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Descriptions and Records of Bees.— XX.

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with a distinct central longitudinal carinate line; lateral areas of the abdomen above macularly black; face moderately compressed, medially centrally longitudinally carinate, the lateral areas finely transversely striate; posterior tibiae with a strong spine at about one-third from apex.

Var.—With the legs bronzy ochraceous.

Long., excl. tegm., 6 mm.; exp. tegm. 19 mm.

Hab. Tanganyika (Brit. Mus.). Transvaal; Watervat-Onder (Ross, Coll. Dist.).

Locris submarginata, sp. n.

Head, pronotum, scutellum, body beneath, and legs black; coxal spots and apices of femora sanguineous; abdomen above sanguineous, the lateral margins and apex black; tegmina testaceous red, a curved fascia before apical area, some large spots in the cells of apical area, and the apical margin, which is strongly subdentately produced inwardly, black; wings very pale fuliginous, subhyaline, basal area piceous, extreme base sanguineous; pronotum punctate, not rugose; face compressed, strongly centrally longitudinally carinate; posterior tibiae with a strong spine at about one-third from apex; tegmina densely finely punctate, the veins on apical area moderately prominent.

Long., excl. tegm., 8 mm.; exp. tegm. 22 mm.

Hab. N.W. Rhodesia; Lualaba R. (Neave, Brit. Mus.).

XXXVI.—*Descriptions and Records of Bees.*—XX.

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

Anthophora melfordi, sp. n.

Represented by the head, thorax, and first abdominal segment, with the mouth-parts extended and the wings well preserved. Black; wings dusky hyaline, with black or very dark brown nervures. Head almost 4 mm. long, and the same in width; thorax about 5 mm. long and broad; anterior wing just over 8 mm. long; extended mouth-parts about $4\frac{1}{2}$ mm. long; legs robust, hairy; claws deeply cleft, the outer tooth much longer than the inner; anterior basitarsus with a lateral fringe of long hair, of which the first hairs are longest and the others successively shorter; middle tibial spur stout, very finely and minutely pectinate, like the hind spur of *Centris* (from the

Ann. Mag. Nat. Hist. 2(8):323-334 1908.

position of the leg the one spur visible appears to be on the middle tibia of the left side, but from the pectination of the spur I suspect that it is really the right posterior leg twisted under the body); hair of legs dark fuscous; tongue with copious long hair, and extending more than $1360\ \mu$ beyond maxillæ; maxillæ extending about $3230\ \mu$ beyond head; width of mouth-parts at base (where they leave the head) about $1020\ \mu$.

Venation normal both in anterior and posterior wings (including the very oblique t.-m. of the latter), except that the first r. n. reaches the second s.m. near the beginning of its last third instead of at the middle. The following wing-measurements are in μ :

| | |
|---|------|
| Length of marginal cell | 1750 |
| " first discoidal cell | 2600 |
| First t.-c. to insertion of first r. n. | 510 |
| Insertion of first r. n. to second t.-c. | 255 |
| Third s.m. on marginal | 408 |
| Lower side of third s.m. | 510 |
| Length of third s.m. in middle | 645 |
| Marginal cell beyond third s.m. (measured along its lower margin) | 765 |

The b. n. meets t.-m., the upper part of which is bowed outwardly.

Hab. Florissant; fossil in the Miocene shales, Station 13 B (Melford Smith, 1908).

This is the first genuine fossil *Anthophora*; the *A. effossa*, Heyden, from Rott, exhibited no wings, and cannot be referred with certainty to any particular genus.

Calyptapis florissantensis, Ckll., 1906.

This genus and species were based on an imperfect specimen obtained by Scudder, and were referred to the Eucerine Anthophoridae. A very good example collected in the Miocene shales at Florissant in 1908 (Station 13 B, W. P. Cockerell) enables me to determine that it is in fact a member of the Bombidae very close to *Bombus* in most respects, but differing in the form of the third submarginal cell and in the somewhat less specialized second submarginal.

It is stout-bodied, with hairy legs, quite as in *Bombus*; head and thorax black; abdomen rather pale reddish, the junctions of the segments marked by moderately broad light bands; the abdomen is not noticeably hairy. The hind basitarsus is flattened and quadrate, broadly emarginate

apically, and with hairy margins; its dimensions in μ are: (1) length 1530, (2) breadth at base 1105, (3) breadth at apex 900. Claws bifid, with the inner tooth much the smaller and shorter, precisely as in *Bombus*.

