulae black, and dull like mesothorax; wings hyaline; nervures dark-brown, basal strongly arched, short of nervulus; cells: the two cubitals very long, the first longest, the second receiving both recurrents; pterostigma dark-brown; hamuli seven, very weak.

Locality: Gosford, January, 1934 (H. Cambourne).

Type in the collection of the author.

Allies: Not close to any described species, and should perhaps be the type of a new genus.

EURYGLOSSINA CHALCOSOMA CLARISTIGMA Raym.

Three females, which do not differ in any character from the subspecies which was described from Port Phillip, searching the earth in the vicinity of "nests" of *Euryglossimorpha nigra* (Sm.).

Mount Canobolas, January, 1936 (P. Whiteley).

EURYGLOSSIMORPHA NIGRA (Sm.).

A series of typical males and females, many of the latter stylized. I have worked out the complete biology, and it is awaiting publication.

Mount Canobolas, February, 1936 (P. Whiteley).

Sydney, Clifton Gardens, October, 1937 (Rayment).

EUPROSOPIS ELEGANS (Sm.).

One male, smaller than usual, but otherwise typical.
Gosford, January, 1934 (H. Cambourne).

GNATHOPROSOPIS AMICULINA (Sm.).

Several females, typical in all characters.
Gosford, February, 1934 (H. Cambourne).

BINGHAMIELLA ANTIPODES (Sm.).

One female, with a very much longer, narrower and more pointed body, brighter red in colour. This may not be conspecific with Victorian specimens.

Woy Woy, February, 1934 (R. Willey).

Gosford (very dark wings) (H. Cambourne).

PACHYPROSOPIS OBESA Ckll.

Eight males, not quite typical, being clear-red on abdomen, and much larger (blackish bands in type).

Gosford, February, 1935 (H. Cambourne).

PACHYPROSOPIS ANGOPHORAE Ckll.

One male, quite typical.

Gosford, February, 1935 (H. Cambourne).

PACHYPROSOPIS ALBONITENS Ckll.

Several males and females linking up with *disjuncta*. These are a larger mountain race, the males having light flagellum and yellow scape, and hind legs blacker; the female having lighter antennae, a black finely aciculate clypeus; nervures of wings blacker; median tibiae having no yellow spot; tegulae black.

White Swamp, June, 1939 (J. Hardcastle).

MEROGLOSSA DESPONSA Smith.

There is a group of rather large—10 millimetres or so—black, shining bees with chrome-yellow markings, but very little body hair. The yellow is very conspicuous, that on the "face" being shaped like a long diamond; the collar having a line; tubercles, and on some a large lunate mark behind them; and a large yellow mark on the scutellum and postscutellum; the wings are slightly dusky.

The face-marks vary somewhat, and the metathoracic area may be polished or rough, but I have determined that the species *desponsa* is a variable one, and that the several forms are best treated as subspecies, though it may be found later that those with the rough metathoracic area should have specific rank.

I have specimens of the species and its several forms from widely separated districts, from north of Brisbane down through New South Wales to the Grampian hills in Victoria. Clarence Borch collected one subspecies at the last-named locality, on the 1st November, 1928. John Hardcastle found a new species with its nest, at The White Swamp, on the Queensland-New South Wales border, on the 8th March, 1939. I myself took a subspecies at Clifton Gardens, Sydney Harbour, on 3rd September, 1937, and these dates suggest differences in the biology of the bees. However, the several bees may be separated by the following key.

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|--|-----------------------|
| Metathoracic area polished | 1. |
| Metathoracic area rough | 5. |
| 1. Lunate spot apicad of tubercles | <i>desponsa</i> Sm. |
| 2. Lateral spots on scutellum | <i>kershawi</i> Ckll. |

3. Metathoracic area with weak rugae *punctata* Raym.
4. Larger, 13 mm. seg. one of abdomen with fine punctures
 *sydneyana* Raym.
5. Seg. one of abdomen with finer punctures *borchi* Raym.
6. Seg. one of abdomen with coarse punctures *hardcastlii* Raym.

MEROGLOSSA IMPRESSIFRONS TUBERCULATA, *subsp. nov.*

Male: Length, 10 mm. approx. Black and yellow.

Head coarsely punctured, shining; face-marks like two long slender yellow clubs on the orbital margins; frons deeply impressed, with a fine carina reaching the median ocellus, and a delicate sculpture which runs out in the deep polished channels at each side of the clypeus; supraclypeal area with a yellow triangle; clypeus with a yellow mark like a short thick anchor; vertex with two short bent foveae reaching the lateral ocelli; compound eyes reniform; genae coarsely punctured; labrum a small oval; glossa short and acute; mandibulae black; scapes dilated, flagellum ferruginous beneath.

Prothorax with yellow line interrupted in middle; tubercles yellow, with a fringe of white hair; mesothorax coarsely punctured; scutellum with a large yellow mark; black dots appear at bases of black hairs; postscutellum has a yellow oval not spotted, white hair; mesothorax polished, bigibbous; abdominal dorsal segments coarsely punctured, those on seg. one finer; ventral segments each with a pair of low tubercles.

Legs with sparse white hair; tarsi somewhat piceous; claws reddish; hind calcar finely serrated, blackish; tegulae black, with a yellow spot anteriorly; wings slightly dusky; nervures dark-brown, both recurrents received just inside the large second cubital cell; pterostigma blackish; hamuli nine.

Locality: Clifton Gardens, Sydney, September, 1937 (Rayment).

Type in the collection of the author.

Allies: The species lacks the tuberculate sternites, and has reddish anterior tibiae; *M. canaliculata* Sm. has yellow on the scapes.

On flowers of *Banksia* sp.

MEROGLOSSA TRIANGULATA, *sp. nov.*

Male: Length 12 mm. approx. Black.

Head with facial quadrangle longer than wide; frons with a few pale hairs; a deep wide channel at sides of "face"; clypeus finely aciculate, the sparse puncturing in rows, a broad cream band expanded at apex; supraclypeal area with a very small cream isoscles triangle; a fine creamy line, thicker above, bordering the orbital margins; vertex coarsely punctured; compound eyes converging slightly below; genae with a few white hairs; labrum black; mandibles black; scapes black, dilated, flagellum black above, creamy below.

Prothorax with two creamy marks laterally; tubercles creamy, with a large cream macula posteriorly; mesothorax shining, with large scattered punctures; scutellum and postscutellum of similar sculpture, the first bearing a cream equilateral triangle, and a cream spot at lateral corners; the second with a minute cream spot; metathorax so deeply impressed in middle as to form two conspicuous nodes; abdominal dorsal segments bright, with a delicate tessellation and scattered large punctures, apex with some black

hair; ventral segments with a few pale hairs, two small nodes on three and four.

Legs and tarsi black, slender, a few white hairs; claws reddish; hind calcar blackish; tegulae black, a few punctures and a cream spot; wings subhyaline; nervures blackish-brown; the second cubital cell extremely long, receiving the recurrents at equal distance from ends; pterostigma narrow and black; hamuli twelve, strongly developed.

Locality: Inverell, November, 1935 (P. Stephens).

Type in the collection of the author.

Allies: *M. desponsa* Sm., which has a large circular yellow macula on scutella, but no facial channels, and metathorax not developed to nodes.

MEROGLOSSA HARDCASTLEI, *sp. nov.* Text figure I.

Male: length, 11 mm. approx. Black, yellow markings.

Head wide; face-marks creamy-coloured and, with supraclypeal mark, extending up as three subtriangular lobes; large frons with a conspicuous fine carina separating two deep depressions—resembling in outline two kidneys placed together—which evidently accommodate the dilated scapes; clypeus entirely cream-coloured; supraclypeal area cream-coloured, and not separated structurally from the clypeus; compound eyes with peg-hairs between the facets; genae microscopically lineolate, with scattered punctures; labrum cream-coloured; mandibulae black, with a yellow stripe; scapes dilated, black, anterior surface yellow; flagellum black, brown beneath.

Prothorax with a minute median yellow spot; tubercles yellow; mesothorax minutely tessellate, with numerous coarse punctures, each with a short black hair; scutellum with a wide yellow band, white hair; post-scutellum with a thick yellow crescent; metathorax with a large inclosed area finely tessellate, outside of this evenly punctured, some white hair laterally; abdominal dorsal segments closely punctured, coarsely and minutely, black hair at apex; ventral segments coarsely punctured, black hair.

