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XXV.—Descriptions and records of bees.—XC

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THE ANNALS

AND

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XXV.—*Descriptions and Records of Bees*.—XC.
By T. D. A. COCKERELL, University of Colorado.

Anthophora optima, sp. n.

♀.—Resembling *A. bipartita*, Sm., in colour and appearance, the thorax having black hair in front, fulvous posteriorly, and the wings dark fuliginous. It differs from *bipartita* in being considerably larger, length 22·5 mm., anterior wing 17; second s.m. very broad, receiving first r.n. beyond middle; hair about ocelli entirely black, with a rusty tint, though there is much dull white hair (mixed with black) on face; clypeus and labrum without light markings; mandibles entirely black; first abdominal segment fulvous-haired (black-haired in *bipartita*); wings darker, not reddish. The hair on the legs is entirely black. The ocelli are reddish, and in a wider triangle than those of *bipartita*.

In Friese's key this falls next to *A. semirufa*, Friese, and *A. basalis*, Sm., but is much larger, and otherwise different.

Maooki, Lydenburgh, Transvaal (*F. J. Kroegor*). South African Museum, to which the unique type will be returned.

Anthophora fallax, Smith.

The face-markings of the male are like those of female *A. circulata*, Fab.

K. Kloof, Natal (*Marley*). Male, Jan. 15.

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Anthophora oldi lusoria, subsp. n.

♀.—Superficially like *A. rhodesiæ*, M.-W., but with the differential characters of *A. oldi*, M.-W. It differs from typical *oldi* in having the thoracic hair if anything a little richer red than in *rhodesiæ*, the very broad clypeal band, labrum and base of mandibles white instead of yellow (they are extremely pale yellow in *rhodesiæ*), and the anterior tarsi with much black hair. The wings in this and *rhodesiæ* are very decidedly dusky, though Meade-Waldo wrote "hyaline." The second submarginal cell is more contracted above than in *rhodesiæ*, but the difference is slight.

Gwelo, S. Rhodesia (*Miss Skaife*). South African Museum.

This seems to connect *rhodesiæ* with *oldi*, but is recognisably distinct from either.

Osmia forficulina, sp. n.

♂.—Length about 15 mm., or 17 if the tail is fully extended instead of being curved downward.

Rather narrow, black, with the hind margins of the first five abdominal segments dark coppery red; head and thorax with white hair, especially long and abundant on face and cheeks; head broad; malar space obsolete; mandibles acutely tridentate; antennæ black, the scape robust and very finely punctured; front dull and extremely densely and finely punctured; mesothorax and scutellum dull, as densely and finely punctured as possible; area of metathorax with basal half dull and rough, the apical half shining; tegulæ large, dark brown, with the outer margin whitish. Wings translucent, but strongly brownish; b.n. going basad of t.-m.; second s.m. long, receiving first r.n. as far from base as length of first t.-c. Legs black, with long white hair, fulvous on inner side of tarsi; spurs pale reddish. Abdomen with little hair, forming white bands at sides of segments only (probably more evident in fresher specimens), segments very densely and closely punctured, but glistening; second and third segments with a conspicuous transverse basal depression; sixth segment with the hind margin distinctly elevated, subtruncate, shallowly emarginate in middle; seventh segment produced into a pair of long stout straight divergent spines, about 1.5 mm. long; no ventral tubercles or teeth. The pulvilli are large.

Likhoec, Basutoland (*Dieterlin*). South African Museum.

Entirely unique by the large size and carwig-like tail, which is curved downward and inward.

Crocisa plumifera, Brauns.

♀.—Matroosberg, Ceres Div., 4500 ft., Nov. 1917 (*Lightfoot*). South African Museum.

This agrees with Brauns's description ; his type came from Willowmore.

Epeolus amabilis, Gerstaecker.

♀.—Henkries, Bushmanland, Oct. 1911 (*Lightfoot*).

Agrees with specimens from Willowmore (*Brauns*) and one from "Cape of Good Hope" (F. Smith collection, labelled *variegatus*).

Epeolus amabilis rhodesicus, subsp. n.

♀.—Length a little over 8 mm.