Wings clear, with pale nervures; length of anterior wing about 8½ mm.

Length of body about 15 mm.

The following measurements of the anterior wing are in μ :—

| | |
|---|------|
| Length of marginal cell | 2380 |
| Depth " " | 595 |
| Length (obliquely) of first submarginal | 1020 |
| " of second submarginal | 765 |
| " of third " | 1020 |
| Second submarginal on marginal | 340 |
| Third " " | 510 |
| Second submarginal on first discoidal | 391 |
| " " third " | 459 |
| Third " " " " | 867 |
| Height of third submarginal in middle | 425 |
| Insertion of second r. n. to appendicular nervure at end of third s.m. | 170 |
| Length of first discoidal cell (obliquely) | 2312 |
| " of transverso-medial nervure | 255 |
| Width of second discoidal cell at apex | 765 |
| Length of basal nervure | 1836 |

The transverso-medial is vertical except at its upper end, where it bends basad and actually meets the basal. This band is easily overlooked, giving the impression that the nervure ends a short distance apicad of the basal.

In the above table of measurements the first and third submarginals appear of equal length; but if measured in the same manner, *i. e.* from the middle of the basal to the middle of the apical side, the third is much the longer.

The new specimen is on a slab with various leaves; a leaf of *Fagus longifolia* (Lx.) is less than an inch from the bee, and a leaflet of *Weinmannia phenacophylla*, Ckll., is equally close.

This species is of great interest to me, because I have just been studying the ancestors of the Bombidae in Baltic amber of Oligocene age. The amber materials, kindly loaned from the Museum at Königsberg through Dr. A. Tornquist, throw a flood of light on the subject, including as they do numerous genera and species in a wonderful state of preservation.

The following is a list of the fossil Bombiform bees; the *Ann. & Mag. N. Hist. Ser. 8. Vol. ii.* 23

descriptions of those from amber will be published at Königsberg:—

- (A) Small compact bees about 8 to 9 mm. long, often with metallic colours. All from Baltic amber.
- (a) Second t.-c. absent; b. n. going basad of t.-m.; stigma well developed.
1. *Sophrobombus fatalis*. Representing a side branch of the primitive Bombidæ, not leading to anything modern.
- (b) Three submarginal cells, as usual; b. n. meeting t.-m.
- (i.) Stigma distinct, but short.
2. *Chalcobombus martialis*. Third s.m. very broad (460 μ) above. Mesothorax, scutellum, and vertex dull black; prothorax, tubercles, and legs coppery red.
3. *Chalcobombus hirsutus*. Head and thorax with long pale hair; wings reddish fuliginous.
4. *Chalcobombus humilis*. Abdomen with a sericeous lustre and a decided green tint, the hind margins of the segments broadly reddish.
- (ii.) Stigma obsolete; third submarginal cell produced apically.
5. *Protobombus indecicus*. Wings rather light fuliginous, with a very dark fuliginous cloud at end of marginal cell.
- (B) About the size and build of the honey-bee (*Apis*), but with the eyes naked; stigma very small; b. n. meeting t.-m.; hind tibia with a single short sharp spur. Species from amber.
6. *Electrapis meliponoides*. Showing characters transitional to *Apis*, but not a direct ancestor of that genus.
- (C) *Bombus*-like, stout-bodied bees.
- (a) Length about 11 or 12 mm.; head and thorax very hairy; b. n. going basad (170 μ) of t.-m.; malar space obsolete. From amber.
7. *Electrapis* (?) *torquisti*. This is the most *Bombus*-like of the amber-bees.
- (b) Length about 15 mm.; b. n. meeting t.-m., but bending at upper end to do so. Florissant (Miocene).
8. *Calyptrapis florissantensis*.