Legs black, white hair, median tibia and anterior femur and tibia with a wide yellow stripe; tarsal hair slightly yellowish; claws reddish, large; hind calcar black, finely serrated; tegulae shining black, tessellate, coarsely punctured basally; wings dusky; nervures blackish-brown, the wide second cubital cell receiving both recurrent nervures equally inside; pterostigma black, large; hamuli seven, strongly developed.

Female: Length, 12 mm. approx. Black, yellow markings.

Head wide; face-mark a large long diamond-shaped yellow mark; frons closely and coarsely punctured, except in centre, where it is microscopically lineolate; clypeus finely aciculate, with large shallow punctures; supraclypeal area prominent, but carina not so sharp as in male; vertex coarsely punctured, black hair, foveae incurving to ocelli as in male; compound eyes long; genae finely lineolate, with even puncturing; labrum black, with a prominent oval protuberance; malar space large, finely aciculate as in male; mandibulae black; antennae black, brownish beneath.

Prothorax thickened, black; tubercles yellow; mesothorax as in male; pleura with even punctures of two sizes; scutellum and postscutellum with yellow marks as in male; metathorax as in male, with white hair; abdominal dorsal segments with hind margins depressed; ventral segments as in male.

Legs, anterior with a curled white pollen-sweeper; tarsi black; claws reddish; hind calcar black, finely serrated; tegulae as in male; wings with costal edge darker; nervures black; second cubital cell very long; pterostigma large, black; hamuli seven.

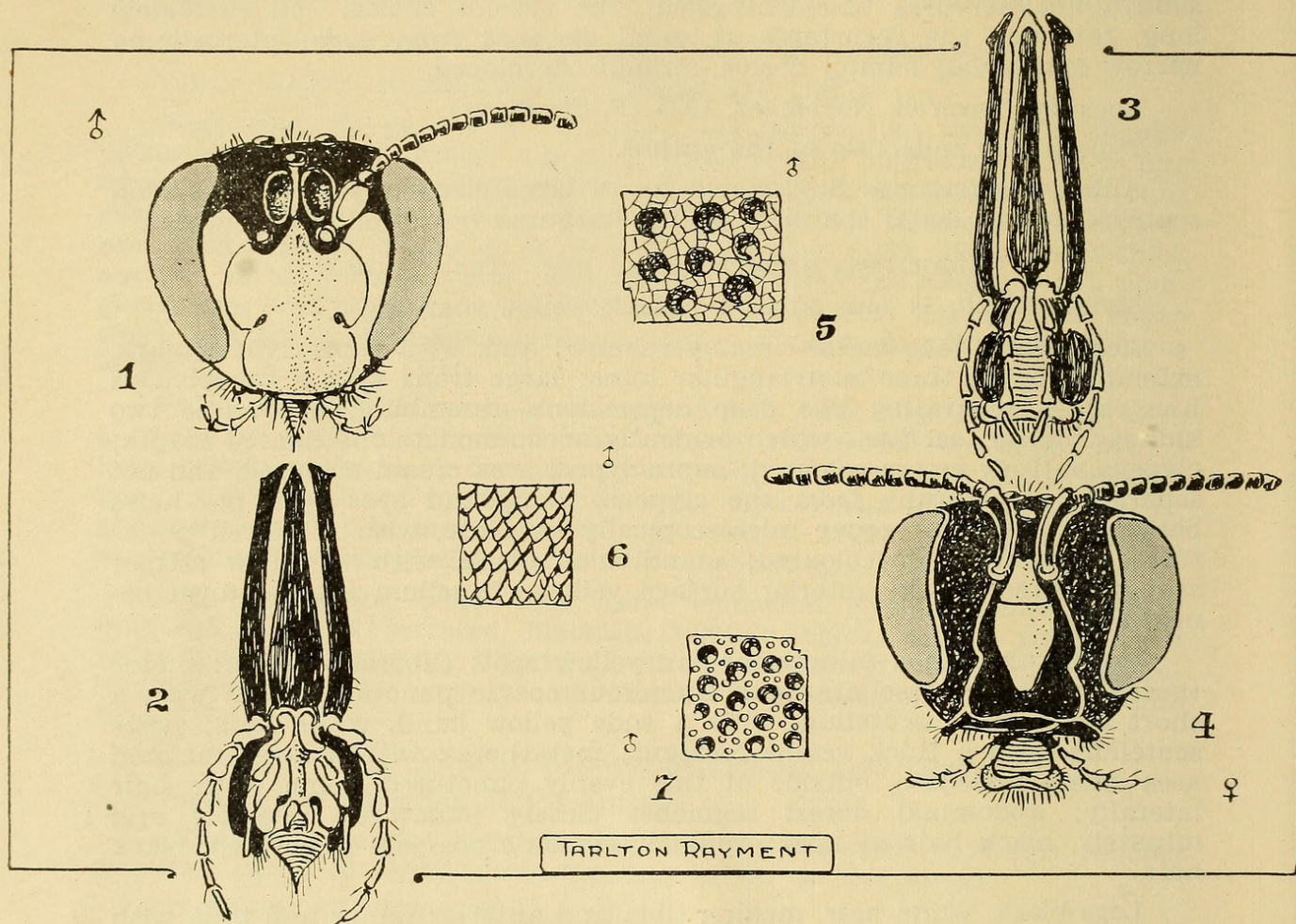


Fig. 1. *Meroglossa hardcastlei* Rayment. 1 and 2: Head capsule and mouth-parts of male. 3 and 4: Same, of female. 5: Sculpture of mesothorax. 6: Of metathoracic area. 7: Of first abdominal segment.

Locality: White Swamp, Macpherson Range (J. Hardcastle, Junr.).

Type and allotype in the collection of the author.

Allies: *M. desponsa* (Smith). Reared from cells in twig of *Tristania conferta*. The complete biology is awaiting publication. These bees gather pollen from Tallow-wood, *Eucalyptus microcorys*.

Division COLLETIFORMES.

Family COLLETIDAE.

Subfamily DIPHAGLOSSINAE.

EURYGLOSSIDIA ACACIAE, *sp. nov.*

Professor T. D. A. Cockerell, to whom I submitted specimens of the red bees, writes:—"They are not *E. rectangulata*; comparing your female with a cotype, yours is larger, with redder wings, and a much darker abdomen, so that it has quite a different aspect".

Compared with *E. purpurascens*, the new bees do not have the dark-purplish colours at the base of the abdomen, being clear-red; the second cubital cell not so long; the first recurrent nervure not so far from base of the second cubital cell; tarsi and knees red; flagellum redder beneath; the clypeus without a longitudinal ridge, and the shining face of the supra-clypeal area not concave. The clypeus of typical *purpurascens* is flattened on the disc, with an obtuse ridge.

"Comparing the male with a cotype of *E. rectangulata*, yours has the disc of tergite 5 black, with blue reflections (which is not at all true of *rectangulata*), and yours also has darker nervures.

Considering the difference of locality, I should expect your bee to be new."

Locality: Emerald, Victoria, September, 1936 (Rayment).

Type and allotype in the collection of the author.

Taken on flowers of *Acacia verticillata*, where the sexes appeared to be copulating.

TRICHOCOLLETES VENUSTUS (Sm.).

A series of males and females quite typical. One male appeared as early as July 31, 1938.

White Swamp, December, 1938 (J. Hardcastle).

On flowers of Scaly Bitter-pea, *Daviesia squarrosa*. The bees in the several States are very faithful to the genus *Daviesia*, but the males hover over *Hardenbergia monophylla*.

HETEROCOLLETES CAPILLATUS Raym.

One typical male. The genus and species was described from Victoria. Male from Wilson's Promontory, and female from Emerald, Vic. New record for State.

Mount Canobolas, February, 1936 (P. Whiteley).

PARACOLLETES PROVIDELLUS BACCHALIS Ckll.

A large series of typical males, indistinguishable from specimens taken by me at Croydon and Emerald, Vic.

Mount Canobolas, February, 1936 (P. Whiteley).

Gladesville (with smaller second cubital cell) October, 1936 (Ian Dutton).

PARACOLLETES PLEBIUS Ckll.

Female, typical in every character, and indistinguishable from specimens taken by me at Scoresby, Vic.