Robust, black, with the clypeus except middle and upper part, labrum, mandibles, prothorax with tubercles, ends of the large axillar teeth, and two spots on the strongly bigibbous scutellum, ferruginous ; pale markings due to hair dull white ; scape red at base and apex ; flagellum black, red at base beneath. In *amabilis* the interrupted apical hair-band on second abdominal segment has its upper edge straight, but in *rhodesicus* the ends of the two sections of the band are swollen or bulbous, while the anterior lateral patches on the same segment are large and rounded. All the femora in *rhodesicus* are mainly black ; in *amabilis* the anterior femora are red.

Salisbury, S. Rhodesia (*D. Dodds*). South African Museum.

Possibly a distinct species, but the characters are slight. The mesopleura has a red patch, but is not entirely red as in *E. incrassatus*, M.-Waldo, and while *rhodesicus* and *incrassatus* are evidently allied, it does not appear probable that they are sexes of one species.

POLYGLOSSA, Friese.

Friese published this genus in 1909, basing it on four South African species, known only in the male sex. *P. capensis*, Fr., is herewith designated the type. In 1912, Friese described the female of *capensis*. *Polyglossa* consists of bees having the appearance of *Andrena*, but with only two submarginal cells, and the tongue formed as in *Colletes*. I have never seen any of the original species, and am by no

means sure that the forms described below are truly congeneric. The interesting point is, that we have the subfamily Diphaglossinæ, so characteristic of Australia, New Zealand, and South America, clearly represented in South Africa. It is also remarkable that the female, which though a different species from the males, seems to be certainly congeneric, has depressed facial foveæ as in *Andrena*, though they are not hairy. I trust that Dr. H. Brauns, of Willowmore, who informs me that he is again actively engaged in the preparation of papers on South African bees, will be able to obtain fresh material of the various South African Diphaglossines, and establish the several genera on a firm foundation.

Polyglossa heterodoxa, sp. n.

♂.—Length about 13 mm., rather narrow; anterior wings 8.5 mm. long, not reaching to end of abdomen.

Black, with the anterior tibiæ mainly bright ferruginous, the anterior knees and small joints of all the tarsi also reddened; head and thorax with very abundant long hair, mainly white, but tinged with ochreous on scutellum and metathorax; head broad; malar space very short; mandibles long, with an inner tooth a considerable distance from the apex; tongue as in *Colletes*; maxillary palpi short, 6-jointed; labial palpi with four subequal joints, but the first is somewhat longer than the second, and the slender fourth joint is longer than the third; scape black, curved, with long hair; flagellum moderate, ferruginous, not at all moniliform; front dull and granular, but there is a smoother channel on each side; ocelli rather large, in a curve; mesothorax and scutellum shining, coarsely punctured; area of metathorax triangular, the basal part rugose, the apical shining; tegulæ piceous with a hyaline margin. Wings hyaline, nervures fuscous, the very narrow stigma ferruginous, with a fuscous margin; marginal cell narrowly rounded at end, with a slight appendiculation; b.n. falling some distance short of t.-m.; two long submarginal cells, the second receiving both recurrent nervures, the first near the base, the second a considerable distance from the apex, second submarginal very broad above; second recurrent nervure without any trace of the *Colletes* curve. Hind femora greatly enlarged, broadly oval; hind tibiæ broadened, with an enormous anteriorly directed apical expansion or lamina, triangular, the outer surface shining, and with an obtuse angle near its base below. Abdomen with long pale hair, tinged with ochreous, on first

two segments, on the third and fourth segments the hair is mainly dark chocolate, becoming black in the apical region, but segments 2 to 4 have thin white hair-bands; apical plate shaped like a broad leaf, with an acute point; first four dorsal segments rugoso-punctate, but glistening; fifth shining, with rather sparse weak punctures; fifth ventral segment polished, with a conspicuous tuft of hair at each posterior corner.

Cape Town, 1914 (*F. Foly*). Two males. South African Museum.