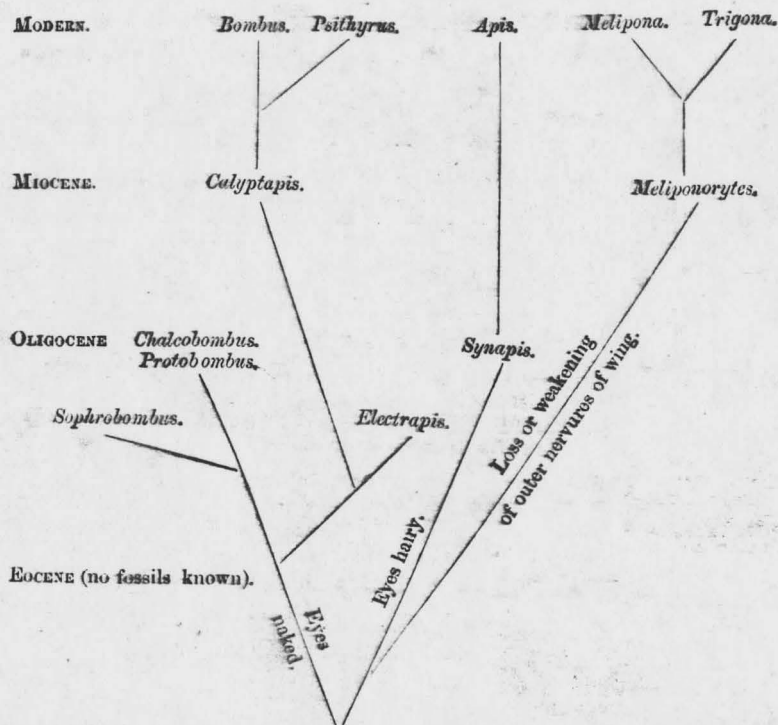
The Bombidæ thus appear to have originated in Europe, but to have reached America as early as the Miocene. *Apis*, though widespread in the Old World, apparently never reached America until brought over by man.

The only known fossil *Apis*, in any true sense, is *Apis henshawi*, Ckll., from Rott, Prussia (Upper Oligocene). In this species, however, the b. n. almost meets the t.-m., so it has been regarded as forming a distinct subgenus, *Synapis*. The character is one which allies it with the ancient Bombidæ. *Apis adamitica*, Heer, from Oeningen (Upper Miocene), is

perhaps related to *Synapis* (it certainly is not a typical *Apis*), but it is so imperfectly preserved and described that its affinities are doubtful.

The Meliponine bees, now so abundant in the tropics of both hemispheres, are only known in the fossil state by a single species, *Meliponorytes succini*, Tosi, from Sicilian amber (Middle Miocene). In this insect the first submarginal cell is complete and well-defined, but the others are absent.

The general scheme of relationships will be about thus:—



Although *Bombus* and *Psithyrus* are thus derived from *Calyptapis* in the diagram, this must not be taken too literally, as meaning that they are of American origin. *Calyptapis* very probably occurred in both hemispheres, as *Bombus* does to-day, or was represented in Europe and Asia by allied genera, from which *Bombus* might equally well be derived*.

* It would even be possible to use *Calyptapis* as an argument in favour of the Old-World origin of *Bombus*. It is recognized that nearly all

Various species ascribed to *Bombus* have been described from the Oligocene and Miocene of Europe, but they require reinvestigation. Buttel-Reepen (Mitt. Zool. Mus. Berlin, 1906, p. 163) has given a scheme of evolution of the Bombidae &c. differing somewhat from the above. He was not, of course, acquainted with the numerous new amber genera, and he took too seriously some of the generic references of the older authors.

Andrena hypolitha, sp. n.

♀.—Length about 10 mm.

Head broader than long (width of head $2\frac{3}{4}$ mm., breadth between eyes in middle of face about $1700\ \mu$); head and thorax black; legs ferruginous, tibiae and tarsi hairy, claws bifid. Length of anterior wing not over 6 mm.; nervures and stigma pale ferruginous. Abdomen oval, about $5\frac{1}{2}$ mm. long and slightly over $3\frac{1}{2}$ broad (no doubt broadened somewhat by flattening); colour of abdomen light ferruginous, with four broad dark ferruginous bands, the first very broadly interrupted, the margins of the bands are suffused and ill-defined.

Stigma large; lower section of basal nervure straight except at its lower end, which is abruptly bent; second r. n. receiving first r. n. beyond the middle; first discoidal cell very long and narrow, possibly a little narrower than normal by distortion; third t.-c. with a strong double curve; end of marginal cell obliterated, but its probable total length less than $1700\ \mu$. Transverso-medial of hind wings almost vertical, the lower end a little more basad.