Mount Canobolas, February, 1936 (P. Whiteley).

PARACOLLETES IRRORATUS (Sm.).

One male, differing from Emerald specimens by the bright-ferruginous underneath of flagellum; rougher disc of mesothorax, and scanty hair of the "face". Probably only a mountain form.

Taken on flowers of *Lomatia* sp.

White Swamp, June, 1939 (J. Hardcastle).

PARACOLLETES FIMBRIATUS Ckll.

A series of robust females, taken as they were about to enter shafts in fine red volcanic soil of a cultivated area. Hair of these bees paler than that of type.

White Swamp, June, 1939 (J. Hardcastle).

PARACOLLETES MELBOURNENSIS Ckll.

Female, plainly between this and *cupreus*, having blackish tegulae and legs, with golden hair at apex of abdomen. Clypeus all metallic blackish. Approaches *P. chalcurus* Ckll.

Gosford, January (H. Cambourne).

PARACOLLETES MORETONIANUS Ckll.

First record for State. Described from Queensland.

Woy Woy, February, 1934 (R. Willey).

STENOTRITUS SUBMACRODONTUS (Raym.).

Two females, which are indistinguishable from one collected on Rottnest Is., W.A. A study of the females shows that they are not *Paracolletes*, in which I had placed the male from Rottnest Is. To my very great surprise, I find that the females are definitely in the genus *Stenotritus*, and a description of the allotype is appended. This record shows a remarkable distribution of the species.

STENOTRITUS SUBMACRODONTUS (Raym.).

Female: Length, 15 mm. approx. Black, green abdomen.

Head small, but broad; face with much pale-ochreous hair; frons coarsely and densely punctured; clypeus ridged, with close very coarse punctures, each with a long, fine, pale hair; supraclypeal area rising to a fine high carina that reaches and encircles the median ocellus; vertex with close huge punctures and many minute ones; compound eyes with anterior margins parallel; genae with long white hair; labrum black, polished, large; mandibulae black, reddish apically, with three large teeth; antennae black, scapes closely punctured, flagellum ferruginous beneath.

Prothorax not visible from above; tubercles black, hidden under the dense pale-ochreous hair of the pleura; mesothorax polished, scattered large punctures and a thick fleece of long pale-ochreous plumose hair; scutellum large, bigibbous, sculpture and hair like mesothorax; postscutellum with a great mammiform elevation coarsely punctured, long white hair; metathorax with a very large polished area bounded by a beaded line, long pale hair; abdominal dorsal segments silky-bright, darkest-green, hind margins with a reddish tint, punctures large and even; apex with a large naked plate, and much black hair; ventral segments each with a scopa of long curled white hair.

Legs black, strong and heavy, with white hair, scopa on exterior of hind tibiae black, but white on inner surface; hind tarsi with a thick black scopa; apical segment reddish; claws reddish; hind calcar reddish, finely spined; tegulae piceous, polished; wings dusky; nervures blackish and heavy; cells: the large second-cubital with parallel sides; pterostigma obsolete; hamuli seventeen, very strongly developed.

Locality: White Swamp, December, 1938 (J. Hardcastle).

Allotype in the collection of the author.

Family ANDRENIDAE.

Subfamily NOMIINAE.

NOMIA FERRICAUDA Ckll.

Three females, showing some variation from the type, and having the third abdominal band of white hair; the tegument of the fourth segment red on apical half; no white hair on base of third, but all have white hair on postscutellum. New record for State.

Gosford, December 12, 1932 (H. Cambourne).

White Swamp, June 6, 1939 (J. Hardcastle).

NOMIA FLAVOVIRIDIS Ckll.

Numerous specimens, all variable, from several localities.

Cooktown, Babinda and Mackay, Queensland (Rayment).

Tamworth, N.S.W. (Rayment).

Balwyn Park, Gunbower, Eltham, Bayswater, Croydon, Horsham and Broadmeadows, Victoria (Rayment).

Perth, W. Australia (L. Glauert).

NOMIA DENTIVENTRIS Sm.

One male, of typical form.

Gosford, December 15, 1932 (H. Cambourne).

NOMIA MOERENS ULONGENSIS Ckll.

One typical female.

Dorrigo (W. Heron).

NOMIA NANA Sm.

A large series of males, taken from a cluster which had assembled on a twig at evening. All were of typical structure, though they varied greatly in size.

Inverell, November, 1935 (P. Stephens).

White Swamp, February, 1939 (J. Hardcastle).

NOMIA AUSTRALICA NUDA, *subsp. nov.*

Two females. Head smaller; "face" devoid of hair on anterior half; longer scape red beneath; puncturing of mesothorax closer and larger; metallic tints of abdomen and hair-bands very dull; portion of flagellum red.

Inverell, November, 1935 (P. Stephens).

Taken while collecting pollen and honey from *Carduus* sp.

Several other females, distinguishable by the sculpture of the first abdominal segment. The tergum is depressed, and the hind margin, which is black, is depressed again, so that there are three areas, each of which is punctured differently, that of the black margin being scattered (it is dense in *reginae* Ckll.); the clypeus is suffused with reddish, the anterior part being impunctate; the second cubital cell is much longer.

Locality: Inverell, November, 1935 (G. Phillips).

Allies: *N. australica reginae* has the same sculpture on the metathorax, but specimens from Meningie, S.A. (H. Minchin), have very dusky wings, those of the new subspecies not so dark.

Family HALICTIDAE.

HALICTUS LANARIUS Sm.

One female, apparently of the February brood, which has females of a different form, and are analgous to those of *Halictus emeraldensis* Raym. This female is indistinguishable from specimens taken from shafts at Emerald and Sandringham, Victoria, by me.

White Swamp (J. Hardcastle).

On flowers of *Senecio orarius*.

Canowindra, N.S.W., December 6, 1931 (Rayment).

HALICTUS TERTIUS Dal. Tor.

One female, differs from type by reddish tints all over the abdomen, and entirely black antennae. (The scape is red in *H. rufipes* Sm.). Described from Melbourne, Vic. This mountain form has no hair-bands on abdomen.

White Swamp, June 10, 1939 (J. Hardcastle).

HALICTUS SANGUINIPES Ckll.

One male, indistinguishable from specimens collected at Emerald and Melbourne, Vic.

White Swamp, June 3, 1939 (J. Hardcastle).

HALICTUS HUMILIS Ckll.

The several specimens of both sexes are typical.

Mount Canobolas, February 10, 1936 (P. Whiteley).

HALICTUS URBANUS Sm.

There are several races of this species. Sydney specimens are larger, with other differences. Champion Bay, W.A., bees having three teeth on the hind calcar; N.W. Australian specimens of *H. urbanus bandinensis* Ckll. have only two teeth. Woy Woy, N.S.W., specimens are typical. A female to hand from Gladesville measures 6 mm. in length, is very robust, and has five teeth on the hind calcar. Woy Woy, specimens (R. Willey).

Gladesville, near Sydney, October 8, 1936 (Ian Dutton).

On flowers of garden poppies.

HALICTUS DEMISSUS Ckll.

Males and females, indistinguishable from Sandringham, Vic., specimens collected on the foreshore, and others taken at Sydney by myself.

Gladesville, October 8, 1936 (Ian Dutton).

HALICTUS EBORACENSIS Ckll.

Mem. Queensl. Mus., vi., p. 117, 1918.

Male: Length, 9 mm. approx. Black.

I.—Further study of the biology of halictine bees reveals two kinds of females in certain species, those of the "bisexual broods" differing from the parthenogenetic generations.

(See the author's paper on the biology of *Halictus emeraldensis* Raym. Arbeiten über physiologische, und angewandte Entomologie aus Berlin, December, 1936, and March, 1937.)

Head transverse; face not so hairy as *seductus*, and frons rougher; clypeus with a similar yellow mark pointed in the middle; supraclypeal area shining; vertex rugose; compound eyes converging slightly below; genae with a few white hairs (dense in *seductus*); labrum black; mandibulae black, long, submoniliform, flagella obscurely brighter beneath.

