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On a Collection of Australian and Asiatic Bees

T. D. A. Cockerell
University of Colorado

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Article X.—ON A COLLECTION OF AUSTRALIAN AND
ASIATIC BEES.

By T. D. A. COCKERELL.

The bees which form the subject of this paper belonged to the collection of the well-known entomologist Henry Edwards, and are the property of the American Museum of Natural History. Mr. Beutenmüller informs me that the Australian specimens were collected by W. Macleay, but the collectors of the others are unfortunately unknown. Of peculiar interest is the little series from Amboina. So far as I can ascertain, ten species of bees have been recorded from that island; eleven are now added, making a total of 21. The first records were three by Fabricius in 1804, based on specimens obtained from Billardièr. These Fabrician species were very briefly described; one of them, a *Crocisa*, was supposed to be well-known, but a topotypical specimen now before me shows that the species has been misunderstood; the second, a *Megachile*, is not known to modern writers, unless it is identical with one later described by Smith — as is indeed probable; the third, supposed to be an *Anthophora*, is unknown to-day, but the abdomen has a single conspicuous fulvous band, which should make the insect easily recognizable. There are some things in the brief description of the last which are rather suggestive of *Megachile*.

The next record was that of an *Apis* by LeGuillou in 1841. This also has not been recently recognized; the two species of *Apis* in the present collection from Amboina are common and widespread forms. Dalla Torre, in his Catalogue, erroneously gives the locality of *Apis gronovii* as Timor.

Smith in 1860 described three species, one of *Xylocopa* and two of *Megachile*, collected in Amboina by Wallace. Radoszkowski in 1894 added a *Crocisa* discovered by Doleschall. Pérez in 1901 recorded a *Xylocopa*, and Friese in 1905 a third *Crocisa*.

The complete list is as follows; the species marked with an asterisk are added in the present paper:—

<i>Apis gronovii</i> LeGuillou.	<i>Megachile frontalis</i> (Fabricius).
" <i>dorsata</i> Fabricius.*	" <i>lachesis</i> Smith.
" <i>indica</i> Fabricius.*	" <i>ventralis</i> Smith.
<i>Xylocopa unicolor</i> Smith.	" <i>doleschalli</i> Ckll.*
" <i>confusa</i> Pérez.	" <i>dampieri</i> Ckll.*
" <i>mohnikei</i> Ckll.*	" <i>funnelli</i> Ckll.*
<i>Anthophora vigilans</i> Smith.*	<i>Crocisa novæhollandiæ</i> Lepeletier.*
" <i>elegans</i> Smith.*	" <i>amboinensis</i> Radoszkowski.
" <i>wallacei</i> Ckll.*	" <i>nitidula</i> (Fabricius).
" (?) <i>fulvata</i> (Fabricius).	" <i>nigrescens</i> Friese.
	<i>Nomia amboinensis</i> Ckll.*

The neighboring islands Ceram and Bouru have the following records:—

<i>Nomia concinna</i> Smith.—Ceram.	<i>Nomada insularis</i> Smith.—Ceram.
" <i>simillima</i> Smith.—Ceram.	<i>Megachile funeraria</i> Smith.—Bouru.
<i>Xylocopa unicolor</i> Smith.—Ceram, Bouru.	" <i>puncticollis</i> Friese.—Bouru.

Melipona atrata (Fabricius), cited by Dalla Torre as from Amboina, is American.

***Megachile macleayi* sp. nov.**

♀. Length just over 17 mm.; abdomen of the parallel-sided type; wings dark fuliginous, shining purple, the apical margins broadly paler; black, seen from above the only conspicuous pubescence is snow-white, covering the scutellums and metathorax, and a bright orange-red patch covering the fifth and sixth, and a large part of the fourth, abdominal segments. Head massive and subglobose, face very broad, the eyes slightly converging above; face at sides and about antennæ, and cheeks below, with thin grayish-white hair; clypeus with rather pale fuscous hair, not conspicuous, a fringe of orange hair beneath its lower margin; antennæ entirely black; vertex with dense large punctures, and minute ones interspersed; a shining ridge descending from each lateral ocellus, the two forming a sort of large U, with the lower part wanting; clypeus transverse, very broad, its anterior margin simple, its surface very densely punctured; mandibles with three large teeth; tegulæ black; mesothorax densely and coarsely rugoso-punctate; tubercles with a dense fringe of white hair; legs black, with inconspicuous dull hair, that on inner side of basal joint of hind tarsi reddish fuscous, contrasting with a tuft of pure white at apex of tibiæ; hind spurs piceous; first abdominal segment with white hair; second and third segments bare and shining; with large punctures; sides of fourth segment bare except apically; ventral scopa creamy white, fuscous on the last two segments.

Hab.—New South Wales (Am. Mus. Nat. Hist., 299).

A very remarkable and beautiful species, somewhat recalling *M. albobasalis* Sm., from Murray Island, Torres Strait, but very distinct from that and all others. There is probably some affinity with the Tasmanian *M. leucopyga* Sm.

***Megachile beutenmulleri* sp. nov.**

♂. Length 10½ mm.; black, abdomen parallel-sided, with a large patch of bright orange-red tomentum occupying the fifth segment except at sides, and the adjacent apical margin of the fourth; head large, face densely covered with pale yellow hair; vertex with a mixture of short dark fuscous and long pale hair; cheeks beneath with a beard of pure white hair; vertex densely punctured; antennæ entirely black; clypeus normal; thorax with long white hair; black interspersed on mesothorax, and a little on scutellum; viewed from the side, the front of the mesothorax appears white-haired, and the region immediately behind this black-haired; mesothorax shining, densely punctured; legs black, with white hair; anterior coxæ densely covered with white hair in front, and unarmed; anterior tarsi slender

and simple; tegulae black; wings hyaline, upper half of marginal cell dusky; first abdominal segment with white hair, and a white patch on each side of second posteriorly; third and fourth segments with short black hair; sixth broadly emarginate, the sides of the emargination very obtuse; seventh not spined; under side of abdomen with white hair.