The following measurements of the anterior wing are in μ :—

| | |
|--|------|
| Second submarginal cell on marginal | 238 |
| Third " " " | 272 |
| Depth of marginal cell | 340 |
| (at 850 μ beyond end of stigma it is | 304) |
| Length of stigma | 850 |
| (stigma on marginal cell | 391) |
| Depth of stigma | 221 |
| Length of first submarginal cell (obliquely) | 935 |
| " " " " on first discoidal (not | |
| allowing for gentle double curve) | 809 |

modern insect-genera are older than the Miocene: hence, if *Bombus* already existed it would probably be in the Old World, a *Calyptus* would represent an earlier type segregated in America, to be exterminated later by the invasion of *Bombus*.

| | |
|--|------|
| Second s.m. on first discoidal | 289 |
| " " third " | 102 |
| Length of third submarginal cell | 578 |
| " first discoidal cell | 1700 |
| Upper section of basal nervure | 272 |
| Lower " " " (not allowing for curve) | 748 |

In the hind wing the t.-m. is $170\ \mu$ long and the distance from the t. to the cubital is 714.

Differs from *A. sepulta* and *A. clavula* by having the second s.m. much broader above and various details of the venation. From *A. clavula* it also differs in the form of the abdomen.

Hab. Miocene shales of Florissant, Station 13 B (1908).

Stelis seneciophila, sp. n.

♀.—Length about $7\frac{1}{2}$ mm.

Brilliant dark shining blue, with black pubescence; punctures on head and thorax strong and dense, but well separated on front; punctures on abdomen somewhat smaller and more separated, but extremely dense on the apical two segments; tegulae and legs dark blue. Wings nearly clear, but the apex greyish and a grey shade in marginal cell; second r. n. going beyond end of second c.

Closely related to *montana*, Cresson, but smaller and more slender, with no green tints, and with clearer, not brownish, wings. The first r. n. joins the second s.m. as far from its base as half the length of the first t.-c., or nearly that; in *montana* it is nearer to the base of the cell, or even sometimes meets the t.-c. The last two joints of the labial palpi are conspicuously more slender than in *montana*.

Hab. Florissant, Colorado, at flowers of *Senecio cymbalarioides*, June 29, 1908 (S. A. Rohwer).

S. montana also occurs at Florissant, and is variable in size and colour (the largest ♀ is $10\frac{1}{2}$ mm. long), but always readily distinguishable from *S. seneciophila*.

Dioxys rohweri, sp. n.

♂.—Length about $6\frac{1}{2}$ mm.

Black, densely punctured, with white pubescence; abdomen with the usual white hair-bands; hind margin of sixth segment ferruginous; tibial spurs bright ferruginous; hair on inner side of tarsi yellowish; tegulae with a large ferruginous spot. Wings dusky hyaline, upper half of marginal cell faintly clouded. Eyes pale greenish.

The smallest American species of the genus; nearest to *D. martii*, Ckll., from which it differs by the much smaller size, very much finer punctures, more delicate thoracic spine, and the much smaller (almost rudimentary) subapical lateral spines of abdomen. The flagellum is only faintly reddish beneath.

Hab. Troublesome, Colorado, alt. 7345 ft., June 9, 1908 (S. A. Rohwer).

Osmia bruneri, Ckll., ♂.

At Troublesome, Colorado, June 8 and 9, 1908, Mr. S. A. Rohwer took both sexes of this species.

The male is about 8 mm. long, short and compact like the female, with the most brilliant colours. Clypeus a splendid purple; sides of face largely green; vertex blue and purple; cheeks green; thorax (including tegulae) yellowish green, bluer at sides; abdomen brilliant green, bluer at sides and apex; legs blue-green, but tibiae black or nearly on one side; hair of thorax above and occiput white without any admixture of black; hair of vertex and clypeus black, but that of sides of face white; apical segments of abdomen with black hair; sixth segment with a distinct notch, seventh bidentate.

In my table in *Ann. & Mag. Nat. Hist.*, Aug. 1907, p. 123, it runs to *O. bennettæ*, from which it is easily distinguished by the black hair of the clypeus, the shape of the abdomen, &c.

Osmia gaudiosa, Ckll.

♂.—Florissant, Colorado, at flowers of *Mertensia lanceolata*, June 19, 1908 (S. A. Rohwer).

The specimen has the abdomen more shiny than that of the type, but I believe there is only one species.

Diandrena nothocalaidis, Ckll.

