



THE HABITS OF HETERO CERUS BEETLES.

1. Mud bar where the beetles breed. 2. Burrows made by the larvæ. 3. Pupal cases.
4. Adult. 5. Eggs. 6. Larva. 7. Larva ready to pupate. 8. Pupa.

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POPULAR AND PRACTICAL ENTOMOLOGY.

NOTES ON THE HABITS OF HETERO CERUS BEETLES.

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In the hot, dry days of summer, when the creeks run low and the mud bars become numerous along the margins of the streams, a common sight on this recently deposited mud is the network of lines which mark and ramify the surface. Investigation shows clearly that some small animal has pushed its way through the soft alluvium and formed little tunnels in the freshly exposed sediment left by the receding water. These little subterranean passages were a source of great perplexity to the writer until the summer of 1916, when the entire mystery was revealed as if by magic.

Along a small creek in western Illinois on a day late in July, the entire life-history of the little builder of the burrow was found in all completeness. Near the water (pl. I, fig. 1), just beneath the surface of the soft squashy mud, were the tunnels, freshly made. Farther back on the dryer portion of the bar, the tunnels were more numerous and the elevation of the soil which marked the passages was more distinct, due to the drying of the earth. Still farther back the lines formed, in places, an almost unbroken mat, so extensive had the network become (pl. I, fig. 2). On the higher, firmer portions of the deposit, among the older less distinct galleries, were little cases with chimney-like extensions projecting from the mud (fig. 3).

Here then was the life-history of these interesting beetles in all its completeness within this very limited area. The adult beetle (fig. 4) was found to be the maker of the tunnels in the fresh mud near the water. Several were captured within the burrows, and others, when disturbed, forced their way out through the mud and flew away. In these newly constructed passages are laid the eggs in small masses (fig. 5). The eggs hatch into active running larvæ (fig. 6) which greatly extend the home already started for them by the adult. growing to a length of 7 or 8 millimetres, the larvæ construct for themselves the mud chambers with the peculiar little chimneys extending upward from them (fig. 3). The openings of these chimneys are usually closed near the top by a very thin layer of dry mud. These structures become firm and strong after they are dry. In the chamber the larva changes to a pupa (fig. 8). Beside the larvæ and pupæ, several adults were found within the cells (fig. 3).

The beetles were identified for me by Mr. A. B. Walcott, of The Field Museum of Natural History, Chicago, who says: "The sending represents two species, the larger and paler ones are *Heterocerus pallidus* Say; while the smaller and darker ones are *Heterocerus tristis* Mann." The adults of these two distinct species were found together in the same limited area and in the same kind of pupal cases. Their habits apparently are identical.

The smaller beetles measured on an average 4.3 mm. in length, the larger ones were slightly longer. At the time of pupation the larvæ measured from 7 to 8 mm. in length (fig. 7). The cases averaged 10 mm. in their longest dimension.

When the place was visited again a few days later, a rise of the stream had obliterated the entire colony, and nothing remained but a plain mud bar.

NEW AND LITTLE-KNOWN AMERICAN BEES.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

The new species described all belong to parasitic genera.

***Cœlioxys panamensis*, n. sp.**

♂. Length about 10 mm.; black, with the legs (except coxæ), tegulæ, first abdominal segment and second laterally all bright ferruginous, under side of abdomen darker red; mandibles reddish in middle; face and front densely covered with appressed, very pale, yellow hair; eyes pale reddish, with short hair; antennæ black, with penultimate joint (except dusky apex) and basal half of last joint dull yellowish red; third joint conspicuously shorter than fourth; vertex densely punctured, but a smooth area at each side of the ocelli; mesothorax densely and coarsely punctured, the anterior margin with a bow-shaped band of pale fulvous hair; a band of similar hair posteriorly, partly on mesothorax and partly on scutellum, and a spot at each side behind the tegulæ; axillar spines long, flattened, appearing slender from above; scutellum densely and coarsely punctured, with a median carina, but no projecting tooth; mesopleura with a broad band of white hair in front and behind; wings strongly brownish; first r.n. jointing second s.m. nearly as far from base as second from apex; anterior coxæ with short, flattened spines; abdomen dorsally finely punctured, shining; hair-bands slender, tinged with yellowish; apex with slender lateral spines; slender, widely divergent, inferior apical spines; and broad, obtuse superior apical lobes, shorter than the inferior spines.

Canal Zone, Panama (*A. H. Jennings*), U. S. National Museum. Not closely related to any species known to me; in my table of males it runs near *C. sayi* and *C. hirsutissima*. The peculiarly coloured antennæ are quite distinctive.

***Cœlioxys nigrofimbriata*, n. sp.**

♀. Length about 9.5 mm.; black, with the tegulæ and legs ferruginous; the abdomen is entirely black above, but dark red (with white hair bands) beneath; antennæ entirely black; mandibles red, black at apex; face covered with erect brown hair, but the sides with white tomentum; clypeus simple; eyes red, with short hair; mesothorax surrounded with pale fulvous hair; mesothorax and scutellum with very large punctures, but the shining intervals conspicuous on disc; scutellum with a smooth median keel; axillar spines rather short, curved; wings strongly brownish; recurrent nervures equally distant from ends of second s.m.; anterior coxæ with short spines; abdomen above highly polished, sparsely punctured, with very narrow whitish hair-bands; sixth segment with very minute punctures, and a median keel; last ventral segment produced far beyond last dorsal, sharply pointed at end, not notched at sides, but densely fringed with black hair; apex of last dorsal also with black hair, but its sides before apical part fringed with white hair.

Manaos, Brazil, (*Miss H. B. Merrill*), U. S. Nat. Museum. In Schrottky's table of Brazilian species this runs to *C. amazonica* Sky., but is smaller, and apparently less densely punctured on thorax above. Schrottky also omits to refer to the more striking characters of the abdomen, present in our species, and presumably absent in his. In the tables of Holmberg and Friese it runs nearest to *C. remissa* Holmberg., but differs in the sculpture of the scutellum.

Cœlixys clypeata Smith, variety a.

♀.—First abdominal segment red above. The pubescence of the large clypeal lobes is reddish.

Trinidad, West Indies, June, (*Aug. Busck*). U. S. Nat. Museum.

Cœlixys deplanata Cresson.

♀.—Tlahualilo, Mexico, July, 1905, (*A. W. Morrill*.)

Cœlixys crassula, n. sp.

♀.—Length about 8.5 mm.; black, robust, with the legs (except coxæ and trochanters) and tegulæ ferruginous; mandibles black; clypeus simple, short and very densely punctured; antennæ black, third joint about as long as fourth; eyes black or almost (not greenish or reddish); vertex with a smooth space on each side next to eye; pubescence dull white, the abdomen with five entire bands, but no short, oblique ones; mesothorax and scutellum with dense large punctures, the latter with posterior margin straight; axillar spines moderate; wings dusky; anterior coxæ with small spines; abdomen very broad at base, well punctured; apical dorsal segment keeled its whole length, ending with an angle of perhaps 60 degrees; apical ventral segment broad, not much turned downward at sides before end, the outer margin of the notch sharp.

Boulder, Colorado, in D. M. Andrew's nursery, at flowers of cultivated *Helenium*, Oct. 10, 1918. (*W. P. Cockerell*). In Crawford's table this runs exactly to *C. octodentata* Say, but it differs by the entire keel on last dorsal segment, shorter last ventral segment, and colour of eyes. On the same flowers, at the same time, were males of *Melissodes semiagilis* (Ckll.). On Oct. 12, the weather being unusually fine and warm for the time of year, I went to the same spot in search of more *C. crassula*. I did not find any, but from the *Helenium* I obtained females of *Megachile brevis* Say, and males of *Halictus armaticeps* Cresson and *Colletes salicicola geranii* Ckll. I also collected a male *Megachile perihirta* Ckll. Immediately adjacent was a row of *Salvia pitcheri*, which was visited by *Bombus americanorum* Fabr., *Anthophora smithii* Cresson, *Pseudo-melecta interrupta rociadensis* Ckll., and *Sphcodes lautipennis* Ckll.

Stelis aliena, n. sp.