Hab.—Victoria (Am. Mus. Nat. Hist. 302).

Somewhat related to *M. erythropyga* Sm. and *M. canifrons* Sm.

***Megachile henrici* sp. nov.**

♀. Length about 14 mm.; black, the face covered with bright orange-ferruginous hair, and the apical dorsal segment of the abdomen nearly covered by tomentum of the same color. Head large, facial quadrangle about square, eyes slightly converging above; vertex with short dark fuscous hair, occiput with long pale hair; antennae entirely black; clypeus transverse, its edge somewhat crenulate, but otherwise simple; mandibles stout, with two large teeth, and a subapical band of fulvous hair; cheeks broad, white-haired; thorax with much white hair, a little black intermixed on mesothorax; mesothorax shining, rather shallowly rugoso punctate; wings dusky, not very dark, upper half of marginal cell fuscous; legs black, with white hair; hind spurs black; hair on inner side of basal joint of hind tarsi dark fuscous; claws with a conspicuous diverging basal tooth; first abdominal segment with white hair, lateral hind margins of second with conspicuous white hair patches; remaining segments, except the red apical patch, with short black hair; ventral scopa silvery white, black at sides of last three segments.

Hab.—New South Wales (Am. Mus. Nat. Hist., 301).

In my table in Ann. Mag. N. H., June 1906, this runs to 5, and runs out because the wings are not very dark and the abdomen is not banded. It is quite distinct from all the described species.

***Megachile maculariformis* sp. nov.**

♀. Length a little over 12 mm.; black, the hair of the face light bright orange-fulvous, and the tomentum covering the apical abdominal segment of the same color; abdomen broad, shovel-shaped, the segments transversely grooved, and their hind-margins having narrow entire pure white hair bands, except the penultimate one, which has the band colored like the apical patch; the hair before all these bands is coarse and black, except that the greater part of the first segment is covered with long white hair; ventral scopa pure white, black at extreme sides except on first segment, entirely black on apical segment, and largely black on apical half of penultimate one. Head large, antennae entirely black; hair of vertex fuscous; clypeus normal; mandibles with three teeth, not counting inner corner; cheeks with white hair; pleura and metathorax with much white hair; hair of thorax above mostly black; spots of dense pure white hair on tubercles, just above tegulae, and a pair of transverse ones in scutello-mesothoracic suture; mesothorax and scutellum very densely punctured; tegulae rufo-piceous; wings dusky, but not fuliginous; legs black, with white hair, the femora and anterior tibiae dark reddish with white

hair; hair on inner side of hind tarsi dark fuscous; basal joint of hind tarsi broadened; claws with a basal tooth.

Hab.—New South Wales (Amer. Mus. Nat. Hist. 303).

Allied to *M. macularis* D. T., but differing in color of antennæ, of abdominal bands, etc.

Megachile modesta Smith. New South Wales. Clypeus emarginate, the sides of the emargination shining; apical segment of abdomen black, but with orange pile. This must be the true *modesta*, and the species reported as *modesta* in Ann. Mag. Nat. Hist., June, 1906, p. 531, should apparently be known as *M. apicata* Smith.

Megachile devadatta sp. nov.

♂. Length 11½ mm.; expanse over 19; length of abdomen about 5. Black with red legs, and dullish fulvous hair, passing into white below; the abdomen short and truncate. Face densely covered with pale yellowish hair, except the upper part of clypeus, where the densely punctured but shining surface is bare; under side of head with long white hair; flagellum obscure reddish beneath, last joint not in the least broadened; mesothorax and scutellum as densely punctured as is possible, but the narrow dividing lines between the punctures shining; hair of thorax above fox-red, not hiding the surface; tegulae pale ferruginous; anterior coxæ black, with stout but only moderately long spines; anterior femora, tibiae and tarsi entirely bright ferruginous, the tarsi somewhat broadened and flattened, but without any very peculiar features; middle femora red above and apically, otherwise blackish, their tibiae red, but their tarsi long and black with much long yellowish-white hair; hind legs colored much like the middle ones, but their tibiae much blackened apically, and decidedly curved; hind tarsi with the basal joint broad but not long, the apical joint very long and slender; claws with the basal half pale fulvous, the apical black, strongly bifid but with no basal tooth; spurs pale fulvous, hind spur minutely ciliate; wings subhyaline, strongly reddish; second s. m. below a trifle longer than first; abdomen black, with a deeply excavated basin at base, its edge sharp; first segment with much fox-red hair; second and third with rather narrow, uniform, pale fox-red hair-bands; beyond this the light bands are dull whitish, and the dark surface shows many black bristles; apical segment vertical, its margin broadly subtruncate; obscurely crenulate of tuberculate, with a feeble median emargination; no sub-apical ventral spines; ventral segments fringed with white hair.

Hab.—Northern India,—no other particulars known (Am. Mus. Nat. Hist.).

Allied to *M. buddha* D. T., but that has the margins of the abdominal segments and the apex of the mandibles ferruginous.

Megachile doleschalli sp. nov.