The hind legs resemble those of *Nomia*. (Frieese says of *P. capensis*, "Femur verdickt, Tibie kantig"; his figure shows nothing unusual.) Such modifications of the legs, or more or less similar ones, occur in the Diphaglossinæ; thus, indications of the tibial lamella may be seen in *Nomiocolletes joergenseni* (Fr.), from the Argentine, which Frieese actually described as a *Nomia*. The apical plate of the *Nomiocolletes* ♂ is broadly rounded or subtruncate, not at all pointed. The point is also entirely lacking in *Pasiphaë*, which has two submarginal cells.

Polyglossa peringueyi, sp. n.

♀.—Length about 13 mm.

Very much like *P. heterodoxa*, except for the usual sexual differences, and with the same venation, though the wings are strongly suffused with brown. The hair of head and thorax is ochreous-tinted throughout, and is strongly fulvous on scutellum. The vertex has long black hair mixed with the reddish, and there are dark hairs in the scutellar region. There is a marked discrepancy in the mouth-parts, which are extended and clearly visible. The labial palpi have the first joint very stout, and much longer than the others. The maxillary palpi have the first three joints relatively large, the last three small, the second and third equal and longer than the first. I cannot see any tongue at all.

Clypeus very densely punctate, with a broad smooth median line; inner tooth of mandibles not salient, but separated by a deep groove; flagellum red beneath, but black above; front dull, but with shining lateral depressed foveæ, about the width of an ocellus; mesothorax and scutellum very rough, densely and coarsely punctured; area of metathorax broad triangular, the basal half rugose; anterior tibiæ black, with a red area in front; hair of legs mainly ochreous, bright fulvous on inner side of tibiæ and tarsi, mainly dark chocolate or black on outer sides of tarsi

and of middle and hind tibiae; hind tibial scopa long, bright ferruginous on inner side; hind tibial spurs ferruginous, very long and straight, reaching considerably beyond middle of basitarsi; abdomen shining, with very weak scattered punctures; no covering of long hair as in *P. heterodoxa*, but hind margins of first four segments with rather thin pale ochreous-tinted hair-bands, weak on first; apex with black hair, not forming a large tuft. Claws simple, and pulvillus very large. (In the male *P. heterodoxa* the claws are cleft.)

Knysna, C.C., Oct. 1916 (*L. Peringuey*). South African Museum.

Friese states that the female *P. capensis* looks extremely like *Andrena symphyti*, Pérez. The present insect could easily be taken, on superficial examination, for *A. flavipes*, Panz (*fulvicrus*, Kirby). Whether it is really a *Polyglossa*, or congeneric with *P. heterodoxa*, may well be doubted, but if a new genus is to be defined, it should be based on more ample materials.

Lithurgus atratiformis, Cockerell.

Mfongosi, Zululand, March 1916 (*W. E. Jones*). South African Museum.

Two females, which I cannot distinguish from the Australian *L. atratiformis*. Presumably the species has been introduced from Australia.

Lithurgus patruelis, sp. n.

♂.—Length about 9.5 mm., anterior wing 7.3 mm.

Similar to *L. capensis*, Friese, but differing thus: eyes pale grey; the abundant long hair of face white, and that of vertex creamy (in *capensis* the hair of front and upper part of face, and of vertex, is reddish fulvous); third antennal joint shorter and broader; hair of sides of thorax entirely white, and of dorsum only feebly tinted with ochreous; tegulae pale testaceous (black or nearly in *capensis*). Wings more strongly reddened; second s.m. broader above, its side on marginal greater than its side on first s.m. (the reverse is true of *capensis*); hind spurs cream-colour (ferruginous in *capensis*); hair on under side of abdomen clear white.

Bulawayo, S. Rhodesia, May 1917 (*R. W. Tueker*). South African Museum.

Morgania barkeri, Cockerell.

Mfongosi, Zululand, March 1917 (*W. E. Jones*). South African Museum.

Morgania jonesi, sp. n.

♀.—Length about 10 mm., anterior wing 8·4 mm.