♀.—Length about 8.5 mm.; with the general appearance, venation and pulvilli of *Dianthidium* (e. g., *D. bicoloratum* Smith), but no scopa, the ventral abdominal segments with thin fringes of hair; cheeks, vertex, occiput and mandibles (except teeth) bright ferruginous; two very broad black bands, beginning between the ocelli, pass down the front to the clypeus, where they become narrower; between these is a red band, the upper end of which (marked off from the red by a constriction) is orange; between the black bands and the eyes, down to the clypeus, is orange suffused with red; clypeus reddish black, the lower corners red; antennæ red; head very densely punctured throughout, as also the thorax, the punctures of scutellum much larger than those of mesothorax; prothorax black, the tubercles with an orange spot; pleura black, with thin white hair, its upper part mainly occupied by a large red patch; mesothorax black in middle, laterally dull red, shading into black at sides, but lateral and anterior margins yellow, except middle of anterior margin, the yellow anteriorly forming triangular patches, which are extended

as orange lines across the disc between the black and red areas; axillæ yellow; scutellum bright red, prominent; metathorax black; tegulæ red, very finely punctured; wings fuliginous; legs red, hind femora suffused with blackish; abdomen black, with an interrupted yellow band on first segment, and four yellow spots each on second to fifth; the broad apical segment wholly black; first three segments shining and rather sparsely punctured, the others with large dense punctures.

San Bernardino, Paraguay, (*K. Fiebrig*). U. S. Nat. Museum. This is the first recognized South American *Stelis*, and from its resemblance to the species of *Dianthidium* of the same general region, it seems possible that it represents an independent development, not derived from the *Stelis* of the Northern Hemisphere. *Dianthidium nudum* Schrottky appears to be congeneric, and may be called *Stelis nuda*.

***Dianthidium bicoloratum* (Smith).**

Male.—Clypeus yellow, greater part of mesopleura and hind margins of first four abdominal segments red. Carcarana, Argentina (*Bruner* 18).

***Dianthidium multifasciatum* (Strand).**

San Bernardino, Paraguay (*K. Fiebrig*).

Erratum. Can. Ent., p. 349. For *Nescorynura* read *Neocorynura*.

SOME NEW OR SCARCE COLEOPTERA FROM
WESTERN AND SOUTHERN FLORIDA—II.

BY W. S. BLATCHLEY, INDIANAPOLIS, INDIANA.

(Continued from Vol. L., p. 424.)

***Mycetophagus pini* Zieg.**—Three examples of what I take to be this uniform fuscous-brown species were taken at Dunedin in December. They were found on different occasions, two in fleshy fungi, the other by beating dead branches. Col. Casey, who has examined one of them, is inclined to doubt its being *pini*, stating that "they are not so elongate as that species and the antennal structure appears to be different." They accord, however, with all the brief descriptions of *pini*, the type of which was from North Carolina. No species of *Mycetophagus* has before been recorded from Florida.

***Hister cœnosus* Ehr.**—This large well-marked *Hister* is recorded by Schwarz as "common in Northern Florida," but no records for the southern half of the State are known. Two specimens were taken at Dunedin, on Dec. 19 and March 29, respectively, both being sifted from carrion traps.

***Hister lecontei* Mars.**—This widely distributed species does not seem to be previously known from Florida, at least no published record can be found. A single specimen was taken from beneath the lake beach debris near Moore Haven on March 3.

***Hister coarctatus* Lec.**—Horn in his "Synopsis of U. S. Histeridæ" * says that this species occurs with *H. parallelus* Say, the latter having been previously mentioned by him as "occurring in Georgia, South Carolina and Florida." This indirect record is the only one I can find for Florida. A single

*Proc. Amer. Phil. Soc., XIII, 1873, 298.

specimen was taken at Dunedin on March 25 while sweeping huckleberry and other low vegetation.

Soronia undulata Say.—A specimen was given me by Dr. E. W. Berger, Entomologist of the Florida State Plant Board, who reared it from larvæ sent in to him as damaging the fruit of guavas at Bradentown. It has not before been recorded from the State. Horn* gives its range as Middle States to Utah.

Cryptarcha strigata Fab.—An introduced European species not before reported from Florida. Two specimens were taken, one at Dunedin, February 11, while beating, the other at La Belle, February 27, by sweeping.

Trogosita hubbardi Leveille.—A subaritime species described from Biscayne Bay, and since taken by Schwarz (Ms.) at Key West and Punta Gorda, Fla., and Cayamas, Cuba. Two specimens were beaten from Florida button-bush, on Hog Island, March 14.

Elater manipularis Cand.—LeConte gives** the range of this species as "Canada to Texas." I can find no record of its occurrence in Florida. Two specimens were taken at Dunedin in December, and one at Lakeland, Feb. 22, all by beating bunches of Spanish moss in which they were hibernating.

Dicerca punctulata Schön.—One specimen beaten from pine at Dunedin, Jan. 15. LeConte, in his Revision, gives its range as New York to Georgia. Not mentioned in any of the Florida lists.

Mastogenius subcyaneus Lec.—Several specimens of this small Buprestid are taken at Dunedin each spring by sweeping ferns and beating in Skinner's Hammock. I have also taken it at Eustis. Schwarz (Ms.) notes it from St. Augustine. There is no previous published record for the State.

Agrilus floridanus Cr.—A half dozen specimens of this handsome bronzed species were swept from huckleberry and other low shrubs at Dunedin during the latter part of March. It was described from northern Florida and is recorded elsewhere only from Tampa.

Agrilus cupricollis Gory.—This species was described from St. Augustine and has been taken by me at Ormond and Dunedin. At the latter place it begins to appear about March 10 and occurs on huckleberry and other low shrubs.

Taphrocerus albonotatus sp. nov.—Elongate, slender, strongly tapering behind. Black, shining, very sparsely and finely pubescent; the elytra with eight isolated white pubescent spots, arranged in three cross rows, two each in the first and third, and four in the second or middle row; the spots of the third row crescent-shaped, the others rounded or oblong, the first row at middle, the others equally spaced behind it. Head as broad as front of thorax, finely alutaceous, not punctate, the occiput with a wide, shallow, median impression. Thorax twice as wide as long, base slightly wider than apex, disk uneven, but less so than in *gracilis*; surface minutely alutaceous and with large, shallow, scattered ocellate punctures. Elytra at base slightly narrower than base of thorax, sides broadly sinuate in front of middle, straight and strongly converging from apical third to the obtusely rounded tips; disk with irregular rows of large shallow punctures, these becoming obsolete towards apex. Abdomen with

*Trans. Amer. Ent. Soc., VII, 308.

**Trans. Amer. Ent. Soc., XII, 1884, 9.

large, very shallow punctures, each enclosing a small oblong white scale. Length 3.5–4.5 mm.

Frequent in southern Florida, on huckleberry and other low shrubs in late fall and early spring. Taken by me at Lakeland, Ft. Myers, La Belle and Dunedin, October 20 to April 10. Confused heretofore with *T. gracilis* Say from which it differs by its more slender and more strongly tapering body, black colour without bronze tinge as in *gracilis*, and by the isolated white pubescent spots, the pubescence in *gracilis* coalescing to form two white cross bars on apical half of elytra. *T. puncticollis* Sz. is distinct by the punctate head and lack of elytral pubescent spots or bands. It has been taken by me at Okeechobee City, Bassenger and Dunedin.

Taphrocerus agriloides Crotch.—A half dozen specimens of this scarce form were taken near Moore Haven by sweeping low vegetation along the margin of Lake Okeechobee. It was described from Texas and is recorded by Schwarz as very rare at Haulover, Fla.

Brachys lugubris* Lec.—This name should be replaced in our lists either as a valid species or a well marked variety of *B. ovata* Web. The surface is black with a bluish tinge, never bronzed, the pubescence always white. The last ventral of male is not visible from above as in *ovata*, and its marginal teeth are much finer. In the female this segment is not truncate, as stated by Le Conte, but broadly rounded. About Dunedin it was swept from Ericads and low vegetation along the borders of lakes on several occasions in February and March, and was also taken under like conditions at Lakeland.

Calochromus perfacetus Say.—Two specimens of this Lampyrid were taken at Lakeland on Feb. 21. It was also found by me at Ormond on April 14. LeConte, in his synopsis of the family, gives its range as "Atlantic States," but this is the first record from Florida.

Chauliognathus pennsylvanicus DeG.—This species, whose general range is more northern than that of *C. marginatus*, was taken at La Belle on Feb. 27. It is mentioned in Schwarz's manuscript list as occurring at St. Augustine and Crescent City.

Phengodes floridensis sp. nov.—Elongate, slender. Pale reddish yellow, pubescent with yellow hairs; antennæ, except the two basal joints, apical or narrowed halves of elytra, inner wings and margins of dorsal segments of abdomen, fuscous. Head with deep transverse curved channel behind the eyes, the latter globose, prominent; occiput and front densely punctate, not grooved lengthwise; antennæ strongly plumose, half the length of body. Thorax slightly wider than long, convex, front angles rounded, hind ones acute, side margins flattened, horizontal, slightly narrowed in front, disk very finely and sparsely punctate. Elytra subulate, reaching scarcely beyond base of abdomen. Length 9 mm.