♀. Length about 13 mm.; expanse 21; black, with fox-red hair, especially on abdomen, which is elongate shovel-shaped. Hair of front and sides of face pale ferruginous, but of clypeus (except the extreme sides) coarse and black; antennæ

black; clypeus very densely and coarsely punctured, except upper margin, and a less decided median line, which form a sort of smooth shining T; anterior edge normal; mandibles black; with a dull red spot at base of second tooth, 4-dentate, the two apical teeth long and narrow, the third in the form of a very broad triangle, the fourth a little tubercle; no subapical band of hair; hair of vertex and thorax above fox-red, sparse in middle of thorax; mesothorax and scutellum shining, with strong punctures, dense laterally, but on disc separated by spaces fully equal to their diameter; at sides of metathorax and below wings the hair is copious and fox-red, on lower part of pleura it is scanty and pallid; tegulae light rufo-fulvous; wings dusky, strongly reddish, nervures and stigma ferruginous; legs black, a reddish spot at apex of tibiae; tarsi with fulvous hair; hind basitarsus (basal joint of hind tarsus) broad and flat, at least as long as the other joints together; spurs ferruginous; claws simple apically, but with a basal tooth; abdomen black with fine punctures, covered above with fine fox-red hair, which is dense and bright on the hind margins of the segments, forming bands against a duskier (but still red-haired) ground; scopa bright ferruginous, a few black hairs on the apex of the last segment.

Hab.—Amboina (Am. Mus. Nat. Hist.).

Named after Dr. Doleschall (*cf.* Wallace, Malay Archipelago, p. 224). This looks just like a small edition of the African *M. fulva* Smith, except that that has a dull mesothorax.

Megachile dampieri sp. nov.

♂. Length about 11 mm.; expanse 20; length of abdomen (which is of the parallel-sided truncate type) about 5. Black, with fulvous hair, that on head yellowish-white or very pale yellow. Face densely covered with yellowish silky hair; ocelli ferruginous; vertex dull, cribrately punctured, with rather thin long erect yellowish hair, and a little fuscous at the sides; antennae long and slender, black; mandibles shining black, strongly elbowed; hair of thorax long and not very bright, not hiding surface; some black hair on scutellum, and even a little on hind part of mesothorax; mesothorax and scutellum with large shallow punctures separated only by their raised edges, giving the whole a fine reticulation, with something the appearance of the surface of the moon; pleura also contiguously punctured; tegulae dark reddish; wings dusky, strongly reddish, nervures and stigma rather dark ferruginous, stigma rather smaller than in *M. doleschalli*; middle and hind legs black, their tarsi reddened, with very long fulvous hair; anterior femora and tibiae red, black on the outside; their tarsi cream-color, the joints flattened but only moderately broadened, the first joint with a fringe of white hair on its lower margin; anterior coxae with black spines; middle tarsi short and flattened, the hind margin with exceedingly long hair; hind tarsi elongated, longer than the tibiae; spurs ferruginous; claws bifid; abdomen with fox-red hair, quite bright, dense on the hind margins of the segments, forming rather obscure bands; apical segment vertical, with some erect dark hairs, its margin strongly emarginate; very small lateral subapical ventral spines.

Hab.—Amboina (Am. Mus. Nat. Hist.).

Looks at first sight like the male of *M. doleschalli*, but the sculpture of the thorax is entirely different.

March, 1907.]

Megachile funnelli sp. nov.

♀. Length about 8½ mm.; black, the middle and hind femora bright ferruginous except at extreme apex; ventral scopa white, very short and somewhat fuscous on last segment. Head large, oval, with a broad vertex, *Heriades*-like; hair of head and thorax very scanty, dull white; antennæ wholly dark; clypeus with very large contiguous punctures, the anterior edge straight; supraclypeal area with the punctures even a little larger, but not so dense; front and vertex cribrately punctured, the punctures of the vertex enormous; mandibles broad, with two strong apical teeth, the other two teeth represented merely by an undulating margin; mesothorax and scutellum nude, with very dense small punctures, hardly half the size of those on vertex; punctures of pleura a little larger than those of mesothorax; tegulae dark, with a reddish tint; wings dusky, but not very dark; stigma and nervures dark ferruginous; b. n. falling only a little short of t. m.; stigma quite large; legs black except the red middle and hind femora; hind basitarsus broad and flattened, with orange-fulvous hair on its inner side; spurs ferruginous; no pulvillus; claws simple, no basal tooth; abdomen densely punctured, with very narrow white hair-bands on the margins of the segments; punctures on raised part of third and fourth segments relatively large.

Hab.—Amboina (Am. Mus. Nat. Hist.).

Named after William Funnell (*cf.* Wallace, Malay Archipelago, p. 224), who visited Amboina in 1705. This species strongly recalls some of the little *Heriadiform* Australian forms.

The following table separates the known Amboinese species of *Megachile*:—

Very large with entirely black pubescence; wings fuliginous	<i>lachesis</i> Smith
Smaller, hair not all black	1.
1. Abdomen with fulvous or red hair above; scopa of known females red	2.
Abdomen not fulvous-haired above	3.
2. Middle of mesothorax shining, with well-separated punctures	<i>doleschalli</i> Ckll.
Middle of mesothorax dull, with a minute raised reticulation	<i>dampieri</i> Ckll.
3. Size small; abdomen with narrow white hair-bands; scopa white	<i>funnelli</i> Ckll.
Larger, over 10 mm. at least; abdomen without light hair-bands	4.
4. Front and clypeus with white hair	<i>frontalis</i> (Fabr.).
Face with yellowish white hair in male; front of head and sides of thorax with black hair in female; scopa bright ferruginous	<i>ventralis</i> Smith.

It is quite possible that *ventralis* is the same as *frontalis*; the short Fabrician description appears to agree with the male of *ventralis*.

Saropoda bombiformis Smith. Victoria; 2♂ (Am. Mus. Nat. Hist. 295).

Anthophora wallacei sp. nov.

