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Descriptions and Records of Bees - XXXVI

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Descriptions and Records of Bees.—XXXVI.

By T. D. A. COCKERELL, University of Colorado.

Megachile rufovittata, Ckl.

The United States National Museum contains one of each sex, collected by T. Fukai at Horisha, Formosa. I also find a male in the Sauter collection from the Berlin Museum, collected at Kanshirei, Formosa, June 8, 1908. The male is about 12 mm. long, narrow, with pubescence much as in the female, the abdomen with narrow entire red hair-bands, and some red hair in the basal depressions of the segments, the face with much red hair, the vertex and disc of thorax with a good deal of black hair. The mandibles are quadridentate, the teeth sharp, the second one smaller than the others; antennæ long and black; anterior coxæ with short spines, hidden among the hairs; anterior tibiæ and tarsi simple; sixth abdominal segment retracted, its upper surface granular, elevated in the middle, and with only scattered erect dark hairs in the Kanshirei specimen, but in the other with some appressed pale yellow tomentum in the middle; margin of

sixth segment broadly rounded, strongly notched in the Kanshirei specimen, slightly in the other, not at all dentate; no subapical ventral teeth. The male of *M. rufovittata* has a rather close superficial resemblance to *M. rotundipennis*, W. F. Kirby, from Christmas Island.

Megachile igniscopata, sp. n.

♀.—Length 13 mm.

Closely resembling the Australian *M. pictiventris*, Smith, but with the mesothorax shining, and sparsely punctured in the middle; the shovel-shaped abdomen has distinct metallic purple tints, narrow dull white hair-bands, evanescent in the middle, and ventral scopa bright orange fulvous, with a few slightly fuscous hairs at the apex of the last segment. In Bingham's table of Indian species it runs to *M. chlorigaster*, Cam., a much smaller species. Hair of head and thorax mainly white, dense and with a slight creamy tinge on front, tubercles, and sides of metathorax; on vertex it is black, and on mesothorax, where it is very thin and inconspicuous, largely black, but on scutellum it is all pale; mandibles quadridentate, the third tooth extremely broad; clypeus normal, densely punctured, with a smooth median band, which forms a T with a smooth band along the lower margin of the supraclypeal area; eyes dark reddish; sides of vertex shining, with strong well-separated punctures; antennæ and tegulæ black; scutellum smooth and shining in front, otherwise well punctured. Wings hyaline, strongly and broadly darkened along apical margin; abdomen with small, distinct, well-separated punctures; legs black, with pale hair, that on inner side of tarsi ferruginous; hind basitarsus broad and flat; claws with a basal tooth.

Hab. Takao, Formosa, October 11, 1907 (*Sauter*). Three females in Berlin Museum.

Megachile spissula, sp. n.

♀.—Length $10\frac{1}{2}$ mm.

Black, including legs and antennæ, narrow and parallel-sided, very closely resembling the American *M. subexilis*, Ckll.; pubescence rather dull white, forming very narrow entire bands on the hind margins of the abdominal segments; ventral scopa white, with a slight creamy tint, on the last segment very short and pale reddish. Head oblong, elevated posteriorly; eyes dark brown; mandibles broad, rugose, quadridentate, the teeth short; sides of face with spreading

white hair; clypeus very densely punctured, not keeled, its lower margin in the middle with a pair of small nodules, and projecting between them a tuft of pale orange hair; supra-clypeal region elevated, convex, very densely punctured, the punctures running into striae; front very densely punctured; vertex with extremely large separated punctures; punctures on mesothorax and scutellum large and distinct (but not so large as those on vertex), those on mesothorax more or less running into striae; area of metathorax granular; hind part of mesothorax with a few hardly noticeable brown hairs; tegulae piceous. Wings dusky; anterior tibiae and tarsi with bright ferruginous hair on inner side; hind basitarsi broadened and flattened, with red hair on inner side; spurs light reddish. Abdomen finely but very distinctly punctured, segments 2 to 4 very strongly transversely sulcate, the punctures beyond the sulcus larger than those before.

Hab. Formosa (*Sauter*). One female in Berlin Museum.

In Bingham's table of Indian species this runs to *M. cephalotes*, Smith, which has a quite differently shaped head. The second and third joints of the maxillary palpi are very bristly; the claws have no basal tooth; the last abdominal segment is higher than long, vertically descending until it bends to form the apical lip; these characters, with the narrow form and general structure and appearance, justify the inclusion of *M. spissula* in Robertson's subgenus or genus *Oligotropus*, hitherto known only in the North American fauna.