One male, swept from ferns in Skinner's Hammock northeast of Dunedin, March 19.

Eupactus obsoletus Fall.—A specimen taken at electric porch-light at Dunedin was received on June 15. Identified by Mr. Fall, who states that it has

*Trans. Amer. Phil. Soc., XI, 1859, 251.

not previously been reported from Florida. *E. punctulatus* Lec. has also been taken at light at Dunedin.

Copris inemarginatus Blatch.—An examination of the male genitalia of this species and of *C. anaglypticus* was kindly made for me by Prof. R. W. Dawson of Lincoln, Neb. He reports that the claspers are uniformly less elongate and less slender in *inemarginatus* than in *C. anaglypticus*. He examined also the genitalia of other species of *Copris*, viz., *mæchus minutus* and three tropical forms, and states that "the differences between the genitalia of these unquestionably distinct species are little if any greater than those between *inemarginatus* and *anaglypticus*." His conclusions therefore are but additional evidence that the Florida form was worthy of a distinctive name*.

Onthophagus alutaceus sp. nov. —Rounded-oval, small for the genus. Black, feebly shining, not at all bronzed; palpi, tarsi and front tibiae brownish. Head of male without carina, sparsely punctate above, more closely near the margins, the clypeus with a broad, rather shallow triangular notch. Thorax twice as wide as long, longest at middle; sides straight in front, then rounded into base, the latter broadly rounded, sinuate near hind angles, distinctly margined; disk strongly convex, its front third declivent and with an obtuse triangular median projection; surface finely alutaceous, sparsely, evenly, coarsely and shallowly punctate, each puncture bearing a short, coarse, stiff, erect, brown hair. Elytra at base distinctly narrower than middle of thorax; striae very fine; intervals wide, coarsely alutaceous, each with two rows of fine, aciculate punctures, each puncture bearing a fine, short, inclined yellow hair. Spur of hind tibiae half the length of tarsi. Pygidium, femora and sterna coarsely, shallowly and sparsely punctate; abdomen almost smooth. Length 4 mm.

One male, taken on the wing at Dunedin, Jan. 7. Chas. Schaeffer, who recently published a review of the North American species of *Onthophagus*,** says it is undescribed form, close to a new species in his collection from Texas, which has the front tibiae armed with a distinct, moderately long hairy pencil as in "*anthracinus*, *landolti*, etc.," this being absent in the Florida specimen. The broad, strongly alutaceous elytral intervals with rows of aciculate punctures resembling minute tubercles, taken in connection with the small size, black colour and notched clypeus, are the principal distinctive characters of *alutaceus*. It is closely related to *cribricollis* Horn, the latter being bronzed, with different sculpture of upper surface and broader clypeal notch.

Aphodius bicolor Say.—One specimen taken at Dunedin, March 18. The first record for the State.

Polyphylla occidentalis Linn.—One specimen taken at porch-light at Dunedin, June 10. Specimens in the Gainesville collection are from Lake City. The *P. occidentalis* of the Schwarz List was based on *P. gracilis*, there being no published record of true *occidentalis* from the State.

*In the last paragraph of the notes following the description of *C. inemarginatus* (Can. Ent., February, 1918), line 8 from the bottom of p. 55 should read "and take the punctures out of" instead of "and put the punctures in."

**Journ. N. Y. Ent. Soc., XXII, 1914, 290.

Heterachthes pallidum Hald.—Elongate, slender, cylindrical. Rather dark reddish brown or rufc-testaceous throughout, strongly shining. Thorax cylindrical, twice as long as broad, narrowed at base, finely, sparsely and irregularly punctate without callosities or antemedian constriction as in *quadrimaculatus*. Elytra twice as long as thorax, slightly wider at base, finely sparsely and irregularly punctate, each puncture bearing a very slender, erect hair. Under surface smooth, glabrous. Length 6.5 mm.

The above description, I take it, is that of the insect mentioned* as a variety of *H. quadrimaculatus* Newm., Haldeman's brief description following that of *H. quadrimaculatus*, being as follows: "Var. *pallidum*. Pale, posterior spots wanting. Three lines long." As described above the differences between the two forms are sufficient to restore Haldeman's name, if not as a valid species, at least as a good variety. One male was taken by beating in Skinner's Hammock northeast of Dunedin, March 23. The antennæ, as is usual with males of the genus, have joints 1 to 6 uniformly thickened, the second very small, globular; the terminal joints much more slender. *H. ebenus*, the only other species known from Florida, was taken at Moore Haven and Okeechobee City.

(To be continued)

THE NORTH AMERICAN DIPTERA DESCRIBED BY NILS S. SWEDERUS.

BY CHARLES W. JOHNSON, BOSTON, MASS.

In Kongl. Vetenskaps Academiens Nya Handlingar, 1787, vol. VIII, pt. 4, Swederus described seven Diptera, including two from North America. The author states that he has followed the classification of Linné, the genera of Fabricius being placed in parenthesis. On page 287 is described *Musca* (*Syrphus* Fabr.) *monoculus*, "Hab. in America Septentrionali." I am unable to identify this species. On page 288, *Musca* (*Syrphus* Fabr.) *americana* is described, "Hab. in America Sept." This is probably the species referred to as "*Musca tomentosa* Swederus" in Osten Sacken's Catl. N. Amer. Diptera, page 136, 1878, in the synonymy under "*Brachypalpus verbosus* (Harris) Walker," and later placed in the synonymy under *Criorhina verbosa* by Williston (Synopsis N. Amer. Syrphidæ, page 211, 1886). The name "*Musca tomentosa* Swederus" is evidently an error, as no species by that name was described by him. In regard to *Musca* (*Syrphus*) *americana* Swederus being the same as *C. verbosa* Walker, there seems to be too many discrepancies, the description agreeing far better with *Eristalis flavipes* Walker.

The name *Musca americana* was previously used by Fabricius 1775. On the other hand, *Syrphus americanus* was used by Wiedemann in 1830. Does the use of Fabricius' genus in parenthesis by Swederus invalidate the name used by Wiedemann? I am inclined to think it does, as the author's intention seems very clear, for, following this description, three other species are described in which only the genus *Musca* is used. To avoid confusion it seems necessary to rename Wiedemann's species. I, therefore, propose the name *Syrphus wiedemanni* n. n., placing *Musca* (*Syrphus*) *americana* Swederus in the synonymy under *Eristalis flavipes* Walker.

*Trans. Amer. Phil. Soc., X, 1847, 43.
February, 1919

LEUCOPELMONUS CONFUSUS, NORTON—TENTHREDINIDÆ.*

BY ALEX. D. MACGILLIVRAY, UNIVERSITY OF ILLINOIS, URBANA, ILL.

Norton in his "Catalogue of the Described Tenthredinidæ and Uroceridæ of North America," describes as a new species, *Tenthredo confusus*. This species was based upon a male received from the Smithsonian Institution. The only locality noted was the United States. The type of this species has been reported as lost and, so far as I am aware, no one has identified this species since.

In the Canadian Entomologist for 1893, Mr. W. Hague Harrington described a peculiar tenthredinid, *Tenthredopsis (?) annulicornis*. It is not unusual for species of Ichneumonidæ to have the proximal and distal segments of the antennæ black or dusky and the intermediate segments white. This is the first record of a species of Tenthredinidæ with antennæ coloured in this way. The female of this species has the fifth and sixth segments white and the others dusky. Such an arrangement of colour makes the female very easily recognized.

Mr. S. A. Rohwer described a similar species from North Carolina under the name of *Perinura turbata*. The female of this species also has the fifth and sixth segments of the antennæ white.

There is included in my report on the Tenthredinoidea in the report of the Hymenoptera of Connecticut a new genus and species, *Leucopelmonus annulatus*, the female of which has similarly coloured antennæ. This species was based on specimens collected in New England. It was hoped that a careful study of all these species could be made before the description of *L. annulatus* was published, but this was impossible.

The description of Norton was based upon a male, but in the case of the species described by Harrington, Rohwer, and MacGillivray, specimens of both sexes were available for study. There is before me for comparison typical specimens of both sexes of these three latter species. While there are slight individual variations, I am unable to find any constant characters for separating them. The males agree perfectly with Norton's description of the male of *confusus*, and I believe that these four names all apply to a single species which is very constant in its structural and colorational characters.

Leucopelmonus MacG.

