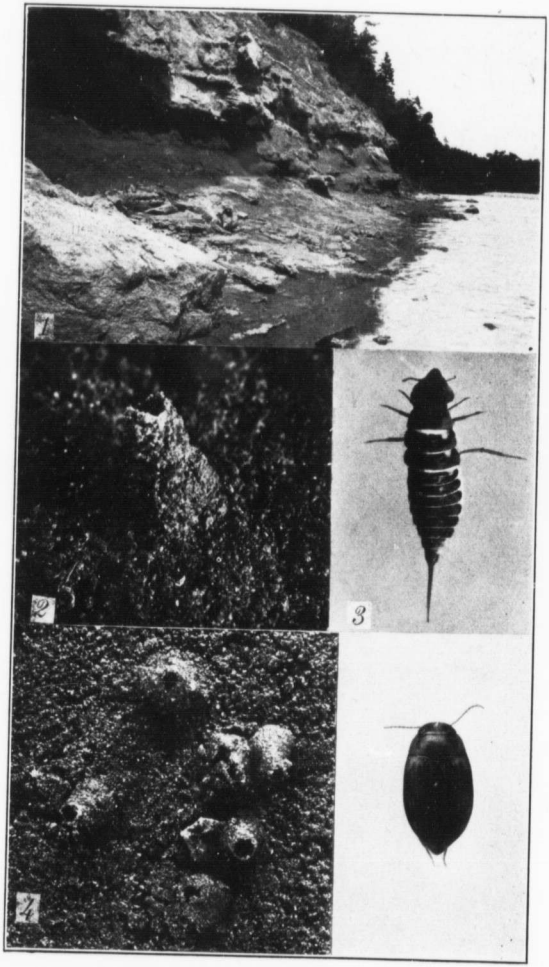


HYDROPORUS SEPTENTRIONALIS, GYLL.

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# LIFE-HISTORY OF A DYTISCID BEETLE (*HYDROPORUS SEPTENTRIONALIS* GYLL.).*

BY ROBERT MATHESON, ITHACA, N. Y.

The Salmon River, a small stream which flows close by the Nova Scotia Agricultural College, Truro, N. S., harbours many interesting species of aquatic insects. At this point it flows through a red sandstone region, the high, red rocky walls standing out in clear relief against a green background of grassy turf and coniferous trees (pl.1, fig.1). During midsummer the river becomes a small stream trickling lazily over its pebbled bottom,leaving wide stretches of flat red rocks covered with fine sand. Here abound mayflies, stoneflies and numerous small water beetles, besides many others. Along the sandy banks tiger-beetles are abundant, and numerous heads are seen to appear and disappear as one walks slowly along. I was interested in trying to rear some of the more common Dytiscid beetles, but found it a difficult task after procuring the larvæ to provide the proper conditions in order to secure continued larval development, pupation, and finally the coveted adult.

While collecting one day last summer (August 7, 1913), I was delighted to find on turning over some flat rocks several beautiful white pupæ quietly resting on their backs in rather wonderfully constructed pupal chambers. Furthermore, there were several different, not only species, but families represented, not all, however, in such peculiar pupal chambers. I was not long in finding representatives of the Carabidæ, Dytiscidæ, Hydrophilidæ and Parnidæ, oftentimes all under the same large flat stone. Unfortunately, other pressing work did not give me opportunity to make as full notes on as many of the species as I could wish. However, there is one interesting form, the life-history of which, in part at least, I wish to present in this short paper.

*This species was kindly determined for me by Mr. John D. Sherman, Jr.

On turning over numerous flat stones I found the pupæ of this species (*Hydroporus septentrionalis* Gyll.) rather abundant in some places. They were found abundant under stones lying on soft, damp, fine sand overlying the broad flat rock-bed now above the water. These were abundant on August 7, 1913, when I discovered this insect, and I at first despaired of finding the larvæ, but on turning over numerous stones I was soon rewarded by finding all stages, larvæ, pupæ and adults. The larvæ construct rather peculiar pupal chambers. These pupal chambers consist of the fine, damp sand, lying over the red sandstone rock which forms the river channel, built into peculiar mounds, usually with a small opening at the top. These mounds are turret-shaped, measuring 6-7 mm. wide at the base, 5-6 mm. high, with an apical diameter of about 2.5 mm. One of these is shown on pl. 1, fig. 2. They are rather beautiful, and when abundant, as they often are under

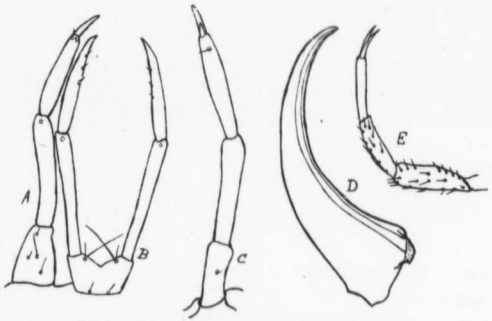



Fig. 9.—*Hydroporus Septentrionalis*, larval structures.

flat rocks, they present, grouped thus together, the appearance of a miniature mud village (pl. 1, fig. 4). I was fortunate enough to observe through the opening in the top one of the larva construct part of its domicile. Round and round it moved within, gradually deepening, and at the same time widening, the interior of the future pupal home. It would turn over and over, smoothing out the sides. I did not observe the beginning of any of these pupal chambers, but I presume the larva began at first to

mine into the soft sand, and by continual turning round and round or moving back and forth gradually construct its chamber.