Megachile tranquilla, sp. n.

♀.—Length 8–9 mm.

Black, with black and white hair, the abdomen with conspicuous narrow entire white hair-bands; ventral scopa white, suffused in the middle with ferruginous, on last segment black; form rather compact; general appearance exactly like the European *M. rotundata*; it may be known from *rotundata*, and also from all the closely allied Formosan species, by the dense white hair of the front having conspicuous black hairs intermixed. Another very similar species is the Australian *M. quinquelineata*, Ckll., but this has the hair on inner side of hind tarsi purplish black, whereas in *M. tranquilla* it is clear ferruginous. Other close allies are *M. seychellensis*, Cam., from the Seychelles Islands, and *M. palmarum*, Perkins, from the Hawaiian Islands.

Mandibles quadridentate; hair of head white, black on vertex, and mixed with black on front; clypeus very densely

punctured, but shining, not keeled, the lower margin finely crenulate or nodulose; supraclypeal area shining, sparsely punctured in middle; vertex, mesothorax, and scutellum closely and finely punctured; hair of thorax white, abundant, but black on disc of mesothorax, and much long black hair on scutellum; tegulae dark brown. Wings slightly dusky. Legs with silvery hairs, those on inner side of tarsi orange-ferruginous; spurs ferruginous; hind basitarsi broad and flat. Abdomen black between the bands, with short black hair.

Hab. Formosa (*Sauter*). Two females in Berlin Museum. The type is from Taihanroku, June 11, 1908; the other from Takao, Oct. 1, 1907.

Megachile rivator, sp. n.

♀.—Length about 12 mm.

Black (including legs), but flagellum ferruginous beneath; form rather narrow and parallel-sided; pubescence pale ochreous, white ventrally, the ventral scopa white at base, otherwise light fulvous, strongly fulvous apically; general form and appearance (except for the yellowish pubescence) like the American *M. soledadensis*, Ckll.

Mandibles quadridentate; clypeus densely punctured, but with a broad shining median low ridge, not amounting to a keel; supraclypeal area with its lower part bare and shining, front covered with dense ochreous hair, with no black intermixed; hair of vertex rather dark reddish; vertex with fine punctures; mesothorax and scutellum finely and very densely punctured; thorax thickly clothed with ochreous hair, short and darker, but not fuscous, above, white beneath; tegulae reddish with pallid margins. Wings slightly dusky. Legs with shining white and pale yellow hair, ferruginous on inner side of tarsi; hind basitarsus broad and flat; spurs very pale; claws with a basal tooth. First abdominal segment with much ochreous hair, the others with conspicuous narrow entire ochreous hair-bands; apical segment obliquely descending, its lateral profile making an angle of perhaps 45 degrees.

Hab. Takao, Formosa, Sept. 29, 1907 (*Sauter*). Two females in Berlin Museum.

A series of 19 other females collected by Sauter in Formosa were at first separated on superficial appearances, seeming smaller and more compact (length 9 to 10 mm), with cordate abdomen. These prove on examination to be *M. rivator*, varying in size, and with the abdomen retracted. They are all from Takao, collected in September and October.

Megachile abluta, sp. n.

♀.—Length $9\frac{1}{2}$ – $10\frac{1}{2}$ mm.

Size, colour, and appearance exactly as in *M. rixator*, but readily separable by the following characters: hair of last ventral segment black; hair of vertex fuscous; clypeus densely punctured, without any median smooth line; flagellum not red beneath; hair on inner side of tarsi very pale; ventral scopa usually paler, the basal half white; otherwise the two are essentially the same.

♂.—Length 7–9 mm.

Face densely covered with pale ochreous hair; flagellum black; anterior coxæ with short black spines; anterior tibiae and tarsi simple, the tarsi red at apex; sixth abdominal segment bilobed, the lobes rounded, the dorsal surface with a large kidney-shaped dense patch of pale hair; no subapical ventral teeth.

This male looks just like the Australian *M. sequior*, Ckll., except that it lacks the thoracic hair-spots conspicuous in *sequior*. It is even more like the European *M. apicalis*, which is without the hair-spots, but *M. abluta* has a fairly evident pallid band in the scutello-mesothoracic suture, wanting in *apicalis*. In *apicalis* the margin of the sixth abdominal segment is denticulate, which is not at all the case in *abluta*. The kidney-shaped patch of hair is more extensive in *apicalis*, almost entirely covering the dorsal surface of the sixth segment.