Prothorax not visible from above; tubercles black, with heavy fringe of white hair; mesothorax coarsely rugose laterally, but more shining on disc; scutellum with a median sulcus, smaller punctures dense about margin; postscutellum has silver hair (drab in *seductus*); metathoracic area pointed posteriorly, with a few large radiating rugae; abdominal dorsal segments polished, but showing a delicate lineation and scattered minute punctures, scattered suberect pale hairs on apical half, and inconspicuous white patch laterally on segments two and three; ventral segments with much white hair.

Legs black, white hair; tarsi obscurely lighter at apex; claws reddish; hind calcar yellowish-amber; tegulae polished posteriorly, tessellate anteriorly; wings slightly yellowish; nervures amber; cells: the second cubital receives the first recurrent farther in than *seductus*; pterostigma brown; hamuli eight, weak.

Locality: Gunbower, Victoria, February 2, 1933 (Rayment). Also Sandringham (Rayment).

Allotype in the collection of the author.

Allies: *H. lanarius* Sm. has larger and closer puncturing on abdominal segments one and two; *H. repraesentans* Sm. has puncturing of two sizes on tergites; *H. seductus* Ckll. is smaller, but exceedingly close; the females are easier to distinguish. Refer to key. Described from Ebor, N.S.W.

Both sexes on *Callistemon* flowers at Gunbower; on *Leucopogon* at Sandringham.

The following key will assist students to separate six males which are exceedingly closely related, and all have a yellow mark of similar form on the clypeus, but the puncturing of the abdominal basal segments is decisive:—

- | | |
|--|------------------------------|
| Small, vertex finely rugose | 1. |
| Much smaller, metathorax finely reticulate | 6. |
| 1. Segments smooth, scattered minute punctures | <i>H. seductus</i> Ckll. |
| Larger, vertex coarsely rugose | 2. |
| 2. Segments smooth, minute punctures closer | <i>H. eboracensis</i> Ckll. |
| Metathorax with a few coarse radiating rugae | 3. |
| 3. Segments with puncturing of two sizes | <i>H. repraesentans</i> Sm. |
| Metathorax with a fine reticulation | 4. |
| 4. Segments with close puncturing of medium size | <i>H. lanarius</i> Sm. |
| Transverse striae behind ocelli, vertex smooth laterally | 5. |
| 5. Segments polished, scattered large punctures | <i>H. instabilis</i> Ckll. |
| 6. Segments dull, extremely close fine punctures | <i>H. asperithorax</i> Ckll. |

HALICTUS ODYNEROIDES, sp. nov.

Female: Length, 8 mm. approx. Black, golden-orange spots.

Head circular from front; face with scattered golden hairs; frons so closely punctured as to appear rugulose; clypeus convex, polished, a few

large shallow punctures, ferruginous on apical half, a few long fine golden hairs; supraclypeal area prominent, polished, scattered large punctures; vertex with smaller scattered punctures; compound eyes claret-colour, reniform; genae prominent, anteriorly with a covering of long golden hair; labrum reddish; mandibulae bidentate, red, with a black margin; antennae submoniliform, bright red, scapes very long and slender.

Prothorax hidden in middle by mesothorax, but on each of the swollen corners, a large isosceles triangle of brilliant golden-orange moss-like hair; tubercles black, a heavy fringe of pale-golden hair, and apical a pale crescent; mesothorax dull, close small puncturing, with scattered large punctures, parapsidal grooves distinct, two large golden-orange hair-spots near scutellum; scutellum of similar sculpture; postscutellum covered with the golden-orange moss-like hair; metathorax with a large lunate area covered with a fine scale-like sculpture; abdominal dorsal segments claviform, one two and three black, dull, owing to the excessively close fine punctures, four, five and six orange-red integument with hair of brighter colour, two with basal band of golden-orange mossy hair; ventral segments black, with red margins, except six, which is entirely red, each with a scopa of long curled white hair.

Legs ferruginous, with some black on coxae and femora, long white hair with some stiff black on median and hind tibiae; tarsi reddish; claws reddish; hind calcar finely spined, reddish; tegulae fulvus; wings dusky, costal half extremely dark, especially the radial cell, so that the pterostigma and cell are almost indistinguishable; nervures: first recurrent meeting the second intercubitus; cells: the small second cubital almost quadrate; pterostigma large, translucent, with a dark outline; hamuli eleven, strongly developed.

Locality: White Swamp, Macpherson Range, May, 1939 (J. Hardcastle).

Type in the collection of the author.

Allies: Clearly in the *bicingulatus* group. A beautiful bee which, owing to the brilliant golden-orange hair-spots, superficially resembles an Odynerid wasp. Closest to *H. peraustralis* Ckll., which has yellowish orange hair on postscutellum.

On flowers of *Lomatia* sp.

HALICTUS GUNBOWERENSIS, sp. nov.

Female: Length, 6 mm. Green and red.

Head wide, scattered white hair; frons finely striato-punctate, iridescent bronze-green; clypeus dark-green, anterior half ferruginous; supraclypeal area light bronze-green, very shining; vertex with striae at right-angles; compound eyes reniform, claret-brown; genae with short white hair; labrum large and ferruginous; mandibulae yellow, with dark-red tips; antennae light-ferruginous (scapes black in a closely related female with dark-green scutellum).

Prothorax not visible from above; tubercles black; mesothorax brilliantly shining, light metallic-green, numerous fine punctures, and a few short white hairs; scutellum similar, punctures smaller; postscutellum darker, and rough; metathorax dark-green, a large lunate area with coarse anastomosing rugae, angles of truncation developed to a sharp point; abdominal dorsal segments orange-red, one with a large basal patch of bronze-green, finely punctured, a few scattered white hairs.

Legs clear light-red, long white hair, coxae blackish; tarsi reddish-amber; claws similar in colour; hind calcar reddish-amber, bent, with one large tooth and a wavy edge beyond; tegulae palest-amber; wings hyaline, iridescent; nervures palest-amber, outer recurrent and intercubitus weakened; cells: second cubital contracted at apex, third cubital quadrate; pterostigma palest-amber; hamuli six, weak.

Locality: Gunbower Is., Vic., March 3, 1933 (Rayment).

Type and allotype in the collection of the author.

Allies: *H. erythrurus* Ckll., which has a black patch on base of darker abdomen. The smaller females with the black scape are clearly linking forms.

HALICTUS ERYTHRURUS APPOSITUS, subsp. nov.

A female, from Hardcastle, with bright-red abdomen, and light-green thorax, provides a beautiful and unmistakable link with this species, and *H. gunbowerensis*, which is itself a link with *H. raymenti* Ckll. A Gunbower female, with black scapes, is exceedingly close to *erythrurus* and subsp. *appositus*. The specimens are extremely interesting, since they provide excellent examples of evolutionary gradations that are seldom available for study. The mountain form is very close to *H. gunbowerensis*, sp. nov., a description of which is appended.

HALICTUS ERYTHRURUS Ckll.

Several females, typical in all characters.

White Swamp, February, 1939 (J. Hardcastle), on flowers of *Senecio orarius*.

HALICTUS WHITELEYI, sp. nov.

Female: Length, 6 mm. approx. Green, orange abdomen.

Head transverse, olive-green, shining; frons finely striate, punctures inconspicuous, scattered white hair; clypeus black on anterior half, with prismatic hues dividing it from the green posterior, polished, with scattered punctures of medium size; supraclypeal area shining, a few large punctures, and rising to a fine carina that reaches the median ocellus; vertex with transverse striae posteriorly; compound eyes claret-brown, reniform; genae with short white hair; labrum dark-red; mandibles blackish-amber basally, dark-red apically; antennae black, flagellum ferruginous beneath.

Prothorax black, a few white hairs laterally; mesothorax polished olive-green, anteriorly the green has a bronze lustre, and an iridescent line separates the two shades, anteriorly there is a lineolate sculpture; the scattered punctures are of two sizes, and there are a few white hairs which are more dense along the scutellar margin; scutellum similar; postscutellum green, darker and rougher; mesothorax shining green, with a wide crescentic area densely covered with fine anastomosing rugose, and angles of truncation developed to triangular points; abdominal dorsal segments clear orange, the fine punctures most conspicuous on basal one, a few pale hairs, and a microscopic white fringe on hind margin of each; dorsal segments with a scopa of curled white hair.

