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Descriptions and Records of Bees.— VIII.

T. D. A. Cockerell

University of Colorado

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to vein 2; a terminal series of small black spots; cilia with fuscous lines at middle and tips. Hind wing olive-yellow strongly irrorated with large black scales; a terminal series of small black spots; cilia with fuscous lines at middle and tips; the underside with traces of curved subterminal line.

Hab. BR. E. AFRICA, Boiyuba (*Betton*), 1 ♂ type. *Exp.* 24 mm.

SECT. II.—Antennæ of male minutely serrate and fasciculate; fore and hind wings with veins 4, 5 radiating from angles of cell.

(2.) *Paraglossa zonalis*, sp. n.

♂. Head, thorax, and abdomen olive-ochreous, tinged with red and irrorated with black. Fore wing ochreous tinged with purplish red and irrorated with black; the costa narrowly black, with a series of ochreous specks on medial area; ante- and postmedial erect sinuous ochreous lines, the former defined externally with black, the latter internally; a black discoidal point; cilia blackish fuscous. Hind wing ochreous, the outer half suffused with purplish pink; a broad antemedial fuscous-black band, edged by slightly sinuous ochreous lines; cilia fuscous black.

♀ darker and redder.

Hab. SIERRA LEONE (*Clements*), 1 ♂ type; NIGERIA, Warri (*Roth*), 1 ♀. *Exp.* 20 mm.

[To be continued.]

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

Panurginus Cressoniellus calochorti, subsp. n.

♀.—Length about 6½ mm.

Black; flagellum black, with only a faint brown tinge beneath on apical half; tegulae shining black; stigma and nervures dark fuscous; marginal cell less obliquely truncate; basal half of second abdominal segment (seen with compound microscope) lineolate all over and with stronger punctures. On account of the dark flagellum this might be taken for *P. atriceps* (Cresson), but the microscopical characters are quite different. In *atriceps* the clypeus is microscopically tessellate, with smaller and much sparser punctures, which

emit hairs. In *Cressoniellus* and *calochorti* the clypeus is smooth and shining, with very large widely separated punctures and some exceedingly minute ones between. In *atriceps* the basal half of second abdominal segment is microscopically tessellate, not punctate; in *Cressoniellus* it is smooth, with only rudiments of the tessellation, and with sparse but distinct punctures. In *Cressoniellus* the sides of the mesothorax mesad of the tegulae are shining, with large and small punctures irregularly mixed; in *calochorti* nearly the same. *P. Cressoniellus* has the apical half of mandibles red, in *calochorti* they are black. These insects are known from the ordinary American species of *Panurginus* by the first recurrent nervure meeting the first transverso-cubital.

Hab. Ward, Colorado, 9000 feet, at flowers of *Calochortus Gunnisoni*, var. *immaculatus*, July 18, 1905 (*Cockerell*).

Halictoides Harveyi, sp. n.

♀.—Length about or not quite 7 mm.

Black, without the least metallic tinge; the scanty pubescence greyish white, the long hairs arising from under clypeal margin reddish, the hair of mesothorax and scutellum somewhat infuscated, that at apex of abdomen merely stained with brown; the abundant scopula of hind femora and tibiae, and even sides of metathorax, filled in the type specimen with very pale greenish pollen; head broad; clypeus shining, with large punctures; punctures of front strong and distinctly separated on a shining ground; flagellum short and very thick, almost clavate, dark reddish beneath; mesothorax shining, the punctures neither dense nor strong, median impressed line distinct; area of metathorax irregularly wrinkled all over; tegulae shining piceous, the outer margin a little reddish. Wings slightly smoky, iridescent, nervures and stigma black or almost; b. n. curved, meeting t.-m.; first r. n. joining second s.m. quite near its base, nearer than the second to its apex. Legs black, with white hair; abdomen shining, sparsely hairy, without distinct bands, the hind margins of the segments more or less reddened.

This small species is quite different from *H. Tinsleyi*, Ckll., in the colour and sculpture of the mesothorax, and also differs in the venation.