Black, with snow-white pubescence covering clypeus, sides of face, lower part of sides of front, cheeks, upper border of prothorax (but not tubercles), a broad band across mesopleura and broad bands on metathorax, as well as posterior corners of mesothorax; head transversely oval, face very broad; mandibles black; labrum large, roughened all over, except a small shining apical spot; vertex shining, with large punctures; antennæ long, entirely black, third joint about or nearly as long as next two united, flagellum thick; mesothorax shining, very strongly but not closely punctured, and with a broad median sulcus; scutellum strongly bigibbous; tegulæ black. Anterior wings rather dilute fuliginous throughout; marginal cell not as broadly truncate as in *M. barkeri*; second s.m. receiving first r. n. a little before middle, and second almost at the end. Legs entirely black, the tibiæ covered with shining white hair on outer side, the tarsi with bright orange hair on inner side; middle and hind femora robust. Abdomen shining, very minutely and not densely punctured; sides of basal segment, and broad bands on sides of second to fourth, and a complete apical band on fifth, of dense pure white tomentum, not sharply defined mesad; apex truncate, dark reddish.

Mfongosi, Zululand, 1914 (*W. E. Jones*). South African Museum.

A remarkable species, known by its black colour and strong punctures. It looks something like a small *Crocisa*.

Morgania fortis, sp. n.

♀.—Length about 12·5 mm., anterior wing 9·5 mm.

Head and thorax, mandibles, antennæ, tegulæ, and legs black; wings deep fuliginous; abdomen shining, bright ferruginous, without hair-bands or patches above or below, only the truncate apex dark; head broad; clypeus strongly produced, the whole face and clypeus with appressed very pale brown hair; mandibles very broad at base; flagellum thick; a polished space on each side of ocelli; mesothorax and scutellum closely and very coarsely punctured, the mesothorax sulcate in middle, the scutellum bigibbous; thorax with very short inconspicuous black or very dark hair; mesopleura shining, with very coarse punctures; tegulæ finely punctured; b. n. going basad of t.-m.; second s.m. large, receiving first r. n. about middle; second r. n.

meeting outer t.-c. a little on the outer side; truncation of marginal cell only moderately broad; spurs very pale reddish; abdomen with very sparse weak punctures.

Maboki, Lydenburgh, Transvaal (*F. J. Kroeger*). South African Museum.

Remarkable for the large size and clear red abdomen without hair-bands. There is some resemblance to *M. nigripes* (Friese), but the wings are quite differently coloured.

Sphecodes hemirhodurus, sp. n.

♀.—Length 5 mm.

Head and thorax black; abdomen with the first two segments bright ferruginous, the others black, except a little red at sides of base of third; mandibles bidentate, bright ferruginous in middle; face broad, covered with greyish-white hair, not hiding the clypeus, which has large punctures; flagellum clear ferruginous beneath, except at base; front and vertex well punctured; mesothorax and scutellum polished, with large sparse punctures; area of metathorax semilunar, with a few very strong irregular branching ridges, enclosing about eight areas; tegulæ very small, basally brown, apically whitish. Wings hyaline, faintly dusky, nervures fuscous, stigma very dark. Knees, anterior tibiæ in front, and small joints of tarsi ferruginous. Abdomen shining, sparsely and very finely punctured, depressed at base of second segment.

Kimberley, March 1913 (*Bro. Power*). South African Museum.

Known among the Ethiopian species by its small size. It closely resembles the European *S. affinis*, Hagens, but has the flagellum shorter and differently coloured, the sides of face much more hairy, the mesothorax with strong punctures, &c.

Crociaspidia maculata (Friese).

Mfongosi, Zululand (*W. E. Jones*). South African Museum.

Dianthidium calescens, sp. n.

♀.—Length about 11.5 mm., anterior wing 9 mm.; breadth of abdomen 4.6 mm.

Robust, entirely black, including legs, antennæ, and the closely-punctured tegulæ; clypeus very densely punctured, its lower edge crenulate, but not dentate; face and front

with abundant fulvous hair, but vertex with dark brown; mesothorax densely rugoso-punctate, entirely dull; scutellum swollen posteriorly, but rounded, entirely dull and rough, except a small shining space in middle, where the punctures are distinctly separated; thorax above with rufo-fulvous hair, strongly suffused with brown on mesothorax; on under side of thorax the hair is very pale, but not pure white. Wings dark grey, with lilacine tints, upper half of marginal cell dark brown; b.n. going basad of t.-m.; second r.n. going beyond end of second s.m. as much as first r.n. is beyond first t.-c. Anterior tibiæ and tarsi with long hair behind; middle and hind tibiæ with bright ferruginous hair on inner side; pulvilli small, but distinct. Abdomen broad, well-punctured, first segment with long ochreous hair; second and third with ochreous basally, fuscous to black apically; fourth to sixth with coarse but not dense black hair; ventral scopa reddish yellow, dark ferruginous on last segment.