Legs black, all tibiae and femora apically clear ferruginous, a blackish suffusion on hind tibiae; tarsi ferruginous; scattered white hair on legs; claws dark-red; hind calcar amber, with one large rounded tooth; tegulae palest-amber, almost pellucid; wings hyaline, iridescent; first recurrent

nervure entering the second cubital cell at apical corner; small second cubital somewhat contracted at apex; pterostigma pale-amber, long; hamuli six, extremely weak.

Locality: Mount Canobolas (4,500 ft.), January, 1936 (P. Whiteley).

Type in the collection of the author.

Allies: *H. codenticalis* Raym., which has the much smaller area on metathorax with fewer rugae, and scapes ferruginous beneath.

I collected a closely allied species at Gunbower, Victoria, in February, 1934. This is easily distinguished by the darker abdomen, which is very similar to that of *H. erythrurus* Ckll., but the basal dark patch is olive-green, instead of black. This bee is between *H. greavesi* Raym. and *H. whiteleyi* Raym., and has ferruginous scapes.

Our increasing knowledge of the chromosomes makes it easier to appreciate the relationships of such forms, and clarifies our concept of what a species really is, and how it has been evolved. Therefore, it may yet be proved that the Gunbower specimens arose as a mutation of any one of four bees, *H. whiteleyi* Raym., *H. greavesi* Raym., *H. codenticalis* Raym., or even *H. erythrurus* Ckll. The exact relationship can be determined only by an investigation of the chromosomes of each, and this group would undoubtedly provide excellent material for such a research but, for the time being, I can do no better than describe it as a new species.

HALICTUS SPHECODOIDES Sm.

One female, not quite typical, abdomen clear red at base and apex, and blackish between.

Gladesville, October 8, 1936 (Ian Dutton).

HALICTUS OXLEYI Ckll.

Six females, that agree with the described male, and these are close to *H. frenchi* Raym., described from Adelaide.

Gosford, December 15, 1932 (H. Cambourne).

HALICTUS CAMBAGEI Ckll.

Not quite typical, the small second cubital cell greatly contracted at apex.

Albury, January 6, 1929 (F. E. Wilson).

HALICTUS PARACOLLETINUS Ckll.

Male, not typical, having no dusky tints on tibiae. Described from Cairns.

Woy Woy, N.S.W., February, 1934 (R. Willey).

HALICTUS TASMANIAE Ckll.

One female, not quite typical.

Sydney, September, 1937 (Rayment).

PARASPHECODES FROGGATTI Ckll.

A series of males having only segments five and six blackened dorsally. Gosford, January, 1935 (H. Cambourne).

PARASPHECODES SEXTUS Ckll.

One male, so exceedingly close that I do not separate it.
White Swamp, May, 1939 (J. Hardcastle).

PARASPHECODES VULNERATUS Ckll.

One female, exceedingly close, perhaps a mountain race.
White Swamp, June, 1939 (J. Hardcastle).

PARASPHECODES CIRRIFERUS Ckll.

One female, typical in every character.
White Swamp, June, 1939 (J. Hardcastle).

PARASPHECODES NOACHINUS Ckll.

Females, indistinguishable from Grampians, Vic., specimens, and typical in every character.

Males (allotype) with description attached.

White Swamp, March, 1939 (J. Hardcastle).

Typical females in every character (topotypes).

Kiata, Vic., October, 1928 (C. Borch).

Grampians, October, 1928 (E. Wilson).

PARASPHECODES NOACHINUS Ckll.

Ann. Mag. Nat. Hist. (8), xiii., 1914.

Male: Length, 10 mm. approx. Black.

Head wider than long; face covered with sparse white hair; frons closely and coarsely punctured; clypeus convex, scattered punctures, a wide yellow mark with a median pointed extension upward; supraclypeal area with closer punctures; vertex rugose; compound eyes reniform; genae with sparse white hair; labrum and mandibulae black; antennal scapes short, flagellum long, black.

Prothoracic corners with dense white hair; tubercles black, with a dense fringe of white hair; mesothorax shining, with close coarse punctures, a few white hairs; scutellum shining, punctures much smaller; post-scutellum rough; metathoracic area with a sharp rim inclosing a number of large longitudinal rugae, outside of area posteriorly are numerous punctures, and a few white hairs; abdominal dorsal segments one, two and three with even large puncturing; ventral segments with scattered white hair, the second sternum having a mammiform elevation like the female.

Legs black, sparse white hair; tarsi black, hair slightly yellow; claws reddish; hind calcar blackish; tegulae polished black; wings dusky; nervures blackish-brown; cells: second cubital contracted at apex, third almost quadrate; pterostigma dark-brown; hamuli thirteen, strong.

Locality: White Swamp, March, 1939 (J. Hardcastle).

Allotype in the collection of the author.

Family MELECTIDAE.

CROCISA OMISSA var. A. Ckll.

A male and a female, with extremely dark wings.

Woy Woy, N.S.W., December, 1935 (R. Willey).

A female, with even darker wings.

Cooma, March 28, 1918 (C. E. Cole).

Clovelly, March, 1934 (P. Whiteley).

CROCISA QUADRIMACULATA Rads.

Two females, typical. New record for State.

White Swamp, March, 1939 (J. Hardcastle).

Family MEGACHILIDAE.

MEGACHILE SERRICAUDA Ckll.

A series of males with pale ochreous—not fulvus, as in type—hair of thoracic disc not abundant. One female, taken at same time and place is probably the other sex. One male lacks the emargination at apex of abdomen.

Sydney, January, 1930 (P. Whiteley).

MEGACHILE DEANII Raym.

A female, not quite typical, since it lacks the fulvus scales about the antennae.

Observed to gather refined wax from domestic bee-hives, and to carry the wax pellet between the front legs and "chin", grasped by the mandibles.

Described from Mount Tambourine, Queensland.

For biology of this species, see "A Cluster of Bees".

White Swamp, June, 1933 (J. Hardcastle).

MEGACHILE CHRYSOPYGA Ckll. syn. *M. MACULARIFORMIS* Ckll.

Females, not quite typical, having black legs, scopa reddish, but it may be stained with pollen-oil. Typical leafy "nests" of three cells each, constructed in cracks of "flaggy" rock. Gathers pollen from "Tallow-wood", *Eucalyptus* sp.

White Swamp, March, 1939 (J. Hardcastle).

MEGACHILE SUBATRELLA, sp. nov.

Female: Length, 10 mm. approx. Black.

Head transverse, much white hair at sides of face; frons with dense coarse punctures; clypeus closely and coarsely punctured, with a median line irregular, and polished; supra-clypeal area conspicuously polished, impunctate; vertex densely punctured, a few fuscous hairs; compound eyes green; genae with long white hair; labrum black; mandibulae black, broad, obscurely dentate, coarsely punctured and channelled; antennae black.

Prothorax large, with white hair above; tubercles black, with white hair; mesothorax shining, densely and coarsely punctured, a few ochreous hairs; the large scutellum similar, and jutting over the postscutellum and metathorax; abdominal dorsal segments broadly depressed, minute lineations separating the punctures, each of which has a black hair; narrow white hair-bands on 1-5, 6 with black hair; ventral scopa white, black at apex, and sides of penultimate segment.

Legs with white hair, tarsi with golden hair on inner surface; claw segment reddish; hind calcar amber; tegulae brownish, with lineolate sculpture between the punctures; wings hyaline, nervures dark-brown, second

recurrent meeting second intercubitus (morphological third); pterostigma inconspicuous.

Locality: Inverell, N.S.W., November, 1935 (P. Stevens).

Type in the collection of the author.

Allies: *M. atrella* Ckll., described from Western Australia, and which has red quadridentate mandibulae and a different clypeus; *M. quinquilineata* Ckll., which has the supraclypeal area densely punctured.

MEGACHILE APPOSITUM, *sp. nov.* (Pl. xxiv.)

Male: Length 10 mm. approx. Black.

Head very broad; face with much long white hair; frons, clypeus and supraclypeal area densely punctured; vertex roundly developed; compound eyes with anterior orbital margins parallel, between the facets a number of short hairs; genae closely punctured, with long white hair; labrum black; the fossa is a large remarkable basin-like cavity; mandibulae rather acute, with a large triangular tooth directed down on the lower side; antennae black, flagellum red beneath, the apical segments darker and club-shaped, the subapical one somewhat flattened.