1917. MacGillivray, Bul. Conn. Geol. Nat. Hist. Surv., 22, 83.

Head broad between the compound eyes, nearly twice as broad as the eyes are along at the antennal foveæ; compound eyes with their mesal margins nearly parallel or only slightly converging ventrad; antennal plates not strongly developed, but distinct; malar space one-half as long as the first antennal segment; clypeus deeply emarginate, labrum broadly rounded; lateral ocelli slightly dorsad of a line connecting the dorsal corners of the compound eyes; antennæ with nine segments, the first distinctly longer than the second, segments of the flagellum not thickened or clavate; legs with the metacoxæ not reaching to the caudal margin of the third abdominal segment, metafemora not reaching the caudal end of the abdomen, and the claws deeply cleft; front wings with the radial cross-vein, the free parts of R_4 and R_5 , the radio-medial cross-vein, and the free part of Sc_1 distinct; M_{3+4} originating from the cell R_5 and M_2 from the cell R_4 ; 2nd A a short, transverse vein; hind wings with the free part of R_4 and

*Contributions from the Entomological Laboratories of the University of Illinois, No. 57.
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the transverse part of M_2 wanting, the cells R_3 and M_1 not limited at the margin of the wing by a vein; abdomen with the basal plates not divided at middle.

This genus is related to *Tenthredopsis* and *Rhogogastera*, from the former of which it is separated by having the basal plates undivided and from the latter by lacking the free part of R_4 , and the transverse part of M_2 in the hind wings of both sexes.

***Leucopelmonus confusus* Nort.**

1869. *Tenthredo*. Norton, Trans. Amer. Entom. Soc., 2, 24.
 1887. *Tenthredopsis*, Cresson, Syn. Fam. Gen. Hymen. Amer., 169 *annulicornis* Harrg.
 1893. ? *Tenthredopsis*, Harrington, Can. Entom., 25, 61, *turbata* Rohwer.
 1911. *Perineura*, Rohwer, Proc. U. S. Nat. Mus., 41, 408, *annulatus* MacG.
 1917. *Leucopelmonus*, MacGillivray, Bul. Conn. Geol. Nat. Hist. Surv., 22, 83.

Female.—Head, including the clypeus, finely, densely, shallowly punctured; the clypeus narrowly, deeply emarginate, the bottom of the emargination transverse, the sides oblique, the clypeal lobes large, broadly truncated; the antennal furrows broad, deep, and distinct, more linear between the lateral ocelli and the caudal margin of the head, parallel; the caudal portion of the head distinctly margined, deeply interrupted by the antennal furrows; the postocellar area very convex, quadrangular; the ocellar furrow distinct, broadly rounded, connecting with the antennal furrows and a short, interocellar furrow continued as a slight V-shaped depression surrounding the median ocellus; the ocellar areas not elevated adjacent to the lateral ocelli, forming well elevated ridges continuous with the distinct antennal plates and elevated flat supraclypeal area; the median fovea wanting; the dorsal end of the supraclypeal area abrupt, forming the ventral boundary of the deep ocellar basin, extending from the supraclypeal area to the median ocellus, the ocellar basin variable in depth, the ventral portion sometimes smooth; a distinct lateral fovea adjacent to the dorsal end of each antennal plate; the antennæ with the third and fourth segments subequal or the third slightly longer than the fourth, the fourth distinctly longer than the fifth; the pronotum sparsely coarsely punctured; the median and lateral lobes of the mesonotum polished, with sparse punctures bearing setæ; the mesoscutellum and axillæ densely granular, the mesopost-scutellum polished with a few punctures, the lateral portions sometimes slightly finely striated; the mesoscutum finely densely granular; the mesopleura with the dorsal portion finely densely punctured, gradually merging with the granular ventral portion and polished mesosternum; metapleura granular; the wings hyaline, the proximal half of the stigma pale, the veins including the costa brownish; the claws cleft, the inner lobe about one-fourth the length of the outer; the cephalic tibial spurs enlarged, angularly bifurcate at the distal end; the abdomen polished, sparsely setaceous; the saw-guides slender, the dorsal margin straight, the ventral margin rounded, continuous with the strongly obliquely convex distal portion, the dorsal and distal margins forming a sharp angle; the distal and ventral margin bearing long setæ; the cerci short and truncate; colour rufous shading to whitish with the following parts black: the first to fourth segments of the antennæ, the distal half or whole of the seventh,

and the eighth and ninth, the head except the supraclypeal area for the most part, the clypeus, the labrum, and some irregular marks on the postocellar area, sometimes represented by two black spots, an oval spot on each lateral lobe of mesonotum and a minute spot near the caudo-mesal angle of each oval spot, the metanotum and the sutures between it and the basal plates and first abdominal segment more or less, the ventral aspect of the mesopleura and metapleura, sometimes with a rufous spot on the mesopleura, variable in size and distinctness, mesosternum and metasternum, the coxæ except the distal portion, and a band at the distal end of the metafemora and metatibiæ; the labrum, antennal segments five and six, sometimes the proximal half of seven and the tegulæ white. Length 8-10 mm.

Male.—The male differs only in having a larger proportion of black and in having the rufous colour tending toward white; the antennæ are pale beyond the second segment, rufous or yellowish, the distal segments viewed in certain lights, whitish; the three distal segments of the abdomen usually black, the entire abdomen sometimes rufous; the pronotum in great part black; the mesopleura entirely black. Length 7-8 mm.

Habitat.—Ottawa, Ontario, (W. Hague Harrington); North fork of Swanao River, Black Mountains, North Carolina (Nathan Banks and Franklin Sherman); Franconia, New Hampshire (Mrs. A. T. Slosson); Durham, New Hampshire (C. M. Weed); Hampton, New Hampshire (S. Albert Shaw); Ithaca, New York.

SOME NEW AMERICAN DELPHACIDÆ.

BY F. MUIR, HONOLULU, T. H.

Genus *Columbiana*, nov.

Head a little narrower than thorax; vertex slightly wider than long, apex slightly narrower than base, basal areas five-sided, nearly the length of the vertex with an oblong foveola in each, the diamond-shape cell small and projecting beyond the apical margin; length of face about twice the width, slightly narrowed between the eyes beyond which the sides parallel, median carina simple, slightly thickened at base; in profile vertex and face rounded; antennæ cylindrical, reaching to apex of face, first joint about as long as broad, second joint about twice the length of first and slightly thicker; clypeus tricarinate. Pronotum tricarinate, lateral carinæ divergingly curved posteriorly not reaching to the hind margin; mesonotum tricarinate. Hind tibia longer than the tarsi, first tarsus equal in length to the two others together; spur slightly shorter than the first tarsus, narrow, cultrate, concave on the inner surface, a tooth on apex but none on the hind margin. Media touching cubitus, a short cross-vein between media and radius.

This genus comes near to *Sogatopsis* Muir; if we disregard the spur it comes near to *Delphacodes* Fieb. and *Sogata* Dist.

Columbiana lloydi, sp. nov. Figs. 6-a, 7-a.

Male, macropterous. Castaneous, darker on pro- and mesonota and abdomen. Tegmina hyaline, veins brown with very fine granules, fuscous or brown over the basal half of costal cell and slightly so over clavus, with a darker mark at the apex of claval vein.

Opening of pygofer oblong, the ventral edge produced into three processes, the middle one broad and bifurcate, the lateral smaller and lanceolate; anal segment large without spines; genital styles straight, flat, narrow at apical fourth, apex truncate; aedeagus large, produced into a long, curved narrow apex with a curved spine at base of the narrow apex.

Length 2.6 mm.; tegmen 4 mm.

Habitat.—Almaguer Cauca, Columbia, 10,500 feet elevation (Lloyd).

Pissonotus megalostylus, sp. nov. Figs. 8-a.

Male, macropterous. Width of head including eyes 1.7 times the length including eyes, antennæ reaching nearly to the apex of clypeus, joints subequal in length, vertex longer than wide, apex slightly narrower than base; lateral pronotal carinae straight, diverging posteriorly not quite reaching the hind margin; length of hind tibia subequal to tarsi, first tarsus slightly longer than the other two together, spur large, as long as first tarsus, laminate, small teeth on hind margin.

Light brown, darker between the carinae of face and clypeus, along the posterior margin of pronotum, over the medio-lateral areas of mesonotum, the abdomen and third tarsus. Tegmina hyaline, median vein and all the apical veins brown, on the median vein all the brown extends into the neighbouring membrane, a brown mark at the end of commissure; wings hyaline with brown veins.