Troublesome, Colorado, at flowers of *Nothocalais cuspidata*, June 9, many females (S. A. Rohwer).

Previously known only from Boulder.

Andrena pyrrhacita, Ckll., var. *mosina* nov.

♀.—Hair of face and front almost entirely black; clypeus finely punctured, with a very distinct smooth median line; much black hair at sides of metathorax; hair of thorax above

pale, as in type, of abdomen (except at base and apex) sub-appressed and very bright orange-fulvous; hair of abdomen beneath and at extreme sides practically all black.

Hab. Troublesome, Colorado, at flowers of *Salix*, June 8, 1908 (S. A. Rohwer).

The characters of this variety make it resemble the European *A. fulva*. The size and form and small clypeal punctures readily separate it from *A. hitei*. The varietal name is from a Malay word for red. Mr. Rohwer also took *Andrena erythrogastra* (Ashm.) at Troublesome on flowers of *Salix*.

Sphecodes sulcatulus, Ckll.

A female from Troublesome, Colorado, June 9, 1908 (S. A. Rohwer), is smaller than the type and lacks the median groove on first abdominal segment, but is evidently conspecific. The species is noticeable for its shining thorax.

Titusella pronitens, Ckll.

The females were found commonly at Florissant this year, visiting the flowers of *Senecio cymbularioides* during the latter part of June.

A second species of this genus is *Titusella cubiceps* (*Herrades cubiceps*, Cresson) from Nevada; distinguished by its white ventral scopa and clear wings.

Bombomelecta pacifica (Cresson).

Florissant, Colorado, June 12, at flowers of *Ribes*, 1 ♀ (S. A. Rohwer).

The *B. fulvida*, common at Boulder, seems to be only a race of *pacifica*, as Cresson held.

Melissodes martini hitei, subsp. n.

♀.—Differing from *M. martini*, Ckll. (from New Mexico), by the total absence of black hair on thorax above, the presence of black hairs on vertex (occasionally *martini* has a few), the soot-coloured hair on middle basitarsus, and the hind basitarsus with the hair on its inner side ferruginous at base, but otherwise dark fuscous. The abdominal hair-bands, as in *martini*, are pure white.

In my tables in Trans. Am. Ent. Soc. 1906, if placed with the species having the hair on hind basitarsus ferruginous, it

runs to *M. thelypodii*, Ckll., to which it is closely allied, differing conspicuously, however, in the colour of the pubescence. If placed with the species having the hair on hind basitarsus fuscous, it runs to *M. blakei*, Ckll., which differs greatly in the colour of the abdominal pubescence, and is not especially related. The eyes of *hitei* are light green.

Hab. Pueblo, Colorado, Aug. 17, 1907 (*G. M. Hite*).

The *Melissodes* of the *martini-thelypodii* series do not visit Compositæ (so far as our records show); those of the *blakei-mizee* series are visitors of Compositæ.

Tetralonia chryseobotryæ, sp. n.

♀.—Length about 15 mm.; anterior wing 9 mm.

Abdomen with very conspicuous entire pale bands on segments 3 and 4; on 1 and 2 the hair is mouse-colour, but the band on 2 is whitish posteriorly at the sides; on the fifth segment the broad apical band has the middle third dark reddish fuscous and the lateral thirds brownish white; hind basitarsi with the hair on inner side bright ferruginous and on the outer golden; small joints of tarsi ferruginous.

In my table in Trans. Amer. Ent. Soc. 1906, this runs to *T. speciosa* or *cordleyi*, the hind spur not being at all hooked. Compared with *speciosa* it is considerably smaller, with much darker tegulæ, and the bands on abdominal segments 2 and 3 practically straight, not undulating laterally as in *speciosa*. Compared with *T. cordleyi* it is narrower, and the hair on the fifth abdominal segment is quite differently coloured. Compared with *T. frater aragalli* it is easily known by the narrower and much whiter bands on segments 3 and 4. These bands, however, are yellowish white, not greyish as in *T. annæ*.

♂.—Hair of thorax above yellowish white or very pale yellow; clypeus, labrum, and small supraclypeal mark pale lemon-yellow; yellow of clypeus squarely notched at sides; mandibles with a very minute light basal spot; second abdominal segment covered with pale hair, except the apical margin, where it is black; tarsi ferruginous, normal, hind basitarsus a little longer than the other joints together.