Prothorax closely punctured, long white hair; tubercles masked with the long white hair of the rugoso-punctate metapleura; mesothorax and scutellum excessively closely punctured, scattered white hair; postscutellum not so rough; metathorax coarsely tessellate, rugose at base, white hair laterally; abdominal dorsal segments black, with close punctures of a peculiar character, from each of which issues a long black appressed hair, the segments are narrowly depressed basally and apically, laterally the margins are polished amber with a short fringe of hair, one has a bowl-like depression basally, in which at the sides is a tuft of dense moss-like orange hair, the dorsal surface has dense large punctures of ordinary form, and a thin fringe of long white hair, two has a tessellate sculpture, with close large and small punctures, five with a large patch of rather long orange hair that invades the margin of four; six is black-haired and slightly emarginate; ventral segments very peculiar, being produced to thin transverse plates at an obtuse angle to the body, a dense mat of silvery white hair covers the gaster.

Legs black, tibiae and median and hind tarsi reddish; the anterior tarsi remarkable, segments one, two and three of equal length, expanded to thin cream-coloured plates with a black spot interiorly, and long fringes of golden hair posteriorly, the fourth very small, the fifth longest and extremely slender, amber; the anterior coxae with a pair of very long and fine polished-black processes clubbed at the apex; claws red, bifid; hind calcar red; tegulae obscurely red, closely punctured, with a tuft of white hair; wings slightly dusky; nervures blackish-brown, basal just short of nervulus; cells: the very long second cubital receives both recurrents just inside the intercubiti; pterostigma dark-brown; hamuli nine, of moderate development.

Locality: Botanic Gardens, Melbourne, Victoria, January, 1933 (Rayment).

Type in the collection of the author.

Allies: Approaches *Thaumatosoma duboulaii* Sm., which has simple legs and the seventh abdominal segment armed with lateral spines. The new bee plainly links up the ordinary forms of *Megachile* with the males

of this genus; the club-like apex of the flagellum not being so marked in the new species. However, to the student of comparative morphology, these intermediate forms undoubtedly demonstrate evolutionary development, and are more interesting than the typical species. The English bee, *M. willoughbiella*, has some characters of the new bee.

The specimen was netted whilst darting over the flowers of *Swainsona galegifolia*, but all the females collected from the same plant proved to be of an entirely different species; the male of which is known.

MEGACHILE TRICHOGNATHA Ckll. and its subspecies TOSTICAUDA Ckll.

Adelaide, S.A. Type locality. Four forms of this leaf-cutter are a demonstration of variation within a species, and, though the minutiae separating them may be tedious, yet the naturalist, seeking to separate one from the others, will find the characters given below of prime importance.

Lake Hattah, Vic. These differ slightly from the type, having greenish eyes, with minute hairs between the facets; a large snout-like elevation on the clypeus; flagellum dull-orange beneath; red claws; tegument of thorax shining; radial cell shorter; genae grooved; tegulae dark-apricot; legs black; margin of clypeus simple.

Broadmeadows, Vic. Specimens from here are typical in every respect.

Gunbower, Vic., var. A. of the subspecies. Blackish eyes, without hair; a smaller elevation on the clypeus; which is subcrenulate on the margin; flagellum dull-red beneath; claw-segment and tegulae half red and half black; genae grooved; tegument shining; radial cell longer.

Locality unknown, var. B. Black eyes without hair; very small elevation on the clypeus, which is crenulate on the margin; flagellum black; genae with round punctures; claw-segments and tegulae jet-black; tegument of scutellum with a minute tessellation; tarsal hair very golden; radial cell very long. Male smaller, with acute, not broad, mandibles; some red on median legs.

Mackay, Queensland. Subspecies *tosticauda*. Eyes darker, with no hairs; little, if any, elevation on the clypeus; flagellum dull-red beneath; foxy-red hair at apex of abdomen more abundant.

Adelaide, S.A. Females similar to those from Lake Hattah have been received very recently. The bees from Lake Hattah were collected by that veteran, J. E. Dixon, of the Field Naturalists' Club, Victoria.

MEGACHILE CETERA Ckll.

Two females, larger than type, tegulae pallid anteriorly (black in Swan River, W.A., specimens); recurrent nervures equally distant from intercubiti.

Woy Woy, March, 1934 (R. Willey).

Sandringham, Vic., March, 1936 (Rayment).

Both sexes on flowers of garden Asters.

Swan River, W.A., (L. J. Newman).

Bronte, N.S.W. (with nests) (P. Whiteley).

Orange, N.S.W. (P. Whiteley).

Woy Woy, N.S.W., and Windsor, Vic., March, var. A. Ckll. (Rayment).

Sydney, N.S.W., March, 1934 (P. Whiteley).

MEGACHILE GILBERTIELLA Ckll.

One female, typical in all characters.

New record for State. (Described from Cooktown, Queensland).

Woy Woy, N.S.W., March, 1934 (R. Willey).

MEGACHILE CHRYSOPYGA Ckll.

One female, with second recurrent nervure meeting third intercubitus. This is a very stable species.

Sydney, September, 1937 (Rayment).

MEGACHILE LATIPES Sm.

One typical female.

Sydney, October, 1937 (Rayment).

MEGACHILE SUFFUSIPENNIS Ckll.

One female.

Cronulla, October, 1937 (Rayment).

MEGACHILE LATERICAUDA Ckll.

One female, typical.

Albury (M. McKean).

MEGACHILE SUBSERICEICAUDA, *sp. nov.*

Further study of a male, taken with a female (described by the author, in a "Cluster of Bees", as the allotype), shows the necessity for separating it from *serricauda* Ckll. The female thus becomes the type of the new species, and the description of the male is appended.

Male: Length, 10 mm. approx. Black.

Head large; facial quadrangle longer than wide, with much fulvous hair; frons more coarsely punctured; clypeus extremely densely punctured with shorter paler hair; supraclypeal area with smaller punctures masked with fulvous hair; vertex roundly developed, uniform coarse punctures all over, a few pale hairs; compound eyes greenish in life; genae with palest straw-coloured hair (much denser in *serricauda*); labrum black; mandibulae black, wide, bidentate, a few pale hairs; antennae long and black.

Prothorax not visible from above; tubercles black, with white hair; mesothorax and scutellum densely punctured, with a few palest straw-coloured hairs; postscutellum rougher, metathorax with a tessellate area shaped like an inverted moorish dome, surrounded by coarse punctures; abdominal dorsal segments shining, coarse punctures, the broad posterior margins of one and three with a fine tessellation and depressed, but all have a fine band of pale straw-coloured hair; apex emarginate, with fine teeth like *serricauda*; ventral segments with red margins and dense fringes of white hair.

Legs black, with long white hair; anterior tarsi slightly modified as in *serricauda*, with some cream-colour anteriorly; claws red with darker tips; hind calcar reddish-amber (black in *sericeicauda*); tegulae black basally and amber, finely punctured; wings slightly smoky; nervures brown; cells: normal (fuliginous on upper half of radial in *sericeicauda*); pterostigma brown; hamuli twelve, of moderate development.

Locality: Sydney, N.S.W., January, 1933 (P. Whiteley).

Allotypes in the collection of the author.

Allies: *M. sericeicauda* Ckll., which has simple anterior tarsi; *M. serricauda*, which has pale-fulvous hair-bands on abdomen. The new species stands between these two.

Family ANTHOPHORIDAE.

ASAROPODA RUFA Raym.

A series of fine large females, taken when "sleeping" on a grass-stalk, on which they prop themselves out horizontally. Females conforming to *A. punctata* were taken from the same slumbering group, and these may prove to be the two sexes.

Marrickville (P. Whiteley).

ANTHOPHORA ADELAIDAE Ckll.

One female, in bad condition, but does not seem to differ from specimens taken on Rottnest Is. W.A. (J. Glauert).

Inverell, November, 1935 (P. Stephens).

Gunningbland, December (Col. not known).

Wururga, W.A., November (— O'Connor).

Gunbower, Vic., February (Rayment).

A series of males and females, quite typical.

White Swamp, March, 1939 (J. Hardcastle).

On flowers of *Plectranthus parviflorus*.

One male, quite typical.

Macquarie River, January, 1936 (P. Whiteley).

ANTHOPHORA LILACINA Ckll.

One male, typical.

Macquarie River, January, 1936 (P. Whiteley).

ANTHOPHORA GILBERTI Ckll.

Two smaller females, but typical otherwise.