H. oryx, Viereck, has the mesothorax like *Tinsleyi*, and is probably its male.

Hab. Harvey's Ranch, Las Vegas Range, New Mexico, Aug. 22 (*W. Porter*); another from Ward, Colorado, at flowers of *Drymocallis*, July 1905 (*T. D. A. & W. P. Ckll.*). It occurs at altitudes of 9000 feet and upwards.

Andrena johnsoniana, sp. n.

♀.—Length about 8 mm.

Conspicuous for its broad, convex, very black, shining, minutely but very distinctly punctured abdomen, and the shining mesothorax and scutellum, with strong but irregularly scattered and sparse punctures. Black, pubescence dull white; facial quadrangle conspicuously broader than long; clypeus with strong rather close punctures; facial foveæ with white tomentum, broad, especially above, occupying more than half the distance between eye and antenna, not departing noticeably from orbital margin, overhung on each side of antennæ by a conspicuous tuft of white hair; cheeks ordinary; metathorax dull and rough, the enclosure obscurely defined but very rough and wrinkled; tegulæ nearly black in front and at base, otherwise subhyaline testaceous. Wings clear, iridescent; stigma and nervures ferruginous; second submarginal cell narrow. Legs dark, with dull white hair; second segment of abdomen at apex much broader than first (breadth of abdomen 3 mm.); all the segments *very* narrowly margined with fulvo-testaceous; hair of apex reddish fuscous.

Hab. Johnson Mesa, New Mexico, July 7, 1905 (*Anna Gohrman*, no. 1).

Andrena Wilmattæ, sp. n.

♀.—Length 8 mm.

Black; thorax above covered with fulvous hair, long and dense and very bright orange-fulvous on scutellum and postsentellum; runs in Robertson's table exactly to *corni* (which is a synonym of *commoda*, Smith), except that the abdomen is shining. Hair of face greyish white, the clypeus hairy; process of labrum broadly rounded; clypeus dullish and closely punctured; flagellum dark ferruginous beneath except at base; third antennal joint at least twice as long as fourth; facial foveæ very broad, not departing from orbital margin, their tomentum pale ochreous; mesothorax dullish, distinctly punctured; area of metathorax scarcely defined, strongly obliquely plicate basally; tegulæ shining black. Wings yellowish, apical margin broadly dusky; stigma and nervures ferruginous; second submarginal cell large, receiving the first recurrent nervure a long distance from the end. Hind tarsi clear red, their tibiæ largely red; hair of hind tibiæ and tarsi pale reddish golden. Abdomen shining, minutely but distinctly punctured; segments 2 to 4

with a fine white pile, giving a pruinose appearance, most apparent at the sides; no hair-bands; apical hair orange-fulvous. A very beautiful species.

Hab. Boulder, Colorado, June 4, 1905 (*W. P. Cockerell*).

Prosopis universalis, sp. n.

♂.—Length about $5\frac{1}{2}$ mm.

Black; face-marks creamy white; mandibles with a white stripe; tegulae and tubercles light-spotted, but prothorax otherwise dark. Wings smoky, iridescent; nervures and stigma black; first abdominal segment with very minute punctures. This runs in my table ('Entomologist,' Aug. 1898) to *P. episcopalis*, to which it is closely allied; differing as follows:—flagellum clear ferruginous beneath; supra-clypeal mark broad (much broader than in *P. asinina*), shaped as in *episcopalis*, but the upper end narrowly truncate; upward extension of lateral marks narrow, gradually narrowing to a point, which is a little divergent from the orbital margin; upper border of prothorax all black; less than basal half of hind tibiae white. From *P. coloradensis* it is easily known by the much narrower, pointed, upward extension of lateral marks. The scape is ordinary (not swollen), and has a pallid streak on the outer side.

Hab. Boulder, Colorado, June 11, 1905 (*W. P. Cockerell*).

Nomada Packardella, sp. n.

♀.—Length nearly 9 mm.