Opening of pygofer oval, margin entire; anal segment small with two small spines on medio-ventral edge; armature arising from the middle of the diaphragma as a cultrate projection; genital styles large, flattened, curved, in lateral view bent at right angles before middle, apex pointed the apical portion curled round into nearly a complete circle, a small projection where the curl begins.

Length 2.5 mm.; tegmen 4 mm.

Habitat.—Demerara River, British Guiana.

Megamelus timehri, sp. nov. Fig. 9.

Male, macropterous. In structure and colour similar to the macropterous *M. notula* (Germ.) to which it is closely related. Spur slightly longer than first tarsal joint, thin and broad with apex rounded, numerous small teeth on the hind margin.

Dark brown, carinae of head, legs, antennæ and pygofer lighter brown; tegmina hyaline, veins brown with a few minute granules bearing black hairs; wings hyaline with light veins.

Pygofer on the same plan as that of *M. notula* (Germ.), the ventral margin with three emarginations, a semicircular median one and a pair of lateral ones deeper than wide; anal segment small, closely embraced by the pygofer; genital styles small, flat, outer edge slightly convex, inner edge straight or slightly concave, apex obtusely pointed.

Length 2.2 mm.; tegmen 3 mm.

Habitat.—Demerara River, British Guiana.

M. notula (Germ.) differs from this species in having the two processes between the emarginations on the ventral edge of the pygofer much narrower and pointed, the genital styles are more pointed and have a large projection at base, and the anal segment is not closely embraced by the pygofer. The variety *flavus* (Crawford) differs from *M. timehri*.



Fig. 6.—Dorsal view of head and pronotum of *Columbiana lloydi*.



Fig. 6a.—Face of same.



Fig. 7.—*C. lloydi*, full view of pygofer.



Fig. 7a.—Lateral view of same.



Fig. 8.—*Pissonotus megalostylus*, full view of pygofer.



Fig. 8a.—Lateral view of same.



Fig. 9.—*Megamelus timahri*, full view of pygofer.



Fig. 10.—*Chloriona fuscipennis*, full view of pygofer.



Fig. 11.—*Delphacodes guianensis*, full view of pygofer.



Fig. 12.—*Delphacodes subfusca*, full view of pygofer.

Chloriona fuscipennis, sp. nov. Fig. 10.

Male, macropterous. Length of vertex twice the width, apex slightly narrower than base, length of face two and one-half times the width, slightly wider on apical half; antennæ reaching to the base of clypeus or slightly beyond, first joint half the length of the second; hind tibia of equal length to tarsi, first tarsus longer than the other two together, spur nearly as long as first tarsus, wide, laminate, many small teeth on the hind margin; lateral pronotal carinæ diverging posteriorly, slightly curved, not reaching the hind margin.

Dark brown, front and middle legs lighter brown, antennæ, rostrum, hind legs, lateral portions of pronotum, middle of pro- and metanota yellowish or light brown. Tegmina hyaline, fuscous, an area over apex of costal and subcostal cells clear, infuscation darkest along cubital area, commissure white with a dark mark at apex, granules minute with black hairs; wings hyaline with brown veins.

Pygofer opening wide, dorsal emargination deep; anal segment sunk into emargination, round; genital styles long, straight, flat, narrowed on apical third, apex truncate.

Length 2.5 mm.; tegmen 3.4 mm.

Habitat.—Demerara River, British Guiana.

Delphacodes guianensis, sp. nov. Fig. 11.

Male, macropterous. Vertex as long as wide, length of face slightly more than twice the width, sides subparallel, slightly narrowed between the eyes; antennæ reaching slightly beyond the base of the clypeus, first joint more than half the length of the second (1 to 1.4); hind tibia longer than tarsi, first joint of hind tarsus as long as the other two together, spur large, as long as the first tarsal joint, broad, laminate, apex acute, small teeth on the hind margin.

Light brown or ochraceous; a minute black spot on the lateral carinæ of face in front of the ocelli, a slightly darker longitudinal mark down the tibiæ, abdomen darker with a light line down the middle of the ventral surface and on pleura. Tegmina hyaline, slightly yellow, veins yellow, granules fine with black hairs; wings hyaline with yellow veins.

Opening of pygofer slightly deeper than broad, anal segment small not closely embraced by pygofer, a pair of short, stout, curved, diverging spines on medio-ventral surface, their bases approximate; genital styles large, flat, broadest at apex which is truncate and oblique, outer edge slightly concave, inner edge produced into a process at the middle, which is longer than broad and rounded at apex.

Length 2 mm.; tegmen 3.3 mm.

Habitat.—Demerara River, British Guiana.

Delphacodes subfusca, sp. nov. Fig. 12.

Male, macropterous. Vertex slightly broader than long; antennæ reaching to base of clypeus, first joint about half the length of second; length of face about twice the width, slightly narrowed between the eyes, beyond which the sides are parallel; median carina furcate at base; hind tibia equal in length to the tarsi, first tarsal joint equal to the second and third together, spur as long as first tarsi at joint, wide, pointed, laminate, small teeth on the hind margin.

Light brown or ochraceous, darker between carinæ of head and over coxæ

and abdomen. Tegmina hyaline with light brown veins, granules very small bearing black hairs, a dark mark at end of commissure, wings hyaline with brown veins.

Opening of pygofer round, margin produced into a small lobe at each side of the anal segment; anal segment small with a pair of small, stout spines on the medio-ventral edge, touching at their bases and slightly diverging to the apices; armature or diaphragm small, Y-shape; genital styles long, flat, slightly curved, slightly narrowed at middle, apex truncate with the corners slightly produced.

Length 1.6 mm.; tegmen 2.0 mm.

Female lighter in colour, especially so on coxae and abdomen.

Length 2.2 mm.; tegmen 2.8 mm.

Habitat.—Demerara River, British Guiana.

SAMUEL WENDELL WILLISTON.

In the death of Samuel Wendell Williston, on August 30, 1918, American entomology has lost one of its keenest students. Although his professional work lay mainly in palaeontology, in which field he attained great distinction, he also ranked as the foremost American dipterist of his time and a world-authority in this branch of entomology.

The following brief sketch of his life is based upon, and largely quoted from, the admirable account by Prof. J. M. Aldrich, which appeared in the November number of the *Entomological News* (vol. XXIX, pp. 322-327, with portrait).

Samuel Wendell Williston was born on July 10, 1852, and was, therefore, 66 years old when he died. At this time and for some years previously he was Professor of Palaeontology and Director of the Walker Museum in the University of Chicago. His boyhood was spent at Manhattan, Kansas, where he entered the Agricultural College, graduating in 1872. He began to study medicine in 1873, but in the following two years he spent the summer months in fossil-collecting expeditions in Western Kansas, the work being done for Prof. Marsh, of Yale University. After a winter at the Medical School of the University of Iowa, he visited Prof. Marsh in the spring of 1876, and this visit resulted in almost continuous employment with Marsh for nine years, until 1885, when he received his Ph. D., specializing in palaeontology. He also managed to finish his medical course in 1880, and in 1886 was appointed demonstrator in anatomy at Yale Medical School. So great was his ability as an anatomist that he obtained a full professorship in Human Anatomy in the following year.

After three years in this position he accepted a call to the University of Kansas as Professor of Historical Geology and Palaeontology. Twelve years of arduous and productive work followed, during which he helped to organize the Medical Department of the University and took on the deanship of the latter in addition to his other duties.

Though possessed of a vigorous constitution, his health began to give way under the strain of overwork, so that, after resigning from this post, he went to Chicago in 1902 as Professor of Palaeontology, in which capacity he was able to concentrate upon his chosen specialty. Here he spent the last 14 years of his

life, beginning under some unexpected hardships and gradually working up to full recognition and honours.

Williston never held an official entomological position, but he found time to do much valuable work as a pioneer in dipterology. His interest in flies began to be serious about 1878, but he was virtually alone in the field in America, and the difficulties which confronted him in the identification of genera and species were almost overwhelming. After a year or two of slow and tedious effort, however, he came upon Schiner's *Fauna Austriaca*, in which he found great relief and satisfaction, for he was now able, through its excellent analytical tables, to trace all his American flies to their families and, in most cases, to their genera. "He was so impressed by the saving of time accomplished that his own publications coming later show the effect of this early experience on every page; everywhere he has the beginner in mind and is clearing the way for him.

¶In a few years he began publishing tentative papers analyzing the American families and genera of flies. These he extended and enlarged in a pamphlet in 1888, and again in a bound volume in 1896; and in 1898 published a third edition still more complete, with 1,000 figures, his well-known *Manual of Diptera*. This third edition is his main contribution to entomology. It is a handbook unapproached by anything else dealing with a large order of insects. From necessity he published it at his own expense; it was eight years before the receipts from sales covered the cost of printing, but happily he lived to see this consummation.