Hab. Formosa (*Sauter*). 31 females and 34 males in Berlin Museum. The type is a female from Takao, Aug. 23, 1907. All the females come from Takao, July to October. The males bear the following data: Takao, May 3, and July to October; Taihanroku, June and July; Koroton, Sept. 8; Kagi, Aug. 29.

Megachile subusta, sp. n.

♂.—Length 11–12 mm.

In nearly all respects exactly like the male of *M. rufovittata*, but with the hair of the vertex and thoracic dorsum entirely ferruginous, without any fuscous or black. On the disc of the mesothorax the punctures are close, yet the shining surface is clearly visible between them, whereas in *rufovittata* this is not the case. The abdomen is much less closely punctured than in *rufovittata*; thus the disc of the fourth segment is closely punctured in *rufovittata*, sparsely

in *subusta*. The anterior and middle tarsi have long fringes of white hair behind.

Hab. Formosa (*Sauter*). Five males in Berlin Museum. The type is from Koroton, first half of September, 1907. Two are from Koroton, Sept. 8; two from Kagi, Aug. 20.

M. subusta and *rufovittata* are certainly distinct species, yet extremely closely allied.

Megachile aspernata, sp. n.

♂.—Length about 10 mm.

Black, with pale pubescence, which is white beneath and on legs, above ochreous-tinted; head broad, eyes pale greenish, moderately converging below; flagellum ferruginous beneath; front very densely and minutely granular-punctate, concave on each side; vertex finely irregularly punctured; mesothorax and scutellum very densely granular-punctate, like front; area of metathorax dull; tegulae rather light brown, with pallid margins. Wings hyaline; second r.n. ending nearly as far from end of second s.m. as first from its base. Legs black; anterior coxae with strong spines; anterior femora with inner surface pale ferruginous; their tibiae a little reddish apically, and behind with a brush of white hair; their tarsi with the first joint bearing a hollow, boat-shaped scale or lobe, which is pale ferruginous; the anterior and middle tarsi are fringed with white hair behind, the middle ones not only have a large thick fringe, but the outer surface is densely covered with hair; the hind tarsi have a fringe of white hair in front. Abdomen rather short, finely and closely punctured, with coarse hair-bands; sixth segment with the projecting edge broadly rounded, emarginate in middle, and coarsely toothed; dorsal surface of sixth segment almost wholly covered with a dense mat of creamy-white hair; no subapical ventral teeth; margins of third and fourth ventral segments each with a little semicircular patch of glistening appressed pale yellow hair, quite distinct from the other pubescence.

Hab. Takao, Formosa, July 1, 1907 (*Sauter*). One male in Berlin Museum, the dorsal pubescence in poor condition.

Very distinct from all other Formosa species by the character of the anterior legs; the dentate margin of the sixth abdominal segment recalls the much larger and otherwise quite different *M. kagiana*. I cannot find any species very closely related to *M. aspernata*.

Megachile dinura, Ckll.

A female from Foochow, China (*H. R. Caldwell*), in the U.S. National Museum, cannot be separated from the Formosan *M. dinura*. It is in poor condition, having apparently been in alcohol.

Anthopora zonata (L.).

The Sauter collection from Formosa contains a long series of *A. zonata*, or what has passed everywhere as the Linnean species. The females include eleven from Takao, August to December, and ten without precise locality. The abdominal bands vary from bright blue to pale green, but I cannot distinguish more than one species. So far as the females go, there is no apparent difficulty in assigning them to *A. zonata*, and, according to current usage, the name var. *subcærulea* (Lep.) is applied to those with pale bands. An examination of the males reveals a curious state of affairs. The colour of the abdominal bands varies as in the females, but there are other good characters separating the specimens into three groups, as follows:—