A red and black species, with the hind margins of the first three abdominal segments broadly black and that of the fourth broadly very dark brown. Closely allied in all respects to *N. nigrocincta*, Smith, but having the following distinctive characters:—antennae very long, entirely red, third joint about as long as fifth and shorter than fourth, but not greatly so; labrum red; mandibles red except at tips, simple; no yellow at lower corners of face; black above antennae and around ocelli; thorax above coarsely rugoso-punctate; mesothorax red, with a narrow median black band; the scanty hair of head and thorax above orange-fulvous; metathorax red, with a median black stripe, the sides with hardly any pubescence (dense white pubescence in *nigrocincta*). Wings dark at apex; stigma ferruginous, nervures fuscous; b. n. a long distance basad of t.-m.; second s.m. very broad below. Legs red, with black at bases of femora behind, the black more extensive on hind femora; abdomen rather long and

narrow, punctulate, banded as described above, and with very small and obscure yellow spots at extreme sides of segments 2 and 3, and evident round subdorsal yellow spots on 4 and 5; black at base of first segment divided into three marks; venter red, with short, median, transverse, black marks.

Hab. Boulder, Colorado, June 11, 1905 (*W. P. Cockerell*).
Dedicated to the memory of Dr. A. S. Packard.

Nomada vallesina, sp. n.

♀.—Length $8\frac{1}{2}$ mm.

Head, thorax, and legs bright ferruginous, without yellow, except that the postscutellum is a sort of dull orange (black at extreme sides); a little black above bases of antennæ and around ocelli, black lines along sides of supraclypeal area and halfway down clypeus, and cheeks posteriorly black, leaving a very broad red band behind eyes; mesothorax very densely punctate, with a rather obscure median black band, the places of the four yellow stripes of *Xanthidium* being very vaguely indicated by suffused stripes of a lighter shade of red; scutellum strongly bilobate, red, the posterior corners a little yellowish; pleura red; region above and in front of middle and hind coxæ black; metathorax red with a median black stripe, its sides with rather abundant pale fulvous hair; hair of head and thorax above short and scanty, pale orange-fulvous; face broad; eyes reddish grey; antennæ long, entirely red, third joint about as long as fourth; legs red, with the hind femora suffused with black behind; tegulæ large, red, strongly punctured. Wings dusky, stigma orange, nervures fuscous; b. n. just on basad side of t.-m.; second s.m. broad, about twice as broad above as third. Abdomen dullish, minutely and closely punctured, red with extremely broad lemon-yellow bands on segments 2 to 5, that on 2 invaded by red at the basal middle, but not nearly interrupted; apical plate broad; venter immaculate red; first dorsal red, with the hind margin suffusedly blackened, and some black marks at extreme base. The coloration of the abdomen recalls *N. obliterata*, but the venation is not as in that insect. In my table of Rocky Mountain *Nomada* it runs to male *coloradensis*, but it is not like the female of that species.

Hab. Las Valles, New Mexico, by the Gallinas River, at flowers of wild plum, April 20 (*Cockerell*). It was flying with many *Andrena prunorum* and a few *A. kansensis*.

Osmia lignaria lignariella, subsp. n.

Osmia lignaria, var. α , Ckll. Ann. & Mag. N. Hist., May 1900, p. 409.

Romeroville and Las Vegas, New Mexico.

I have been surprised to find that the species of this group which I have recently obtained in Colorado (viz. at Halfway House, Pike's Peak, May 30, at flowers of *Salix*; at Ward, 9000 ft., July, at flowers of *Phacelia circinata*; and at Boulder, June 12, taken by my wife; all females) is not *O. lignaria* but the Pacific region *O. propinqua*, Cresson.

Osmia hesperella, sp. n.

♀.—Length $8\frac{1}{2}$ – $9\frac{1}{2}$ mm.

Head and thorax very densely punctured, dark (slightly greenish) blue; abdomen shining dark blue, not at all greenish; pubescence, including ventral scopa, white; head rather large, the cheeks broad; antennae black; anterior edge of clypeus straight and simple; mandibles 4-dentate, the two apical teeth large, the two inner ones small, and consisting of what is in reality a single broad bicuspidate tooth; no tubercles on front; tegulae dark blue in front, piceous behind. Wings somewhat dusky, first r. n. twice as far from base of second s.m. as second r. n. is from its apex; b. n. meeting t.-m. (or falling a little short of it); middle and hind femora and tibiae more or less blue, the hind femora in front a splendid purple-blue; abdomen well-punctured.