White Swamp, January 1, 1936 (J. Hardcastle).

A remarkably large female, from a plaster cell.

Maitland (Rayment).

ANTHOPHORA SALTERI Ckll.

Females taken from plaster cells in mortar of brick wall.

Marrickville, January, 1936 (P. Whiteley).

ANTHOPHORA CINGULATA Fabr.

Females and males, quite typical.

Woy Woy, February, 1935 (R. Willey).

ANTHOPHORA MURRAYENSIS, *sp. nov.* Text figure 2.

Female: Length, 10 mm. approx. Black.

Head with drab-white hair; face-marks cream-colour; frons closely punctured; clypeus with a pattern like the three prongs of a heavy trident; supraclypeal area with a bracket-shaped narrow mark; vertex covered with a mixture of black and white hair; compound eyes greenish; genae with white hair; labrum and mandibulae cream-coloured; antennae a cream line on scape, flagellum ferruginous beneath, seg. 4 palest, and a similar spot under the cream on the scape.

Prothorax not visible; tubercles black; mesothorax closely punctured with dull yellowish-white hair; on scutellum and postscutellum a few black hairs intermixed; metathorax similar; abdominal dorsal segments closely punctured, with five bands of palest-blue hair, apex of abdomen with black hair; ventral segs. with a few black hairs.

Legs with dull-white hair, hind basitarsi with black hair and a spot of light hair; claws large; hind calcar black; tegulae apricot; wings clear; nervures dark-brown; cells normal; pterostigma inconspicuous; hamuli very strongly developed.

Male: Length, 8.5 mm. approx.

The cream face-mark in the middle of the clypeus is almost a pyramid, but the apex on *lilacina* is as wide as the supraclypeal mark, which is quite different in shape.

Locality: Gunbower, Vic., February 2, 1934 (Rayment).

Type and allotype in the collection of the author.

Allies: *A. pulchra* Sm., which is definitely not *zonata* of the East. I compared this with a specimen from Formosa, identified by Meyer. The genitalia of the four bees discussed here are quite different.

ANTHOPHORA THOROGOODI, *sp. nov.* (Text figure 2.)

Male: Length, 9 mm. approx. Black.

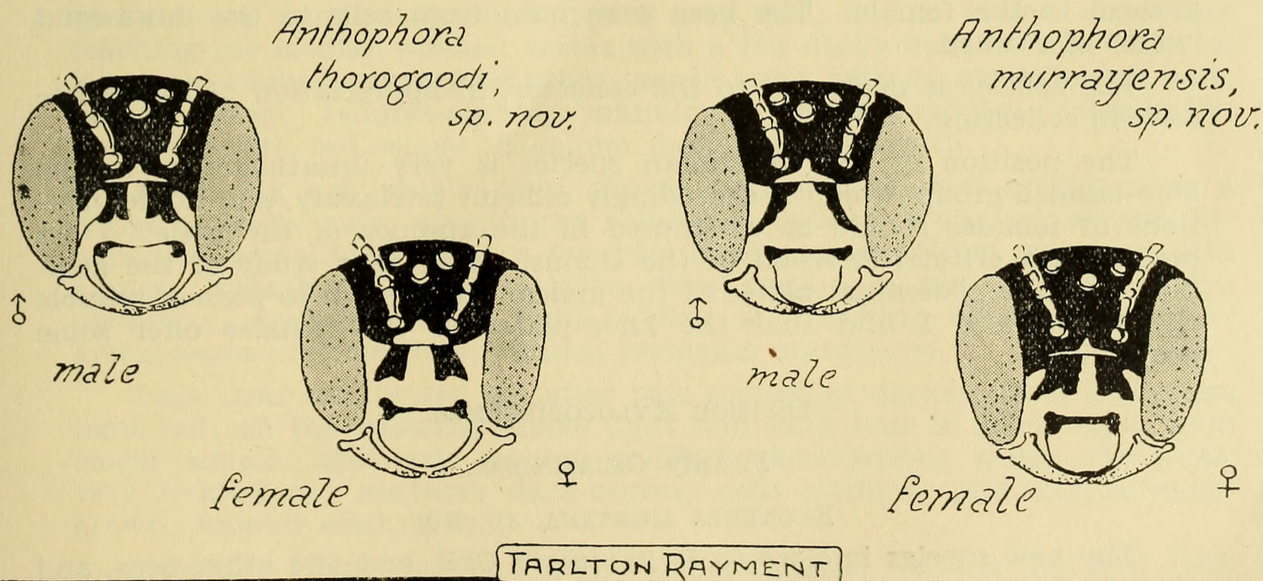


Fig. 2. Head capsules of *Anthophora thorogoodi* Rayment, and *Anthophora murrayensis* Rayment.

Head transverse; face-marks cream-coloured; frons closely punctured, white hair; clypeus cream, with two quadrangular black marks, the lower margin of which is like a fishtail; supraclypeal area with a small narrow mark; vertex with orange and black hair intermixed; compound eyes brown; genae have the palest-blue hair; labrum cream-coloured; mandibulae cream at base, reddish at tip; antennae blackish, scape with cream stripe.

Prothorax not visible; mesothorax closely punctured, with ochreous and black hair intermixed; scutellum and postscutellum similar; metathorax with dull-white hair; abdominal dorsal segments with five bands of palest bluish-green hair, basal two with ochreous tints; ventral segments with three bands of bluer hair.

Legs black, hair drab-white to ochreous; tarsi black; claws very long; hind calcar blackish; tegulae dark-amber, covered with long golden hair; wings clear; nervures dark-brown; cells: second cubital greatly contracted at top; pterostigma inconspicuous; hamuli well developed.

Female: Length, 11 mm. approx.

Head with orange and black hair intermixed; black marks on clypeus much wider, with black hair, white hair on the cream portions; supra-clypeal area has a low triangular cream mark reaching clear across the black marks of the clypeus; genae with pale-blue hair below, yellowish hair above; antennae with cream line on scape.

Thorax with dense bright-orange and black hair intermixed; abdominal dorsal segments with five bands of hair, the basal two ochreous, the others palest blue; ventral segments have pale-blue hair at sides.

Legs with dull-white hair, ochreous basally; a trifle of similar hair on the basitarsi, which otherwise have black hair.

Locality: Proserpine, Queensland, March, 1937 (H. Thorogood).

Type and allotype in the collection of the author.

Allies: *A. emendata* Sm., which is larger, with a slightly different face-pattern in the female. The bees were bred from cells in the large mud "nest" of a wasp.

The species is dedicated to the collector, in appreciation of his assistance in collecting.

The position of the Australian species is very unsatisfactory in the blue-banded group, which is exceedingly difficult to classify, and no descriptions of females should be attempted in the absence of the male. I am preparing a critical Revision of the Genus, based on a study of the genitalia and the abdominal plates of the males, which seem to possess reliable characters, and I find that the knee-plates of the females offer some possibilities.

Division XYLOCOPIFORMES.

Family CERATINIDAE.

EXONEURA MONTANA, *sp. nov.*

The new species is close to *E. hamulata* Ckll. and two other bees, and since there is some doubt about the male of *hamulata*, I append the following synopsis.

E. montana: Large females, 9 mm. Face-mark like *hamulata*, but

fading; eyes converge slightly below; legs like *hamulata*, but red, much lighter, with black hair on hind tibiae; wings paler.

Smaller females: 7 mm. Face-mark brighter; base of abdomen with a black mark like a heavy T, the cross-bar on seg. 1, and the shaft on seg. 2. From same brood.

Male: Length, 7 mm. Cream face-mark nearly an equilateral triangle; antennae red beneath; face shining; wings clear, nervures light-amber.

E. hamulata Ckll.: Females, 7-8 mm. Cream narrow face-mark hooked at top; eyes do not converge; legs dark-red, with ferruginous hair on hind tibiae; wings darker, nervures dark-brown.

Male: Length, 7-8 mm. Face-mark like female; face dull; wings suffused, nervures dark-brown. Specimens from Grampian Hills (Western), do not differ from those from Emerald Hills (Eastern) Victoria.

E. bicolor Smith: Length, 6-7 mm. Face-mark narrower; eyes converge below; orange hair at apex of abdomen; antennae darker.

Male: Length, 6-7 mm. Two cream-coloured lateral face-marks in addition to the one on clypeus.