"His other papers of his early period, 1881-89, dealt with *Asilidæ*, *Conopidæ*, *Tabanidæ*, and smaller groups, and especially with *Syrphidæ*, in which his fine monograph of 1886 is still in universal use, and by the taxonomic genius of its author has created in the United States an ineradicable belief that the family is an easy one, well adapted for the beginner to publish in; a mistaken belief, but highly complimentary to the monographer.

"From 1890 his more important papers were concerned with tropical *Diptera* (Mexico, St. Vincent, Brazil), and with bibliography. As his official duties grew more exacting, he gradually abandoned entomology, but he had as many farewell appearances as an opera singer, for he could not resist the temptation to come back again and again * * * But after 1896 he did little work on the order except in preparing the third edition of his *Manual*, which cost him two years of arduous work, as he drew 800 figures with his own hand. His deep interest in genera and his very wide acquaintance with them, together with his universally recognized taxonomic ability, made him in the period 1890-1900, the peer of Osten Sacken, Brauer and Mik as a world-authority in *Diptera*."

Williston exercised a stimulating and inspiring influence upon his students, with whom he associated himself intimately. Although he never gave any formal entomological courses, he gave much informal assistance to many who were interested in his special studies, and among these are some of our most eminent dipterists, as well as others who attained distinction in palæontology. "But his life work was mainly directed to the larger circle outside his own institution."

"His last years were full of honours. He was a delegate to the International Zoological Congress at Monaco; Yale University gave him an honorary D. Sc.;

he was chosen to the limited membership of the National Academy of Sciences, and the Entomological Society of America made him an Honorary Fellow, one of seven out of its membership of 600.

He was married in 1880 to Annie I. Hathaway, of New Haven, who survives him together with three daughters and a son."

In his concluding paragraph Prof. Aldrich says: "More than any other of my teachers, he became my ideal of a scientific man; and if in later years my ideal took on larger proportions, so he too seemed to expand in his nature powers; and at the close of his life I still feel that a splendid and inspiring example of scientific work and achievement is contained in his career."

SOME NEW LACHNIDS OF THE GENUS LACHNIELLA.

(HOMOPTERA-HEMIPTERA.)

BY H. F. WILSON, MADISON, WIS.

(Continued from page 22.)

Lachniella nigra, n. sp.

Descriptions made from specimens collected at Kilbourn, Wisconsin, August 18, 1917, on *Pinus* sp. Very abundant and found in colonies on the underside of the branches or on the trunk of young trees. General colour shining or a metallic chocolate brown, not pruinose. Colour notes from live specimens, other notes from alcoholic and balsam material. Types in the writer's collection.

Apterous viviparous female.—General colour metallic brown with the legs and antennæ black. After being in the balsam for a few months the antennæ and front and middle pair of legs became lighter, especially the tibiæ. Antennæ with the third segment being much stouter. Third segment approximately as long as the fourth, fifth and sixth together, the sixth being slightly longer than the fourth, and both less than the fifth. Third segment without sensoria, fourth with two small ones, and the fifth with one small sensoria near the middle, and a very large one at the distal end. Beak long, extending to the tip of the body. Nectaries very large and with a straight sloping base, cauda angled rather than rounded at the tip. Hairs abundant and of medium length.

Measurements.—Length of body 2.5 mm. Length of antennal segments: III, 0.5 mm.; IV, 0.187 mm.; V, 0.27 mm.; VI, 0.21 mm. Total length 1.34 mm. Length of beak 2 mm. Length of hind tibiæ 2.35 mm.

Alate viviparous female.—General colour bronze brown with antennæ and legs black. Colour notes made from live specimens, other notes from balsam mounts. After several months in balsam the antennæ and legs become lighter coloured. The antennæ from the base of the third segment, gradually becoming darker toward the tip, the last segment being dusky to black. The tibiæ of the first and second pair of legs excepting at the joints become quite clear, those of the hind pair continue to be dusky black. Third antennal segment approximately as long as the fourth, fifth and sixth. As in the apterous forms the antennæ taper somewhat, the last two segments being thicker than the preceding; from one to three sensoria are found on the distal end, except that occasionally two sensoria may occur near the end, and one larger one about the centre of the segment. Fourth segment normally with one sensorium, but two may occur,

Fifth segment with two large or one large and two small sensoria. Beak reaching to tip of abdomen, wings as usual in the genus. Nectaries not quite as large as in apterous forms, and cauda more rounded.

Measurements.—Length of body 2.25 mm. Length of antennal segments: III, 0.62 mm.; IV, 0.25 mm.; V, 0.27 mm.; VI, 0.187 mm. Total length 1.5 mm. Length of beak 2.15 mm. Length of hind tibiae 2.6 mm.

Lachniella montana, new species.

Description made from three apterous specimens on one slide. Material sent to me by Prof. C. P. Gillette and designated as a new species by him under the name *Lachnus montanus* collected by Prof. Gillette at Cimmaron, Colorado, on oak August 22, 1906.

Apterous viviparous female.—General colour cannot be determined. Antennae light coloured throughout, legs slightly darker without black areas. Antennae reaching slightly beyond the hind coxae, third segment not as long as the fourth, fifth and sixth together. Third and fourth antennal segments without sensoria, fifth with one at the distal end. Beak reaching slightly beyond the hind coxae. Abdomen with a row of distinct tubercles along each side, which are raised areas on the front edge of each tracheal opening. A few scattered glandular areas are also to be found on the abdomen. Each hind tibia has a number of round to oblong sensoria on the upper side of the basal one-third of the segment. It is possible that the specimens at hand are oviparous females, but it hardly seems possible that this form would occur in that climate as early as August. The cauda and oval plate are slightly distinct.

Measurements.—Length of body 3.5 mm.; width 2 mm. Length of antennal segments: III, 0.72 mm.; IV, 0.31 mm.; V, 0.4 mm.; VI, 0.25 mm. Total length 1.67 mm. Beak: III, 0.23 mm.; IV, 0.21 mm.; V, 0.083 mm.

Lachniella burrilli, new species.

From material collected by Professor A. C. Burrill on *Sabina scopulorum* at Twin Falls, Idaho, July 6, 1917. One alate specimen in good condition, one apterous specimen in poor condition and a number of larvae. Mr. Burrill states that these were found on the underside of the limbs feeding on the bark, and that they greatly resembled the colour of the bark. Mr. Burrill's notes on coloration are included in the descriptions. Specimens of what is evidently the same species but differing slightly were sent to me from Fort Collins, Colorado, by Professor C. P. Gillette. These were collected on the same food plant. Types in writer's collection.

Apterous viviparous female.—General colour closely resembles the bark, being black with pruinose patches which produce a calico effect. Antennae cream-coloured at the base and black at the tip. Abdomen with two rows of black blotches along the median line and two rows of black dots dorso-laterally along the abdomen. Legs with the femora black, and the tibiae black at the tip. Nectaries black, cauda light coloured. Antennae with third segment less than length of fourth, fifth and sixth segments. Fourth longer than the sixth. Third segment with three sensoria, fourth with one and five with one. Nectaries small conical, and diameter of base not much greater than that of the opening. Body, legs and antennae moderately hairy, hairs short and inconspicuous.

Measurements.—Length of body 3 mm. Length of antennal segments: III, 0.42 mm.; IV, 0.2 mm.; V, 0.17 mm.; VI, 0.12 mm. Total length 1.3 mm.

Beak: III, 0.166 mm.; IV, 0.166 mm.; V, 0.063 mm. Total length 1.56 mm.?
Length of hind tibiae 0.95 mm.; hind tarsus 0.21 mm.

Alate viviparous female.—General colour black with white pruinose areas producing a calico effect. Antennae cream-coloured at the base of the third and fourth segments, other parts dusky and tip dusky black. Head dusky, thorax black, wings dusky, veins with dusky borders. Legs with femora light coloured at base and dusky toward the tip. Tibiae light coloured except slightly at the base and a small part toward the tip. Tarsi black. Abdomen smoky, with two rows of dorso-lateral black dots, and an extra dot on segment four. Posterior segments almost black. Cauda black. Third antennal segment shorter than the three distal segments, four and five approximately equal, and six shorter than four. Beak reaching to base of nectaries. Nectaries cone-shaped and rather large. Cauda and anal plate broadly rounded.