♀. Length about 14 mm.; expanse of wings about 27. Robust, black, with rather pale fuliginous wings; hair of cheeks and occiput dense and white; front and face with long black bristles; white hair at sides of face and around antennæ; clypeus

coarsely and densely rugoso-punctate, its anterior margin, and a median streak at right angles with it, dull cream-color; a small triangular creamy supraclypeal mark; a round spot of the same color at each lower lateral corner of clypeus (joining marginal band), and a small mark by each lateral suture; base of mandibles with a large light spot; labrum light, with the edge dark, and a dark spot at apex and one at each basal corner, the light part with numerous fuscous bristles; maxillary palpi 6-jointed, the second nearly as long as the following four together, broad, curved, its inner edge very finely and regularly ciliate, its outer with coarse black or fuscous bristles; third joint only about half as broad as second, but much broader than any of the following; fourth a little shorter than third; fifth shorter still; sixth minute; paraglossæ reaching beyond middle of labial palpi; tongue very long; antennæ short, entirely dark; *hair of thorax very dark brown, at first sight appearing black, but white, in strong contrast, on the metathorax and extending as far forward as the scutellum*, though on the latter strongly intermixed with dark; anterior middle of mesothorax also with some white hair; tegulæ dark rufo-piceous; legs with dark hair, white on outer side of the tibiæ; hind tibiæ and tarsi flattened, *basal joint of latter broad, entirely dark-haired*; spurs of hind and middle tibiæ very large; abdomen black, black-haired, segments 3 and 4 each with a very conspicuous band of white hair.

Hab.—Amboina (Am. Mus. Nat. Hist.).

Named after Dr. A. R. Wallace, in remembrance of his visit to Amboina.

Very much like *A. sesquicincta* (Erichson), but larger, and differing in the details of the pubescence. *A. sesquicincta* is generally known as *A. bicincta* = *Apis bicincta* Fabr. 1793, not of Schrank, 1781.

Anthophora æuginosa Smith. New South Wales, two (Am. Mus. N. H. 296).

Anthophora zonata (L.). Cochin China (Am. Mus. N. H. 415).

Anthophora vigilans Smith. Amboina (Am. Mus. N. H. 403). Dours gives entirely wrong measurements for this species, and places it as a variety or subspecies of *A. zonata*, while at the same time remarking that he has never seen it. It is entirely distinct from *A. zonata*, though somewhat related.

Anthophora elegans Smith. Amboina (Amer. Mus. N. H.). ♀. There are light hairs among the black on the head and thorax, and the hair of the cheeks is dull white; the red hair of the posterior tibiæ extends to cover most of the outer side of the basal joint of their tarsi. The species is a very striking one and the Amboina specimen looks just like Smith's types from Key Island, which I saw in the British Museum.

Anthophora pulchra Smith. Queensland and New South Wales (Am. Mus. N. H., 297). The hair of the thorax above is strongly intermixed with black, a fact not indicated by Smith. I do not know how this insect is to be separated from *A. zonata subcærulea* (Lep.), but I have no Indian specimens of the latter to compare; if, as I believe, there is no essential differences, *subcærulea* has priority. In general appearance, the insect is exactly like the African *A. circulata* (Fabr.).

Xylocopa tenuiscapa Westw. Madras. ♀.

Xylocopa latipes (Drury). Sumatra (R. Weber). ♂.

Xylocopa fenestrata (Fabr.). Madras, ♀. This is *fenestrata* as understood by Pérez; it does not wholly accord with the description of Bingham; thus, the hair at the apex of the abdomen is all black.

✱ *Xylocopa verticalis* Lepel. N. India. ♂. This is evidently very close to *X. confusa* Pérez.

Xylocopa dissimilis Lepel. China. ♀.

Xylocopa bryorum (Fabr.). ♀. North Queensland. ♂. New South Wales. In Ann. Mag. Nat. Hist., Aug. 1905, p. 224, I regarded the Australian insect as belonging to a subspecies *dimidiata* Lep. This now appears to be an error, and I believe *dimidiata* is after all a valid species, not found in Australia.

Xylocopa mohnikei sp. nov.

♀. Length 20½ mm.; expanse 42 mm.; black, the thorax with bright yellow hair. Superficially, this is exactly like *X. bryorum*, but it differs as follows: Wings not so dark, nor so strongly tinted with green; first transverso-cubital nervure entire; base of first submarginal cell if anything a trifle shorter than that of second; face conspicuously narrower; clypeus with no median keel; upper two-thirds of pleura covered with yellow hair; basal segment of abdomen above with very sparse yellow hair, hardly apparent without a lens; median groove of mesothorax weaker. The face, cheeks and anterior tibiae behind have dull white hair, on face mixed with black, as is also the yellow of the vertex.

Hab.—Amboina.

X. dimidiata Lep. is from Timor; *X. aruana* Rits. is considered to be the same. *X. mohnikei* differs from *dimidiata* by having the flagellum ferruginous beneath except at base, the yellow hair on first abdominal segment very scanty, the hair at apex of abdomen all black, the hair on anterior tibiae behind dull white instead of yellow, and presumably in the structural characters cited above, those of *dimidiata* being supposed to be essentially as in *bryorum*. From *X. confusa* Perez, the new species differs by the absence of a clypeal keel and the proportions of the submarginal cells.

Named after Dr. Mohnike, the Amboina entomologist (cf. Wallace, Malay Archipelago, p. 224).

Xylocopa dimidiata Smith, Trans. Ent. Soc. Lond., 1874, p. 287, from Ega on the Amazons, may take the name *X. batesi*, n. n.

Xylocopa chionothorax sp. nov.

♀. Length about 21 mm.; expanse 47½; width of abdomen 10. Black, of the general form of *X. dissimilis*, but smaller, the wings not so dark, and the thorax

above covered with white hair. Hair of head mixed fuscous and dull white; of sides and under part of thorax dark fuscous, except a large white patch beneath the wings; of basin of first abdominal segment rufo-fuscous; apical fringe black, and no light hair on abdomen; hair of legs brown-black; head large, face broad; space between lateral ocelli scarcely or not over half distance from either to eye; vertex dullish, with very few large punctures; area between antennae convex, but not keeled; scape long, somewhat flattened but not dilated, with a little red at apex and base; flagellum reddish beneath; clypeus densely punctured, with a well-marked smooth median band; labrum with a median tubercle; maxillae conspicuously marked with red at base and apex; middle of mesothorax smooth and impunctate; wings fuscous, with a strong purple (rosy-purple) iridescence; submarginal cells complete, the second a trifle longer below than first; posterior tibiae with a raised line or keel from near the base to a short distance before the middle its end curved outward; in a strong light the hair on under side of hind legs appears dark reddish; scutellum and postscutellum transversely keeled; abdomen with numerous strong punctures; hind margins of ventral segments narrowly reddened.