In my tables runs to *T. frater* (Cresson), having the mesothorax dull and the hind spur normal. Compared with *frater* (a Cressonian cotype) it differs by the longer (much longer than wide) third antennal joint, the lighter yellow of the clypeus, the broader face, and the better-defined (though narrow) bands on segments 3 to 5. The fourth and fifth

segments, except for the bands, are shining black, with short black hair. The last ventral segment has a median sulcus and a little groove or channel on each side, the latter being curved and ending abruptly posteriorly. The yellow of the clypeus approaches the orbital margin much more closely than in *T. atriventris*, but not so closely as in *T. edwardsii vagabunda*. The second s.m. is broad, and receives the first r. n. no great distance beyond the middle. The third t.-c. is bent almost to a right angle.

Hab. Boulder, Colorado, May 2, 1908 (Glenn M. Hite).

Both sexes were taken at flowers of *Ribes* or *Chrysobotrya odorata* (Wendl.); the *Ribes longiflorum* of Rydberg's 'Flora of Colorado.'

NOMIA.

A critical examination of various specimens of *Nomia*, supposed to be *N. foxii*, D. T. (*punctata*, Fox), shows that several species have been confused. Fox, in his original description, evidently confuses two or more species, and I have found it difficult to determine which ought to be called the true *foxii*. He cites (Entom. News, 1893, p. 135) specimens from Denver, Colorado (Beales), Vega S. José, New Mexico (Townsend), and Big Stone City, S. Dakota (Aldrich). He does not state which is the type locality, but I consider myself at liberty to select the New Mexico species as true *foxii*, a course which may be justified by the fact that it has been frequently referred to in my writings as such, whereas the other forms have not, I think, been alluded to since Fox's paper appeared. Another reason is that Fox classes as a variety the very strongly punctured form, which must, I suppose, be the northern species here separated; on the other hand, however, he says the tarsi of the female are typically testaceous, which does not accord with what I here call *foxii*. The last character is very likely to be variable and is not nearly so important as the difference in sculpture. The species of the *foxii* group may be separated thus:—

Males.

Abdominal (tegumentary) bands somewhat broader, suffused with emerald-green; second abdominal segment with a strong basal transverse groove; punctures of fourth segment minute and close. (El Rito, N. M., Aug. 5, Townsend; Santa Fé, N. M., July, Ckll.; common in New Mexico.) *N. foxii*, D. T.

Abdominal bands somewhat narrower, suffused with turquoise-blue; second segment flat, with no transverse depression, fourth (except at base) with large punctures; abdomen generally with very large and distinct punctures. (Boulder, Colorado, one, July 6, 1908, picked up on the pavement, struggling with a worker *Pogonomyrma occidentalis*, Cress., T. D. A. Cockerell; one, July 14, Paul M. Dean.) *N. universalis*, sp. n.

Females.

Larger; lateral hind margins of first abdominal segment green; mesothorax very sparsely punctured, except at sides. (Washington State.) *N. melanderi*, Ckll.

Smaller; lateral hind margins of first abdominal segment not green or blue 1.

1. Wings greyish; truncation of metathorax less strongly punctured; first abdominal segment with well-separated but numerous punctures; mesothorax closely punctured. (Las Cruces, N. M., Sept. 5, Townsend; Rincon, N. M., Sept. 14, Ckll.) *N. foxii*, D. T.

Wings brownish; truncation of metathorax more closely punctured; first abdominal segment shining, with very sparse small punctures; mesothorax with larger punctures, irregular in size and irregularly spaced; punctures of third abdominal segment minute, much smaller than in *foxii*. (Mesilla Valley, N. M., toward Organ Mts., end of September, Ckll., C 4.) *N. mesillensis*, sp. n.

The new species has green bands, as in *N. foxii*.

University of Colorado,
Boulder, Colorado, U.S.A.,
July 15, 1908.

XXXVII.—Descriptions of new Species of New-Zealand *Coleoptera*. By Major T. BROUN, F.E.S.

GEODEPHAGA.

Group CNEMACANTHIDÆ.

- Mecodema aceductum*.
- *cognatum*.
- *lewisi*.
- *seriatum*.
- *attenuatum*.

- Diglymma tarsalis*.
- Snofru æmulator*.
- Oopterus nigritulus*.
- *frontalis*.
- *sculpturatus*.

Group ANISODACTYLIDÆ.

- Allocinopus ocularius*.