Measurements.—Length of body 2 mm. Length of antennal segments: III, 0.33 mm.; IV, 0.166 mm.; V, 0.18 mm.; VI, 0.1 mm. Total length 1.36 mm. Beak: III, 0.166 mm.; IV, 0.166 mm.; V, 0.083 mm. Total length 1.55 mm. Length of hind tibiae 1.46 mm. Hind tarsus 0.23 mm.

Lachniella caudelli, new species.

From specimens collected by A. N. Caudell at Kaslo, B.C., July 7, 1903, on spruce. One slide containing one alate and five apterous forms. This species is sufficiently distinct to warrant a description, although the material at hand is not abundant. Types in U. S. Bureau of Entomology collection.

Apterous viviparous female.—General colour cannot be determined. Antennae light at the base growing darker toward the tip, last segment dusky. First and second pair of legs light except at the joints, tarsi dusky. Hind legs with femora light at base and dusky towards the distal end; tibiae dusky except a light area near the base. Tarsi dusky and long and slender.

Antennae with third segment shorter than the fourth, fifth and sixth together. Fourth and sixth approximately equal in length. Third antennal segment without sensoria, fourth with one small, one or none and the fifth with one large one near the distal end. Beak reaching to base of nectaries. Nectaries with base quite flat and about three times as wide as the opening. Opening proportionately larger than the base. Abdomen with two irregular rows of black spots dorsolaterally placed, and with two rows of five oblong spots which appear to be glands. These spots are distinct on two individuals but their structure is obscured by the balsam. Cauda broadly rounded and anal plate wide and dishd.

Measurements.—Length of body 2.42 mm. Length of antennal segments: III, 0.63 mm.; IV, 0.166 mm.; V, 0.25 mm.; VI, 0.19 mm. Total length 1.28 mm. Length of beak: III, 0.23 mm.; IV, 0.18 mm.; V, 0.1 mm. Total length 1.76 mm.

Alate viviparous female.—Antennae dusky throughout and each segment of the same relative thickness. Third segment slightly longer than the fourth and fifth together, the fourth and sixth approximately equal. Third segment with five or six large sensoria, fourth with one or two and fifth with one very large, and one small sensoria.

The legs are generally dusky black with a slight yellowish area near the base of the hind tibiae. Wings with the median vein having but a single fork.

Whether or not this is normal cannot be told until more specimens are gathered. Only one nectary is visible but it is distinctly shown. The base is a little wider than in the apterous forms, and is distinctly cone-shaped but with widely sloping sides. Hairs on antennæ medium short and not overly abundant; they are shorter on the legs but more abundant. They are fine and inclined backward.

Measurements.—Abdomen of this individual crushed, approximate length 2.5 mm.? Length of antennal segments: III, 0.47 mm.; IV, 0.21 mm.; V, 0.27 mm.; VI, 0.22 mm. Total length 1.32 mm. Length of beak: III, 0.21 mm.; IV, 0.167 mm.; V, 0.083 mm. Total length 1.6 mm.

Lachniella pinivora, new species.

From material collected by A. D. Hopkins No. 7422.

Two slides containing six alate specimens. This species resembles *L. gracilis* quite closely but there is considerable difference between the two, in that the hairs at the base of the tibiæ of *L. pinivora* are longer and more inclined than is the case with *L. gracilis*.

Alate viviparous female.—Antennæ light coloured at the base of the third, fourth and fifth antennal segments, distal portion of these segments and the sixth dusky. First and second pairs of legs yellowish at the base of the femora and along the middle of the tibiæ. Other parts and tarsi deep dusky brown. Hind femora yellow at the base and dark brown at the joint, hind tibiæ with yellow area clear and covering about one-third of the segment. Nectaries large and volcano-shaped. Cauda and anal plate both broadly rounded. Third antennal segment with seven medium-sized sensoria widely set apart, fourth with one or two and fifth with two. Third segment shorter than the last three together, five distinctly longer than four and six four-fifths as long as four. Beak short, extending to the farther edge of the middle coxæ. Hairs long and drooping, but not so much so as in *L. strobi*.

Measurements.—Length of body 2.9 mm. Length of antennal segments: III, 0.55 mm.; IV, 0.22 mm.; V, 0.24 mm.; VI, 0.164 mm. Beak: III, 0.172 mm.; IV, 0.15 mm.; VI, 0.63 mm. Total length 1.25 mm. Length of hind tibia 2.29 mm. Hind tarsus 0.27 mm.

Lachniella edulis, new species.

From material collected by Mr. L. C. Bragg at Trinidad, Colorado, June 18, 1911, on *Pinus edulis*. Other specimens collected on the same plant by Professor C. P. Gillette at Walsenburg, Colorado, and by Mr. Bethel, Cannon City, Colorado, may possibly be the same species although some differences have been noticed. Types in writer's collection.

Apterous viviparous female.—Antennæ clear at the base and dusky at the tip. Two anterior pairs of legs dusky except over a greater portion of the tibiæ. Hind legs dusky except a light coloured area near the base of the tibiæ. Third antennal segment slightly shorter than the fourth and fifth together; sixth segment about two thirds the length of the fourth. Apterous forms on Prof. Gillette's slide do not show sensoria on the third segment, while those collected by Mr. Bragg have three small ones near the distal end. Fourth segment with one or two and fifth with two sensoria. Nectaries large and volcano-shaped. Antennæ and body with a moderate number of medium short hairs, legs more abundantly set with short drooping hairs. Hind tibiæ distinctly curved.

Measurements.—Length of body 3.74 mm. Length of antennal segments: VII, 0.5 mm.; IV, 0.25 mm.; V, 0.27 mm.; VI, 0.145 mm. Total length 1.32 mm. Beak: III, 0.187 mm.; IV, 0.155 mm.; V, 0.063 mm. Total length 2.1 mm. Length of hind tibiae 2.9 mm.; hind tarsus 0.33 mm.

Alate viviparous female.—Specimens cleared before mounting and colour characteristics not definite. Antennae with third, fourth and fifth segments light at the base and dusky at the tip. First and second pair of legs with femora dark, tibiae light coloured except at the ends. Hind legs with the femora and tibiae dark except a yellowish area near the base. Third antennal segment slightly shorter than the fourth and fifth together, sixth segment little more than half as long as the fourth. Third segment with four to six round irregular sized sensoria, four with two or three and five with two. Wings folded under the specimens so that venation cannot be determined. Nectaries very large and volcano-shaped. Tibiae long and strongly curved. Antennae and body moderately set with medium short hairs, hind tibiae, thickly set with short drooping hairs.

Measurements.—Length of body 3.5 mm. Length of antennal segments: III, 0.52 mm.; IV, 0.31 mm.; V, 0.31 mm.; VI, 0.187 mm. Total length 1.55 mm. Beak: III, 0.25 mm.; IV, 0.21 mm.; V, 0.063 mm. Total length 2.8 mm. Length of hind tibiae 2.8 mm.; hind tarsus 0.35 mm.

***Lachniella montanensis*, new species.**

From material sent to me by Mr. J. R. Parker, of the Montana Agricultural College. Two slides, one containing specimens collected by F. C. Bishop at Florence, Montana, July 2, 1914, on Pine and a second containing specimens collected by Mr. Parker at Bozeman, Montana, June 25, 1915, on *Pinus laricis*. Types in writer's collection.

Apterous viviparous female.—Antennae with segments three, four and five yellowish at the base and dusky at the tip, sixth segment completely dusky. Legs completely black except a small section at the base of the femora and light areas near the base of the tibiae. This area is a little longer on the front tibiae. Nectaries dusky black broken with light patches about the base.

Third antennal segment longer than segments four and five together, fourth almost equal to five and six about one-half as long as four. Third segment without sensoria, fourth with one or two and fifth with three. Nectaries large and volcano-shaped, cauda angular. Antennae and body moderately hairy, legs, abundantly set with short and drooping hairs. Hind legs strongly curved.

Measurements.—Length of body 4 mm. Length of antennal segments: III, 0.58 mm.; IV, 0.27 mm.; V, 0.27 mm.; VI, 0.15 mm. Total length 1.46 mm. Rostrum: III, 0.31 mm.; IV, 0.31 mm.; V, 0.1 mm. Total length 2.39 mm. Length of hind tibiae 2.9 mm. Length of hind tarsus 0.27 mm.

Alate viviparous female.—Antennae dusky to deep black with light areas at the base of third and fourth segments. Legs as in the apterous forms except that the light areas on the tibiae are less prominent. Nectaries similar to those of the apterous forms. Third antennal segment approximately equal in length to the fourth and fifth segments together. The two latter being approximately equal in length to the fourth and fifth segments together. The two latter being approximately equal in length. Sixth segment about one-half as

long as four. Third segment with seven or eight regular and round sensoria whose diameter is about one-half the diameter of the segment. Fourth segment with two or three and five with two sensoria. Beak extending slightly beyond the hind coxæ. Wings typical of the genus.