E. robusta Ckll.: Length, 6-5 mm. Seg. one of abdomen black; antennae and legs black, or only obscure red.

Male: Length, 6 mm. Face entirely black.

Type-locality of *montana*, White Swamp, Macpherson Range, 1938 (J. Hardcastle).

Cotypes in the collection of the author.

EXONEURA FLORENTIAE, *sp. nov.*

Female: Length, 6 mm. approx. Black, red abdomen.

Head shining, a delicate sculpture; face-marks confined to two minute leaf-shaped lateral creamy marks; frons deeply excavated laterally down to labrum; clypeus convex, suffused with reddish-amber, a delicate sculpture and minute punctures; supraclypeal area dull, a fine carina above not reaching the median ocellus; vertex with a few dusky hairs; compound eyes large and convex, converging below; genae large, with sparse yellowish hair; labrum large, reddish-amber; mandibulae black, reddish subapically; antennae with red scapes, flagellum dark-amber beneath.

Prothorax not visible from above; tubercles blackish-amber, with a fringe of white hair; mesothorax shining, a delicate sculpture, almost impunctate; scutellum similar, a few pale hairs; postscutellum margined with amber; metathorax with a large area having a scale-like sculpture; abdominal segments clear light-reddish approaching orange in colour; apical segments tessellate; ventral segments orange-red.

Legs clear orange-red, anterior pair somewhat darker; tarsi and claws light-red; on the posterior tibiae light and dark hair is intermixed; hind calcar simple, light-red; tegulae polished, dark-brown; wings dusky-red, very iridescent; nervures dark-brown; cells normal; pterostigma dark-brown; hamuli weak, five.

Locality: Black Sands, Yarra Valley, Victoria, October 16, 1936 (Md. E. F. d'H. G.).

Type in the collection of the author.

Allies: *E. albolineata* Ckll., which has a yellow clypeal mark, black at base of abdomen, and legs black basally. *E. hackeri* var. *incerta* Ckll., which has dusky bands on abdomen, and black scape; *E. angophorae* Ckll., which has yellow clypeal stripe and black hair on hind tibiae.

On flowers of Heathy Parrot-pea, *Dillwynia ericifolia*.

The species is dedicated to Md. Elsa Florence d'Henzil Gosewinckel in appreciation of her conscientious assistance in collecting.

Family CERATINIDAE.

EXONEURA BACULIFERA Ckll.

One female, quite typical. Another with a black basal patch on abdomen.

Woy Woy, N.S.W., February, 1935 (R. Willey).

Gladesville, October, 1936 (not quite typical) (Ian Dutton).

EXONEURA HAMULATA Ckll.

Two females, quite typical in every character.

Gosford, 1933 (H. Cambourne).

One male, almost entirely black. (Specimens from the Grampians, Vic., are redder.)

Woy Woy, N.S.W., February, 1935 (R. Willey).

EXONEURA FLORATULA Ckll.

One female, quite typical.

Woy Woy, March, 1935 (R. Willey).

EXONEURA PARVULA Raym.

A series of females, quite typical, but one has black spots only on basal segment of abdomen. Smallest only 4 mm. in length.

Woy Woy, N.S.W., March, 1935 (R. Willey).

The several females are indistinguishable from specimens collected at Marysville, Vic., by myself. These have some resemblance to *E. brisbanensis*, Queensland.

EXONEURA ANGOPHORAE OBLITERATA Ckll.

One female.

Sydney, October, 1938 (Rayment).

ALLODAPULA SIMILLIMA (Sm.).

One female, indistinguishable from Bribie Is., Queensland, specimens (H. Hacker).

Gosford, April, 1933 (H. Cambourne).

White Swamp, May, 1939 (J. Hardcastle).

These typical forms were taken on flowers of *Lomatia* sp.

The complete biology of this species is awaiting publication.

Family XYLOCOPIDAE.

XYLOCOPA (MESOTRICHIA) BRYORUM (Fabr.).

Females, typical in all characters.

Observed to emerge from galleries in Native Orange Tree, *Capparis Mitchellii*.

Narrabri, February, 1934 (H. H. Hardy).

Townsville, Queensland, May 5, 1934 (Col. not known).

Tarringa, Queensland (Col. not known).

Woods Reef, Barraba, N.S.W. (Rayment).

Taken on flowers of garden Wisteria.

Tamworth, N.S.W., March 3, 1932.

Cairns, Queensland, May, 1934 (J. Mansky).

Subsp. DIMIDIATA Lepel.

Cooktown, Queensland, June 27, 1906 (T. Thorn).

LESTIS BOMBYLANS Fabr. var. VIOLACEA.

Typical females.

Barraba, October, 1932 (P. Stephens).

Bingera, April, 1938 (J. Dunstan).

White Swamp, March, 1939 (J. Hardcastle).

Family APIDAE.

Subfamily MELIPONINAE.

TRIGONA CARBONARIA ANGOPHORAE Ckll.

Typical workers (collected from blossoms of fruit trees).

White Swamp, November, 1938 (J. Hardcastle).

TRIGONA CARBONARIA Sm.

A number of workers, quite typical.

A "swarm" observed issuing from a cavity in a tree as a thick, fast-moving "ropy" spiral, having a diameter of eight inches.

Narrabri, February, 1934 (H. H. Hardy).

EXPLANATION OF PLATE XXIII.

1. Adult male, *Sphaerhylaesus procurvus* Rayment. Note how the dilated bases of the antennae project out in front of the eyes.
2. Front view of the head-capsule showing the globular scapes, the emarginate compound eyes and the yellow lower half of the "face".
3. Genitalia of the male.
4. Small long-oval labrum.
5. Mandible is bidentate, but long and narrow, not wide and short as in *Gnathoprosopis*.
6. Digging spur (calcar) of the hind leg is finely spined.
7. Wing-hooklets (hamuli) are very few and weak.
8. Antenna-cleaner (strigil) of the front leg.
9. Median legs have simple claws but those of the hind legs are bifid.
10. Pattern (striato-punctate) of the mesopleura.

11. Pattern of metathorax is only striato-tessellate.
12. Punctures of the abdomen are few and small.
13. Disc of the metathorax has dense and coarse puncturing regularly disposed.

PLATE XXIV.

1. Adult male, *Megachile appositum*, Rayment.
2. Apical ventral segments.
3. Mandible.
4. Tarsal segments of anterior leg.
5. Coxae, with slender process.
6. Basin at base of abdomen with two conspicuous hair-spots; note the small oval depressions on the margin.
7. Posterior view of the head-capsule showing the great fossa with the labrum folded over the mentum.
8. Inner surface of three tarsal segments of the anterior leg; a, b, c, three types of spines.
9. Sculpture of second abdominal segment.
10. Sculpture of first abdominal segment.
11. Sculpture of the metathorax is tessellate, but narrowly rugose at base.

REVIEW.

An Australian Bird Book. By J. A. Leach. Revised by Charles Barrett. 8th Ed. 1939. Whitcomb & Tombs, Ltd. Melbourne and Sydney. 8/6.

To Australians generally, and to Victorians in particular, the name of Dr. Leach is familiar as a guide to the beautiful and interesting birds of this Continent. As a youth, and in the early days of his service in the Department of Education of Victoria, Leach was a keen student of wild life, and especially of the birds. With advancement in the service he gave more time to nature study, and made his hobby a sure means for promotion. By open-air lectures and addresses to students, and by publication of his now memorable Australian Bird Book, he proved his value to the educational system, eventually being appointed Secretary of the University of Melbourne Extension Board.

This new edition, published nearly ten years after his early and lamented death, comprises the "lecture" which he placed as a sort of running commentary at the base of each page of the original editions of his "Book", but now removed to the end of the systematic list of birds, and slightly added to by the present editor, Charles Barrett. The coloured representations of 178 species are from the original plates, and, though rather small for ready identification in some instances, at least give a general idea of the form and colour of our birds. Mr. Barrett has added a number of half-tone illustrations from his own and other photographs, all of which add to the attractiveness of a most useful and comparatively cheap guide to the nature student. The "jacket" depicts a charming study of our old friend the Kookaburra in colour and contemplative mood.—A.F.B.H.



1939. "Bees from the highlands of New South Wales and Victoria." *The Australian zoologist* 9, 263–294.

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