Hab.—China (Am. Mus. Nat. Hist. No. 156).

In Bingham's arrangement of the Indian species, this falls next to *X. collaris*, but it is known at once from that by the white hair covering the thorax above except a small space in the middle. In size and shape, it resembles *X. fenestrata*; the coloration is much more like that of *X. phalothorax* Lep., from Sumatra.

Lestis bombylans (Fabr.). Both sexes from New South Wales. My material of *L. arcata* Smith is from Queensland.

Apis dorsata Fabr. Amboina. (Am. Mus. N. H.) This is typical *dorsata*: *Apis binghami* Ckll. (*zonata* Smith), appears to be a distinct species, as Ashmead states. I have it from the Khasia Hills, India (Sladen).

Apis indica Fabr. North India. The specimens have the abdomen banded as in var. *nigrocincta* Smith, but the apical segments and legs are dark. I have very similar specimens from Ceylon (Green).

Amboina, two specimens. I had hoped that I could identify these with *A. gronovii*, but they certainly are *A. indica*, and do not accord well with the description of Le Guillou's species.

Paracolletes venustus Smith. Victoria (Edwards). Previously known from S. Australia.

Paracolletes frederici Ckll. N. S. Wales. (Am. Mus. N. H. 305.) The specimen is a female; only the male has been known hitherto. It agrees in general with the male; length about 13 mm.; scape black; flagellum red beneath except at apex; apical fimbria of abdomen pale; hind femora and tibiae with a very copious creamy-white plumose scopa, a tuft at the apex of the femora, and a suffused band down the tibiae above, of fuscous hair; hind spur pectinate with numerous fine and quite long teeth. On both sides, the lower third of the first transverso-cubital nervure is wanting.

Paracolletes crassipes Smith. N. S. Wales. 2 ♀. (Am. Mus. N. H. 306.) Previously known from Swan River.

Paracolletes cupreus semipurpureus Ckll. New South Wales. Previously known only from Queensland. The specimen has only the apical part of the flagellum distinctly red. The abdomen of a second specimen is dark green with only a little crimson.

Paracolletes carinatulus Ckll. New South Wales. A female, nearly 11 mm. long, is referred with little hesitation to this species, known hitherto only from a male obtained in Queensland. It is close to *P. carinatus*, Smith, but differs by the hair of the legs being yellowish white, except a broad fuscous band on outer side of hind tibiae, a fuscous band on outer side of middle tibiae, and the hair on middle and hind basitarsi within a sort of pale orange. The long fringes of hair on margins of ventral abdominal segments 2 to 4 are white. The abdomen is olive green, with purplish tints. The upper edges of the clypeus shows beautiful crimson and purple tints. This insect is allied to *P. cupreus semipurpureus*, but larger, with black (not largely red) legs.

Euryglossa ephippiata Smith. N. S. Wales (Edwards). Previously known from Adelaide and Queensland.

Euryglossa fasciatella sp. nov.

♀. Length nearly 8 mm.; expanse just over 13 mm.; superficial appearance exactly like the European *Halictus fasciellus*, except for the dark stigma. Black; with dull white pubescence; clypeus shining, with strong scattered punctures, and no keel; mandibles dark red at apex; antennae black; vertex and mesothorax dull, minutely granular; scutellum shining though granular, with scattered punctures; metathorax minutely granular, dullish; tegulae testaceous; wings yellowish; stigma large, dark reddish; nervures testaceous; second s. m. below a little more than half as long as first, receiving first r. n. a trifle nearer base than second to apex; b. n. falling short of t. n.; legs black, knees dark reddish, tarsi somewhat reddened, but not pale or red; abdomen broad, somewhat shining, reddish-black, the narrow hind margins of the segments testaceous.

Hab.—South Australia (Edwards coll.; Amer. Mus. Nat. Hist.).

Distinguished from *E. halictiformis* Sm. by the larger size, color of the legs, etc.

Euryglossa edwardsii sp. nov.

♀. Length about 7½ mm., expanse about 13; head and thorax black, without any metallic lustre; head large and round; face and cheeks with soft dull-white hair; labrum with a transverse shining groove; mandibles dark red except at apex; clypeus broad and flattened, shining, with strong scattered punctures, and no trace of a longitudinal keel; front dull, minutely striato-punctate; facial foveae long and

linear; vertex dullish and punctured; ocelli in a curve; antennae ferruginous, stained a little with fuscous above; thorax with very little hair; mesothorax shining, very sparsely punctured; area of metathorax smooth and shining; tegulae black; wings yellowish, nervures and stigma ferruginous, venation normal; legs red, the femora darkest, the anterior femora strongly blackened behind, middle and hind tibiae and tarsi light yellowish-red; hind spur pectinate with three long teeth, and one or two others rudimentary; abdomen broad, entirely dark ferruginous, with a silky gloss, apex with dull white hair.

Hab.—New South Wales (Am. Mus. Nat. Hist., 324).

Looks like a *Parasphecodes*; it is allied to *Euryglossa simillima* Sm., but differs by the red legs, entirely red abdomen, etc.

Goniocolletes gen. nov.