- (1) *A. zonata* proper, in the sense of Lepeletier and Dours. Face-markings creamy white; clypeus with only a narrow black band on each side; hair of hind basitarsus entirely black; fifth ventral segment black, with black hair, its apical margin broadly excavated or emarginate; last ventral keeled. Thirty specimens; Takao, August to October; Taihanroku, June 11.
- (2) *A. korotonensis*, nov. Face-markings light primrose-yellow; bands at sides of clypeus rather broad, but essentially as in *zonata*; outer side of hind basitarsus with much white hair; fifth ventral segment very dark reddish, black-haired, with a tuft of white hair on each side (small white tufts also in *zonata*), the apical margin broadly excavated, but also depressed in middle. Koroton, Sept. 8, 1907. One specimen.
- (3) *A. calceifera*, nov. Face-markings coloured as in *zonata*, but black marks at sides of clypeus large, notched below, having the form of a boot (in a single specimen the marks are narrower and band-like); hind basitarsi with a good deal of white hair on outer side; fifth ventral segment coloured like

the others, except that there is a subapical, round, suffused, black spot, the hind margin in middle straight, neither excavated nor depressed; last segment with a round shining depression, in which is a strong carina. Twenty-three specimens. Takao, March, April, August, October; Koroton, Sept. 8, 1907.

Two other forms come from the Asiatic mainland:—

- (4) *A. caldwelli*, nov. Face-markings pale yellow as in *korotonensis*, but marks at sides of clypeus large and notched below, shaped entirely as in *calceifera*; hind basitarsus with some white hair, especially at base; fifth ventral segment black, except for the tuft of white hair on each side, its margin broadly shallowly excavated; abdominal bands light blue. Foochow, China (*H. R. Caldwell*). U.S. National Museum. I have erroneously determined this as *A. zonata*.
- (5) *A. subcærulea*, Lepeletier. Face-markings very pale yellow; clypeus with very large quadrate black patches as in the female; hind basitarsus without white hair; fifth ventral segment with hind margin straight. Kalutara, Ceylon, March 1910, 2 ♀, 1 ♂ (*E. Comber*); Nasik, India, Sept. 1908 (*E. Comber*). British Museum.

I suppose that this is Lepeletier's *subcærulea*, as he describes the sexes as having the face-markings alike. The female agrees well with the description, except that the antennæ are red beneath from the end of the third segment, and the fifth abdominal segment has black hair in the middle and white at the sides (instead of the two intermixed). The abdominal bands are pale blue, as in *caldwelli*.

From the standpoint of genetics the above insects are extremely interesting. The differences may be regarded as plus and minus variations, corresponding probably to Mendelian allelomorphic pairs, as follows:—

- (1) Face-markings yellow (+) or white (−).
- (2) Marks at sides of clypeus like female (+), or boot-like (first reduction stage) or narrow bands (second reduction stage).
- (3) Hind basitarsus with hair all black (+) or partly white (−).
- (4) Fifth ventral segment entire (+) or emarginate (−).

According to this scheme the several forms may be tabulated thus :—

	Face-markings. (Colour.)	Marks at side of clypeus.	Hind basi- tarsus.	Fifth ventral segment.
<i>A. zonata</i>	—	— (2)	+	—
<i>A. korotonensis</i> ..	+	— (2)	—	—
<i>A. calceifera</i>	—	— (1)	—	+
<i>A. caldwelli</i>	+	— (1)	—	—
<i>A. subcærulea</i>	+	+	+	+

According to this plan, *A. subcærulea* seems to be the stem-form, while the others represent various degrees of reduction. *A. korotonensis* would seem to have been derived from the Chinese *caldwelli*; while *zonata* and *calceifera* may represent independent derivatives from *subcærulea*. It is possible, however, that the forms inhabiting the same region (as *zonata* and *calceifera* in Formosa) may freely cross, with Mendelian results, in which case *calceifera* cannot be considered a valid species. Against this last supposition is the fact that the several characters seem to go together, with the single exception in regard to the clypeal marks mentioned under *calceifera*.

Still another form from North-west India may be described as follows :—

Anthophora comberi, sp. n.

Hair of head and thorax above pale reddish mixed with black, as in *zonata*; abdominal bands very brilliant shining turquoise-blue; face-markings light yellow; size of *zonata*.

♂.—Lateral markings of clypeus reduced to small pyriform sutural spots (a third reduction stage); hind basitarsus with a few white hairs at extreme base; fifth ventral segment *elevated* in middle and broadly emarginate (Nasik, = type).

♀.—Clypeal marks large and elongate-quadrate, shaped as in *subcærulea*, and with the median yellow band broad; spots at basal corners of labrum small; hind basitarsi with the hair all black; light hair of legs white, with a brown stain apically on middle tibiae. Hab River, Karachi, Sept. 1909.

Hab. Nasik and Hab River (*E. Comber*). British Museum.

In the above scheme this will stand as +, — (3), +?, —. This is a considerably larger insect than *A. subcærulea*.