Montague, C.C., Oct. 1917 (*E. P. Phillips*). South African Museum.

Closely related to *D. trachusiforme* (*Anthidium trachusiforme*, Friese), from Ookiep, about 300 miles north of Cape Town. It differs from Friese's species in being larger, without distinct teeth on clypeal margin, and with much black hair on abdomen. *D. trachusiforme* is described as 10 mm. long and 4 mm. broad.

Hypanthidium chionopodum, sp. n.

♀.—Length about 7.5 mm., anterior wing 6.2 mm.

Compact and robust; entirely black, including mandibles, antennæ, tegulæ, and legs, but hind margins of abdominal segments 2 to 5 narrowly pellucid; front and sides of face with long white hair; clypeus densely punctured, with thin dull white hair (no black or brown), its lower margin rather indistinctly crenulate; vertex with long black hair, but that of occiput pure white; sides of thorax with dense pure white hair, but dorsum with thin white hair, and long black hairs intermixed; mesothorax and scutellum densely punctured but glistening; scutellum with the edge rather sharp, but not much produced, the margin except at sides nearly straight; tegulæ feebly and sparsely punctured. Wings dusky, dark brown in upper half of marginal cell, and more suffusedly at apex; b.n. going far basad of t.-m.; first r.n. strongly curved; second r.n. going a short distance beyond end of second s.m. Anterior tarsi clear ferruginous apically;

all the tarsi with dense white tomentum on outer side, and dark fuscous hair on inner. Abdomen shining, finely punctured, with tufts of pure white hair at extreme sides; ventral scopa glistening white; no pulvilli.

Krantz Kloof, Natal, 1.10.16 and 2.10.16 (*Marley*, 1023). South African Museum.

This nearly agrees with Cameron's description of *Anthidium melanosomum*, from Grahamstown, but in his insect the apical slope of clypeus is said to be smooth and impunctate, and the clypeus has fuscous hair. Unless Cameron's description is erroneous, the species must be distinct. It is also very like *A. lanipes*, Friese, but that insect seems to have no dark hair on head or thorax. *A. lanipes* is recorded from "Marienhof (Ukerewe Insel), Deutsch Ost-Afrika," so one would expect it to be distinct. Possibly the three species are all races of one, but this cannot be definitely affirmed at present.

Anthidium albolineatum, sp. n.

♀.—Length about 7.5 mm., anterior wing 6 mm.

Compact and robust, black, without light markings, except that abdominal segments 1 to 5 have very narrow white tegumentary bands; sides of face, cheeks, and sides of thorax with abundant white hair; mandibles light ferruginous apically, but the teeth black; clypeus simple, very densely punctured, elevated in middle; vertex and front dull and very densely punctured; mesothorax and scutellum closely punctured, but glistening between the punctures; margin of scutellum produced over metathorax, but not acute; hair of thorax above scanty and pale, with some brownish intermixed, but not easily seen; vertex with long dark fuscous hair, contrasting with the shining white hair of occiput; tegulæ shining piceous, with the margin white. Wings slightly dusky; b. n. going a short distance basad of t.-m.; second r. n. meeting outer t.-c., a little on the outer side. Legs with pale hair, dark rufous on inner side of tarsi; spurs creamy white. First ventral abdominal segment marked with ferruginous; ventral scopa long and pure white; abdomen above very thinly hairy, many of the hairs brown; no pulvilli.

Mfongosi, Zululand, April 1916 (*W. E. Jones*). South African Museum.

On account of the black head and narrow abdominal bands, this resembles *A. capense*, Cam.=*burorum*, Brauns (both names published in 1905), but the scopa is quite differently coloured.

Megachile melliferina, Cockerell.