♂. Colletiform, hairy, with a rather narrow tapering abdomen; mandibles slender, with a short inner tooth; tongue very small; labial palpi 4-jointed, the joints subequal, the second and third shorter than the first or fourth, the first two joints broad apically, the last two very slender throughout; maxillary palpi ordinary, six-jointed; antennae ordinary, the last joint flattened apically; stigma small and narrow; three submarginal cells, the first below about as long as the other two combined, the third larger than the second; second s. m. receiving first r. n. at its middle, third receiving second r. n. very near its end; second s. m. broad, moderately narrowed above; marginal cell with the apex rounded, not on costa; b. n. meeting t. m., or falling a little on the outer side; second r. n. with its upper part gently curved outwards; seventh dorsal abdominal segment presenting a roughened black triangular pygidial area, sharply pointed apically; apical ventral plate projecting far beyond dorsal, pygidiform, narrow, rounded apically, dull and roughened except apically, where it is shiny, fringed laterally with very long curved pale hairs, and beneath with an erect median fringe of dark curved hairs; penultimate ventral segment shining and sparsely punctured, elevated in the middle and keeled, presenting a beak-like appearance in lateral view; remaining ventral segments normal; area of metathorax transversely grooved; legs slender, very peculiar; anterior tarsi with the first joint narrow, pale and flat, more than twice as long as the rest of the tarsus; middle coxae with a keel-like protuberance beneath; middle femora with the lower half beneath excavated, as though a large piece had been bitten out, the basal end of the excavation furnished with a large tooth, directed apicad; middle tarsi long, pale and slender, the first joint concave beneath, and about twice as long as the rest of the tarsus; hind coxae with a large protuberance beneath; hind tibiae strongly bent; only one spur visible on hind tibiae, and that small and pale; hind tarsi long and slender, basal joint with a tooth-like prominence beneath, basal joint not nearly as long as the remaining joints together; claws with a strongly divergent inner tooth. Type *G. morsus*, sp. nov.

Goniocolletes morsus sp. nov.

♂. Length about 13 mm.; black, clothed with long light yellow hair, dense and golden on the face; face broad; lower edge of clypeus broadly whitish; mandibles yellowish-white except the dark apex; scape black; flagellum red; blackish

above at base; mesothorax shining, strongly and closely punctured, except an area in the middle, where the punctures are very sparse; scutellum similarly punctured; sides of metathorax coarsely roughened or very densely punctured, yet shining; area triangular, transversely rather irregularly grooved; tegulae pale yellowish; wings yellowish, nervures and stigma ferruginous; tarsi pale pellucid yellowish; tibiae suffused and stained with rufo-fuscous; femora marked much like tibiae, but anterior and middle femora entirely pallid above; abdomen black and densely punctured, except the very broad hind margins of the segments, which are pellucid shining testaceous; on the sixth segment above the long hair is fuscous, but on the first to fifth pale yellow.

Hab.—New South Wales (Amer. Mus. Nat. Hist., 304).

Lamprocolletes ruficornis, Smith, from Western Australia, shows several points of similarity, and may prove to be congeneric. It is not yet known in the male.

Crocisa quadrimaculata Rads. New South Wales (Am. Mus. N. Hist. 317). So far as I can make out from the description, this must be *quadrimaculata*, which is not a synonym of *C. albomaculata* Sm., as Friese has placed it — though with a query.

Crocisa macleayi sp. nov.


♀. Length a little over 14 mm.; black, the light markings (of pubescence) white stained with ferruginous; eyes converging below; mandibles somewhat elbowed, and with a spot of white hair at base; labrum with a low prominence on each side; clypeus rough with very dense small punctures, and with a smooth median line on its apical third; antennae black; thorax with the usual spots; pleura light haired, with two bare black spots, one above and the other below; scutellum black, the margin w-like, the points very sharp, reddish-white hair coming from beneath the middle incision; tegulae black; anterior wings very dark fuliginous, except the base (much less than half) and the usual spots, which are hyaline; marginal cell very short; tibiae and basal joint of tarsi light-haired on outer side; first four abdominal segments with two spots on each side; first also with white shoulder-spots; inner spots on second segment transversely elongated, approaching the outer, which are hardly to be seen from above; fifth segment with one spot on each side; pygidial plate very narrow, with a strong median keel, and somewhat elevated cariniform margins, ventral segments two to four with a transverse spot on each side.

Hab.—New South Wales (Am. Mus. Nat. Hist., 317 pars.).

This looks at first sight like *quadrimaculata*, but it is much larger (♀ *quadrimaculata* is 11 mm. long) and the scutellum is quite different.

The following table separates the white-spotted Australian species of *Crocisa*:—


Length 11–12 mm.; second abdominal segment with an interrupted white band;	
scutellum W-like	<i>C. rotundata</i> Friese (<i>albomaculata</i> Smith).
Second abdominal segment with four spots	1

1. Middle and hind tibiae white only at base; size large . . . *C. lugubris* Smith.
Middle and hind tibiae covered with white hair on outer side . . . 2
2. Larger, scutellum W-like *C. macleayi* Ckll.
Smaller, scutellum -like *C. quadrimaculata* Rads.

C. albomaculata Smith is preoccupied by *C. albomaculata* (DeGeer) from Africa. *C. australensis* Rads., which Friese gives as a synonym, is an entirely different, blue-spotted, species, and *C. quadrimaculata* is also distinct. The latter, however, is perhaps what Friese took for *albomaculata*, and I believe that *rotundata* Friese is Smith's species. Smith expressly says, "scutellum deeply notched."

C. australensis is evidently very close to *C. lamprosoma* Boisd., and is perhaps not to be separated from it.

Crocisa cæruleifrons W. F. Kirby. New South Wales. (Am. Mus. Nat. Hist. 316.)