Closely allied to *O. albiventris*, Cresson, of which it may be considered a western representative; *albiventris* is smaller, with the abdomen not so blue and the legs entirely black. *O. pumila* is also allied.

Hab. Boulder, Colorado, June 12, 1905, 2 ♀ (*W. P. Cockerell*!).

The apical joint of the maxillary palpus is very slender, strongly contrasting with the penultimate one, which is much thickened at end.

Osmia gaillardie, sp. n.

♀.—Length about $11\frac{1}{2}$ mm.

Dark blue-green, the sides of thorax and most of clypeus black; sides of face yellower green; hair of face and vertex partly black and partly white; of cheeks black; of pleura black; of thorax above long and white, with long black hairs sparsely intermixed; tuft behind wings white; punctures of clypeus and mesothorax excessively dense;

antennæ wholly black; head broad; clypeus squarely truncate, the sides sloping away, and presenting a concave edge on each side of the truncation; two little tufts of orange hair beneath clypeus; tegulæ slightly reddish, with a broad punctate marginal or submarginal area. Wings slightly stained with brown, with conspicuous stains in the marginal and first submarginal cells; b. n. meeting t.-m.; first r. n. joining second s.m. far from its base, the distance being quite as great as the length of the first t.-c.; second r. n. joining second s.m. not far from the end. Legs black, with black hair; hind spurs straight. Abdomen rather broad and convex, well punctured; hair on first segment above, and basal middle of second, long and white, rest of hair, including ventral scopa, black. Allied to *O. grandior*, Ckll., but the colour of the thoracic hair above is quite different, and it is not nearly so large. The general appearance is quite like *O. nigrifrons*, Cress., but *gaillardiae* differs from that in having the punctures of the third abdominal segment much more distinct and separate, the hair at sides of metathorax white, a tuft of long white hair on and around tubercles, and the sides of face greener.

Hab. Boulder, Colorado, at flowers of *Gaillardia*, July 6, 1905 (W. P. Cockerell).

Osmia Wilmatte, sp. n.

♀.—Length a little over 9 mm.

Dark indigo-blue, the mesothorax slightly greenish, and abdominal segments 2 to 4 with brassy tints; head and thorax extremely densely punctured; head rather large; mandibles very broad, with two sharp teeth, and a broad, obscurely bicuspidate, inner tooth; lower edge of clypeus straight and simple; no brushes of orange hair under margin; antennæ black; hair of face abundant and coarse, entirely black, as is also that of cheeks; front (the tegument) black; hair of vertex black, giving way to white on occiput; hair of pleura black, but of tubercles, tuft behind wings, and sides of metathorax white, of thoracic dorsum white, with black hairs rather copiously intermixed, producing a grey effect; tegulæ black, with a blue spot in front, submarginal area densely punctured. Wings dusky; b. n. meeting t.-m.; first r. n. joining second s.m. about the end of its first third, second r. n. joining it about the beginning of its last sixth. Legs black, with black hair, but that on anterior and middle tarsi largely pallid. Abdomen well punctured, shining, with short black hairs; that on first segment long and white, and on

basal middle of second very short and white; scopa black; hind spurs curved at end.

Allied to *O. brevis*, Cresson, but easily known from that by the strong admixture of black hair on the thorax above. It may also be compared with *O. nigrifrons*, Cresson, but that is very much larger.

Hab. Boulder, Colorado, June 12, 1905 (*Wilmatte P. Cockerell*).

Osmia coloradella, sp. n.

♀.—Length nearly 9 mm.

Steel-blue, the head and thorax very densely punctured, the abdomen shining; hair of head and thorax long and rather copious, entirely white, with no yellow tinge; anterior edge of clypeus straight, with a suggestion of crenulation, but no teeth; tufts of hair under anterior edge tipped with orange; mandibles with the usual two large teeth and no patch of yellowish pubescence (such as is seen in *faceta*); middle of face somewhat greenish; antennæ black; no smooth spots on mesothorax mesad of tegulæ (such as are seen in *atriventris*); area of metathorax minutely roughened and dull, except the broad hind margin, which is shining; tegulæ greenish in front. Wings hyaline, clouded on apical margin; b. n. meeting t.-c.; first r. n. only a little more distant from base of second s.m. than second is from its end. Legs black, with greenish-blue tints, which are quite conspicuous; their pubescence white; hind spurs curved at end. Abdomen convex, well-punctured, its dorsal hair entirely white, and forming rather indistinct bands on the apices of the segments, only seen when the abdomen is viewed from the side; ventral scopa black.