Pilgrim's Rest, Transvaal (*L. Schumke.*) South African Museum.

Magachile pernicioso pallipennis, Friese.

Smithfield, O.R.C. (*Kannemeyer.*) South African Museum.

Andrena vierecki, Cockerell.

Boulder, Colorado, April 15, 1920, ♀ (*Elery R. Becker.*)

Andrena beckeri, sp. n.

♀.—Length 7 mm., anterior wing 5.8 mm.

Black, of ordinary form, resembling the species allied to *A. nasoni*, Rob., but without the broadly cuneate hind tibiae. Head and thorax with long pale greyish hair, except dorsally, where it is rich fulvous, becoming exceedingly rich ferruginous on scutellum; head broad, facial quadrangle much broader than long; malar space linear; process of labrum emarginate; clypeus shining, with sparse but distinct punctures, arranged more or less in transverse rows, no median elevated line; facial foveae broad (equal to about three-quarters distance between eyes and ocelli), reaching a little below level of upper edge of clypeus, whitish, suffused with pale reddish at the upper end; front dull, striate, and more or less punctured; antennae rather long, black, the flagellum faintly brownish beneath; mesothorax moderately shining, but the surface microscopically cancellate anteriorly, and otherwise closely minutely punctured, with scattered larger punctures; scutellum shining; area of metathorax dull and granular, scarcely defined; tegulae shining black. Wings hyaline, faintly greyish apically, not at all reddish; stigma well developed, pale orange, nervures fuscous; b. n. falling a little short of t.-m.; second s.m. receiving first r. n. about middle. Legs with pale hair, tibial scopa greyish white, slightly blackish basally, not conspicuously plumose; hair on the inner side of hind tarsi dull white. Abdomen shining, without distinct punctures, the microscope shows lineolation and sparse very minute punctures; second segment depressed much less than half; segments 2 to 4 with dense dull white hair-bands, broadly interrupted on 2, narrowly on 3, entire on 4; apex with pale, slightly brownish hair. The third antennal joint is about 270 μ long, the next two together about 240 μ .

Boulder, Colorado, March 24, 1920 (*Elery R. Becker*).

Visits flowers of *Townsendia exscapa* (Rich.), which is the first spring flower in the locality. This might be taken for *A. nasoni*, var. *fulvodorsata*, Viereck, but the clypeus is quite different, and the wings are differently coloured. On account of the red hair on scutellum, it resembles *A. scutellaris*, Rob., but that has first r.n. joining the oblique second s.m. far beyond middle, much weaker abdominal bands, &c.

Bombomelecta semifulva, sp. n.

♂.—Length about 14.5 mm., anterior wing 10.5 mm.

Black, somewhat elongate, the thorax above and first abdominal segment densely clothed with fulvous hair; head very broad, with prominent eyes, and projecting clypeus; hair of head a peculiar sooty grey, partly reddish on clypeus, thick and black on outer side of scape, long and broadly tipped with black on upper part of cheeks behind; third antennal joint a little longer than fourth; sides and venter of thorax with mouse-coloured hair, very broadly tipped with black on mesopleura; metathorax with similar, largely black, hair; scutellum with the usual spines, hidden by hair; tegulæ black. Wings stained with brown, but not dark. Legs with mouse-coloured hair, black on inner side of tarsi. Abdomen beyond first segment with appressed greyish-brown hair, mixed with longer black hair, which becomes more abundant on the apical half; no trace of bands or spots.

Boulder, Colorado, May 17, 1920 (*Elery R. Becker*).

A very distinct species, perhaps nearest to *B. pacifica* (Cress.), but readily known by the hair on abdomen.

XXVI.—*A Preliminary Study of the Structure and Function of the Cutaneous Glands in the Terrestrial Isopoda.* By
WALTER E. COLLINGE, D.Sc., F.L.S., The University,
St. Andrews.

[Plates II. & III.]

INTRODUCTION.

It has frequently been pointed out by investigators upon the minute anatomy of the Terrestrial Isopoda, how numerous are the difficulties that are presented in connection with the preservation and preparation of the different organs for histological investigation. Huet (3) has very truly stated that