Crocisa nitidula (Fabricius). Amboina, ♀ (Am. Mus. Nat. Hist.). This species was originally described from Amboina, and the specimen agrees exactly with the Fabrician diagnosis. The tarsi are wholly without light hair, and the insect is 10 mm. long or a little more, so that it agrees with Friese's brief account of his *C. nitidula tarsalis*. The scutellum, however (wholly without dark marks, or hairs protruding from beneath) is rather of the -type, certainly not a good W. The greenish-blue spots shine most brilliantly.

The *C. nitidula* of Lepeletier has a blue-spotted scutellum, and a spot on each side of the first abdominal segment, instead of a broad entire basal band. It cannot possibly be reconciled with the Fabrician insect. *C. emarginata* Lep., from New Ireland, is evidently close to the true *nitidula*, though apparently distinct; this is not the *emarginata* of Friese. The *Crocisa nitidula* of Friese, Zeits. Hym. Dipt., 1905, p. 4, may take the name *Crocisa pernitida*.

Crocisa novæ-hollandiæ Lepeletier. Amboina (Am. Mus. Nat. Hist.). A lovely species, with the light markings pale dull blue; the first abdominal segment forms a very wide W, the points forming angles slightly greater than right angles. The scutellum is all black, but the axillæ have small blue spots. The insect agrees so well with Lepeletier's description that I cannot refuse to identify it with his species; I suspect that the original locality, "Nouvelle-Hollande," may be erroneous, as no such species has been found recently in Australia, and the type was from the Dejean collection, which I have on other occasions suspected to be fallible in the matter of locality-labels.

Nomia australica Smith. New South Wales; both sexes.

Nomia amboinensis sp. nov.

♀. Length $11\frac{1}{2}$ mm.; expanse 20 mm.; a black, *Andrena*-like species with a shining nude bandless abdomen, covered at the extreme apex only with light yellowish hair. Sides of face with black hair, a little reddish near antennæ; front with punctures of two sizes; just above the clypeus is a delicately striated punctureless area; vertex with black hair; antennæ dark, flagellum faintly reddish beneath; clypeus coarsely striatopunctate, with a strong median keel and sharp raised lateral and apical margins; mandibles obscurely bifid; second joint of maxillary palpi about or nearly as long as 3 + 4; thorax above dull and granular, with very minute punctures, and scattered larger ones; hair of thorax short and black, paler on tubercles, dull white and copious on sides of metathorax; postscutellum with a large bifid prominence, the forks blunt; tegulæ large, dark coppery-red; wings very yellow; stigma and nervures clear ferruginous; second s. m. higher than broad, receiving first r. n. beyond its middle; legs black, hind tibiæ and tarsi more or less reddish; hair of anterior legs dark; of middle legs beneath fulvous, but yellowish-white on upper (outer) side of their tarsi and extreme apex of tibiæ; hind femora with a large curled dull white scopa; hind tibiæ and tarsi with much dull white hair; hind basitarsus large; abdomen with only the basal part of the segments punctured, and that not densely; base of fourth segment with long black hairs, prone and directed caudad; hind margins of ventral segments fulvous, and fringed with light hair.

Hab—Amboina (Am. Mus. Nat. Hist.).

Readily known from *N. dentata* Smith, of the Aru Is., by the black hair of face, and bifid postscutellar prominence. The scutellum is normal, a little depressed in the middle. If we admit *Hoplonomia*, *Paranomia* and *Stictonomia* as genera, this species might be regarded as the type of a new genus; but it is questionable whether so many genera should be recognized at the expense of the old *Nomia*.

***Parasphecodes tilachus* Smith.** New South Wales. (Amer. Mus. Nat. Hist.) Previously known from Tasmania.

Parasphecodes tilachiformis sp. nov.

♀. Length 8 mm. or slightly more; head and thorax black, as also legs; abdomen dark red, strongly blackened from the third segment (except its basal third) to the apex; clypeus shining, with large punctures; antennæ wholly dark, the flagellum very faintly reddish beneath apically; hair of head and thorax dull white, abundant on pleura, scutellum and sides of metathorax; mesothorax dull and granular; area of metathorax strongly longitudinally plicate, without a very distinct rim; tegulæ black with a slight red tint; wings smoky, especially at apex, but not especially yellowish; stigma dark ferruginous; nervures fuscous; second s. m. much smaller than third, and conspicuously higher than broad, receiving first r. n. in its apical corner; legs with abundant short dull white hair; spurs ferruginous, hind spur simple; abdomen robust, dullish, with much short dull whitish hair, black on the black areas; venter with coarse dull white hair, which appears to have carried some pollen. In my table of *Parasphecodes* (Am. Mag. Nat. Hist., Sept. 1904) this runs

out, because the first r. n. does not meet second t. c., and the abdomen is not bright red. Putting aside the slight difference in venation, *P. tilachiformis* would run to *P. tilachus*, except that the ridge behind area is not very prominent, and the outer nervures are little weakened. The abdomen is much darker than in *tilachus*, with much more abundant though prevailing shorter hair; the tegulae and flagellum are also darker, as also is the stigma. There are no lateral hair-patches on the abdomen.

Hab.—New South Wales (Amer. Mus. Nat. Hist., 322).

Parasphecodes froggatti Ckll. New South Wales; two males. The antennae (which were broken in the type) are very long, with the flagellum entirely black, varying to dull ferruginous beneath.

Binghamiella (gen. nov.) *antipodes* (Smith).

♀. Superficially like *Sphecodes*; but basal nervure only gently curved; second submarginal cell very broad, receiving the first recurrent nervure about its middle, its breadth below twice as great as that above; basal nervure meeting transversomedial, which is very oblique; stigma large; mandibles tridentate; spurs yellowish white, hind spur simple; face and clypeus shining, with very large punctures; scutellum with very large punctures; area of metathorax distinct, longitudinally plicate; each side of metathorax with two dentiform angles; abdomen shining, sparsely punctured; scopa of hind legs white and silky; apex of abdomen with a small shining pygidial plate; venter hairy.