Very close to *O. atriventris*, Cresson, but not the same.

Hab. Boulder, Colorado, June 4, 1905 (*W. P. Cockerell*).

Megachile opuntiarum, sp. n.

♀.—Length 13 mm.

Belongs to *Megachile*, s. str., as defined by Robertson, and is exceedingly like *M. cleomis*, Ckll., from which it differs as follows:—clypeus very shiny, the punctures in the middle very sparse, small, and weak; apical border of mandibles reddened; hair of top of head white, the vertex with only a few inconspicuous fuscous hairs; hair of thorax above white, the disk of mesothorax posteriorly with scattered dark hairs; disk of mesothorax somewhat shiny, the punctures rather smaller and not so coarse; tegulæ reddened on outer side; scutellum shining, the small punctures quite sparse in the middle;

abdomen, seen from above, not showing black hair projecting at the sides; last dorsal segment in lateral profile not in the least concave; hair on inner side of hind tarsi longer, coarser, and redder, being very bright ferruginous. Clypeal margin straight and simple, but there is a strong submarginal channel; abdomen shovel-shaped, with very conspicuous white hair-bands; ventral scopa cream-colour, black on the last segment; maxillary palpi stout, third joint longest; second joint of labial palpi conspicuously longer than first.

Hab. Boulder, Colorado, at flowers of *Opuntia*, collecting pollen, July 3, 1905 (*W. P. Cockerell*).

University of Colorado,
Boulder, Colorado, U.S.A.,
Jan. 2, 1906.

XXIX.—*A Revision of the Fishes of the South-American Cichlid Genera Cichla, Chaetobranchus, and Chaetobranchopsis, with Notes on the Genera of American Cichlidae.*
By C. TATE REGAN, B.A.

THE present paper is the last of a series describing the American Cichlidae in the British Museum*, and has been written in order to complete my account of the group. It has seemed useful to give a synopsis of all the genera and to offer some remarks on their relationships and distribution.

I.—A REVISION OF THE GENERA *CICHLA*, *CHAETOBANCHUS*,
AND *CHAETOBANCHOPSIS*.

CICHLA.

Cichla, Schneider, Bloch's Syst. Ichth. p. 340 (1801); Cuv. Règne Anim. ii. p. 279 (1817); Heck. Ann. Mus. Wien, ii. 1840, p. 408; Günth. Cat. Fish. iv. p. 303 (1862); Eigenm. & Bray, Ann. Ac. N. York, vii. 1894, p. 611; Pellegr. Mém. Soc. Zool. France, xvi. 1903, p. 183 (1904).

* My papers dealing with the American Cichlidae have been published as follows:—Proc. Zool. Soc. 1905, i. pp. 152-168, pls. xiv. & xv. (*Crenacara*, *Batrachops*, and *Crenicichla*); Ann. & Mag. Nat. Hist. (7) xv. 1905, pp. 329-347 (*Acara*, *Nannacara*, *Acaropsis*, and *Astronotus*); t. c. pp. 557-558 (*Acara subocularis*); ib. xvi. 1905, pp. 60-77, 225-243, 316-340 (*Cichlosoma*); t. c. pp. 433-445 (*Petenia*, *Herichthys*, *Paraneotroplus*, *Neotroplus*, *Herotilapia*, *Uaru*, *Symphysodon*, and *Pterophyllum*); ib. xvii. 1906, pp. 49-66 (*Retroculus*, *Geophagus*, *Heterogramma*, and *Biotoecus*).

Body
element
scales of
lower jaw
by the
jaw; up
operculum
moderate
part of
spinous
Anal with
with 15
Caudal
truncate
Three

In Cichla
developed
frontals
the crown
crests
to the
column
parapetals
vertebrae
posterior
lateral
inserted
of the
the ribs
pair of
not de
united
nearly
pharynx
end of

I. 100

II. 100