Measurements.—Length of body 4 mm. Length of antennal segments: III, 0.6 mm.; IV, 0.29 mm.; V, 0.29 mm.; VI, 0.15 mm. Total length 1.48 mm. Rostrum: III, 0.31 mm.; IV, 0.30 mm.; V, 0.1 mm. Total length 2.4 mm. Length of hind tibiæ 2.9 mm.; hind tarsus 0.39 mm.

Lachniella schwarzii, new species.

From material collected by E. A. Schwarz at Prescott, Arizona, June 20, 1901, on *Pinus* sp. Also three specimens collected by Professor C. P. Gillette at Laporte, Colorado, July 1, 1898, on *Pinus ponderosa*. Types in U. S. Bureau of Entomology collection.

At a first glance this species may be taken for *Lachniella montanensis* as the markings of the legs and antennæ are quite alike and the wings, nectaries and cauda are very similar. The antennæ vary considerably, and the beak of *L. schwarzii* is much the longer in proportion to the length of the body.

Apterous viviparous female.—Antennæ light coloured over basal two-thirds of third and basal one-third of fourth and fifth segments, remaining parts and sixth segment dusky black. The three pairs of legs except the base of the femora and a yellowish area towards the base of the tibiæ dusky black. This light coloured area is much more extensive on the two front pairs than on the rear pair.

Third antennal segment equal to or slightly longer than the fourth and fifth segments together. Fifth segment slightly longer than fourth, and sixth about two-thirds as long as four. Third segment with one small sensoria at the distal end, fourth and fifth with two each. These are larger than the one on the third segment. Beak long, extending almost to or beyond the tip of the abdomen. Hairs on antennæ and body moderately abundant. Legs thickly set with short drooping hairs. Hind tibiæ strongly curved. Nectaries large and volcano-shaped. Cauda angular.

Measurements.—Length of body 2.5 mm. Length of antennal segments: III, 0.56 mm.; IV, 0.23 mm.; V, 0.26 mm.; VI, 0.166 mm.; IV, 0.23 mm.; V, 0.1 mm. Total length 2.49 mm. Length of hind tibiæ 2.45 mm.; hind tarsus 0.33 mm.

Alate viviparous female.—Colour markings of antennæ and legs like those of the apterous female except that the light areas on the tibiæ are not as extensive. Comparative length of antennal segments as in the apterous form. Third antennal segment with four to six round sensoria of irregular size, fourth with one or two and fifth with two. Rostrum long, reaching to or beyond the tip of the abdomen. Cornicles large and volcano-shaped, cauda angular.

Measurements.—Length of body 3 mm. Length of antennal segments: III, 0.51 mm.; IV, 0.23 mm.; V, 0.25 mm.; VI, 0.166 mm. Total length 1.3 mm. Rostrum: III, 0.25 mm.; IV, 0.22 mm.; V, 0.1 mm. Total length 2.9 mm. Hind tibiæ 2.49 mm.; hind tarsus 0.31 mm.

Lachniella pergandei, new species.

Description made from four slides selected from 25 as being representative of the different stages of the species.

Apterous viviparous female.—Specimens in balsam collected by Theo. Pergande, from *Pinus inops* in Virginia near Washington, D.C., June 9, 1903. The prominent character of this species is the deep brown to almost jet black tibiae set with heavy leaning spines.

Antennæ medium slender and extending to the second pair of coxæ. All segments light coloured at the base, dusky toward the tip. Sixth segment fingerlike and approximately as long as the fourth. Fifth segment with three small sensoria toward the distal end. Beak short, reaching to the base of the third pair of coxæ. Tip dusky black.

Nectaries conical and with a widely sloping base. Cauda bluntly angled and short. Abdomen covered with irregular black spots, a hair arising from each one. The purpose of these spots has not been determined; outside these are found other hairs or bristles, the entire body being set with numerous long spinelike hairs.

The femora are brown in colour and the spines, which are not as coarse as those on the tibiae, stand more nearly upright. The tibial spines are set in a leaning position pointing toward the tarsi.

Measurements.—Length of body 4.16 mm. Antennal segments: III, 0.52 mm.; IV, 0.29 mm.; V, 0.31 mm.; VI, 0.25 mm. Total length 1.52 mm. Length of beak 1.5 mm. Hind tibiae 2.39 mm.

Alate viviparous female.—Specimens in balsam collected by Theo. Pergande, on *Pinus inops*, Catholic University, D.C., June 19, 1905, and by H. F. Wilson at D. C. July 4, 1909. Three specimens in all. Antennæ dusky toward the tip, lighter at the base of the fourth segment and only the distal one-quarter of the third dusky. Legs with femora brown, tibiae black. Beak black at the tip and extending slightly beyond the third pair of coxæ. Antennæ moderately slender and reaching to the hind coxæ. Segments four and five approximately equal. Fifth segment about three-fifths as long as the third, and much longer than the fourth or sixth: Third segment with six or eight round sensoria along the distal two-thirds. Fourth segment with two or three sensoria on the distal half. Nectaries as in apterous forms. Abdomen with numerous dusky spots each of which bears a spine-like hair as in the apterous form. Additional spines occur outside these areas. Entire body, legs and antennæ with numerous hairs.

Measurements.—Length of body 4.08 mm. Antennal segments: III, 0.56 mm.; IV, 0.27 mm.; V, 0.29 mm.; VI, 0.25 mm. Total length 1.55 mm. Length of hind tibiae 2.33 mm.

(To be continued.)

BOOK NOTICE.

THE WINGS OF INSECTS.—By J. H. Comstock, Ithaca, N.Y., The Comstock Publication Company. Pp. XVIII + 423, 9 plates and 427 figs.

Among recent publications in the realm of entomological science few have given us more pleasure to read than Professor Comstock's work on the wings of insects, a pleasure that arises not only from the intrinsic value of an important series of investigations thoroughly prosecuted, but also from the assurance that

the subject is presented to us in logical fashion by a recognized authority. The terminology of the wing-veins of insects has always been a subject for debate, and the difficulties have not been diminished by the fact that at different times various authors have adopted systems of nomenclature that have taken little recognition of the work of others. Some authors, indeed, have not helped to unravel the skein by using different systems even when dealing with the same order of insects. It is a matter for congratulation, therefore, that Professor Comstock has found it possible to gather together and present in book form his numerous researches and those of other workers with a view to the adoption of a uniform terminology, the well-known Comstock-Needham system.

Commencing with what he considers as the most likely hypothetical type of wing-venation, the author traces out the homologies of the wing-veins and shows how the more specialized forms have arisen from the more generalized along three quite distinct lines; namely, 1. Increase in the number of wing-veins by the addition of accessory veins. 2. Increase in the number of wing-veins by the addition of intercalary veins. 3. Reduction in the number of wing-veins by the coalescence of veins, and also in many cases, by the atrophy of veins. In support of his theories Professor Comstock brings to bear information and facts laboriously gathered from the various provinces of palaeontology, morphology, embryology and histology. In the first of these, judicious use is made of the careful work of Anton Handlirsch embodied in his "Die Fossilen Insekten und die Phylogenie der Rezenten Formen." Whilst on the whole Professor Comstock agrees with the views of the palaeontologist, he differs with Handlirsch in his idea that all insects had a common ancestry in the Palaeodictyoptera of Devonian times.

In a work that bears throughout the impress of the master-hand, it were invidious to make distinctions; but we must say that the chapter dealing with "The Basal Connections of the Tracheæ of the Wings of Insects," written by one of Professor Comstock's students, appeals to us particularly as a very careful piece of work. It is shown that there is a strict correlation between the tracheation of the wings of insects and the venation, although this fact is often obscured in the adult to accord with its needs and habits. In the study of the tracheation of the wings of nymphs and of pupæ the truth of the conclusion is demonstrated that the wings of all orders of insects are modifications of a single primitive type, and that consequently it is possible to homologise the wing-veins of any of the orders with those of any other order.

In a series of nineteen chapters Professor Comstock discusses in detail numerous types of venation as found in the various orders of insects, and a valuable chapter outlining laboratory work in the study of the venation of the wings of insects, enhances the value of the book as an aid to the teaching of the subject in universities and colleges. The student will also find an exhaustive bibliography of the more important works referred to in the text. The illustrations are excellent, and the explanatory letters very distinct.

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