In Ashmead's tables this runs to *Callomelitta*, which is, however, very different in appearance, and would not at first sight be associated with it. Colonel Bingham, who kindly examined Smith's type of *Sphecodes antipodes* for me, wrote that it was not a *Sphecodes*, but should be placed in a distinct genus close to *Callomelitta* but differing in the shape of thorax, pubescence on hind tibiae, etc. It is possible that *Binghamiella* should be considered only a subgenus of *Callomelitta*, but I think Col. Bingham is correct in regarding it as a distinct genus.

The specimen in Amer. Mus. N. H. (No. 323) is from New South Wales.

I have given an account of *Callomelitta* in Trans. Amer. Ent. Soc., XXXI, p. 318.

Prosopis elegans Smith. New South Wales. Previously known from Adelaide. It is allied to *P. sydneyana* Ckll., but larger, length about 9 mm. (♀):

Prosopis rotundiceps Smith. New South Wales; both sexes. Previously only known in the ♀, from Melbourne. The male, except for its larger size, agrees with the insect described as the ♀ of *P. metallica* Smith. The clypeus is yellow with the lower edge black, and the large semilunar lateral marks reach the level of the antennae. There is no supraclipeal mark. The sides of the scutellum and postscutellum are black. The ven-

tral surface of the abdomen is without tubercles. The female has a small supraclypeal mark, not mentioned by Smith. Judging by the description, I cannot help suspecting that *P. obtusata*, Smith, is a variety of *rotundiceps*.

Prosopis alcyonea Erichs. New South Wales; both sexes. By the structure of the third abdominal segment in the male, this species, with *P. bidentata*, Smith, and *P. bituberculata*, Smith, form a little group. Erichson described only the female of *P. alcyonea*.

ROCKY MOUNTAIN BASIN DEPOSITS

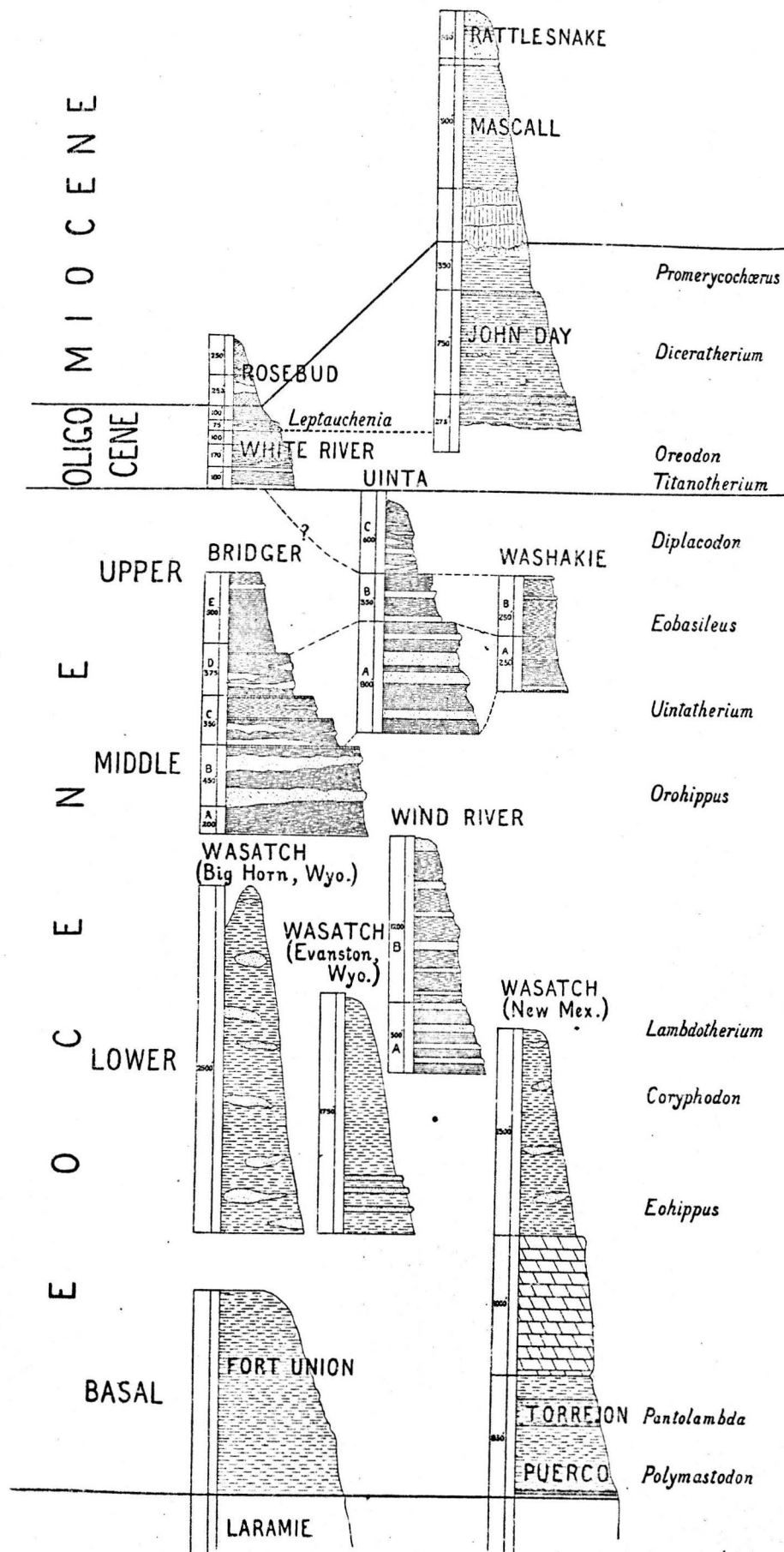


Fig. 1.—COMPOSITE SECTION OF THE EOCENE AND OLIGOCENE
Net Thickness of Eocene, 7200 ft.