Although I was fortunate enough to find all the stages of this beetle, I did not learn anything of its ways in the nearby river. They must have been abundant, for the pupal chambers were observed at various places for nearly a mile along the river bank.

*Description of larva.*

Full-grown larva (pl. 1, fig. 3) ready to pupate, measures 5.3 mm.; caudal setæ 2 mm. additional; head 1.04 mm.

General colour brown above, nearly pure white beneath. Head yellowish brown, a V-shaped brown spot on vertex, the apex directed caudad. Head measures 1.04 mm. long and .9 mm. at its widest part just behind the eyes. Rostrum .16 mm. long, rounded in front, smooth and without setæ on margin. Antennæ yellowish brown, 4-jointed; 1st joint, .12 mm.; 2nd joint, .2 mm.; 3rd, .2 mm.; 4th, .08 mm. A few scattered setæ present on the head, the lateral margins just behind the eyes bearing several larger setæ. Mandibles are long, sickle-shaped, perforated to their upturned tips, which rest against the lower surface of the rostrum, yellowish at base, becoming brownish yellow at their tips. The perforations run along the inner sides of the mandibles (fig. 9, D). The maxillæ (fig. 9, A) are greatly reduced, consisting only of a 4-jointed palpus; 1st joint, .33 mm.; 2nd, .65 mm.; 3rd, .5 mm.; 4th, .2 mm. The labium (fig. 9, B) is small, quadrangular in shape, emarginate in front, with 4 setæ, two long ones arising from the inner surface and two shorter ones on the lower surface, just mesad of the point of origin of palpi. The palpi are two-jointed and arise from the outer angles of the labium, 1st joint, .76 mm.; 2nd, .5 mm. Eyes 6 in number, arranged in two transverse rows.

The prothorax is yellowish brown in colour, with a dark brown spot on each side of the middle line, near the posterior margin. The remaining segments are yellowish brown in colour, with a lateral row of lighter yellow spots on each side of the middle line, extending back to the seventh abdominal segment. These spots

are irregular in shape, larger on some segments than others. The seventh and eighth abdominal segments are light yellowish brown in colour. Each segment bears a fringe of setæ on its posterior margin, while numerous smaller setæ are scattered over their dorsal surfaces. The setæ constituting the fringe are much shorter than the segments. The cerci consist of two long, slender, two-jointed appendages. They are 2 mm. long, much longer than the seventh and eighth abdominal segments taken together. The 1st segment measures 1.2 mm., while the long seta-like terminal joint measures .8 mm. The basal segment is studded with numerous small setæ. Three long, fine setæ arise at the distal end of each basal segment, and are about half as long as the second segment of the cerci.

The legs are almost white in colour. The coxæ are shorter than the femora. The femora and tibia are armed with stout spines on their ventral surfaces. There are but few setæ on the tarsi and swimming fringes are lacking. The tarsal claws are long and sharp.

*The pupa*

The pupa is pure white in colour, except the eyes, which are black. It rests upon its back in the pupal chamber. Length 3.5 mm. The head lies incurved upon the prosternum, and is rather abundantly provided with strong, short setæ, which prevent the tender pupa from coming in contact with the fine sand grains. The anterior margin of the pronotum is provided with a row of strong setæ, while numerous smaller setæ are present on the dorsal side of all the thoracic segments. The posterior margin of each abdominal segment is considerably elevated and is provided with a row of strong setæ. The abdomen ends in a pair of large ventral spines measuring .5 mm. By the aid of these spines the pupa is enabled to move about in the chamber, and at the same time prevent injuring itself from coming in contact with the small grains of sand. I do not know how long the pupal period lasts, but not more than a week or ten days.

The adult is a rather prettily-marked beetle, and is represented in fig. 5.

## NEW OR LITTLE KNOWN SPECIES OF APHIDIDÆ.

BY JOHN J. DAVIS, BUREAU OF ENTOMOLOGY, WASHINGTON, D.C.

### Macrosiphum creelii, n. sp.

*Wingless viviparous female.* (Fig. 10.—Plate II, figs. 1, 2.)

Entire body pea green, excepting the head, which is a whitish green, and a narrow darker green median longitudinal line on dorsum of abdomen. Segments I and II of antenna concolorous with body; segments III, IV and basal half of V brownish, with darker

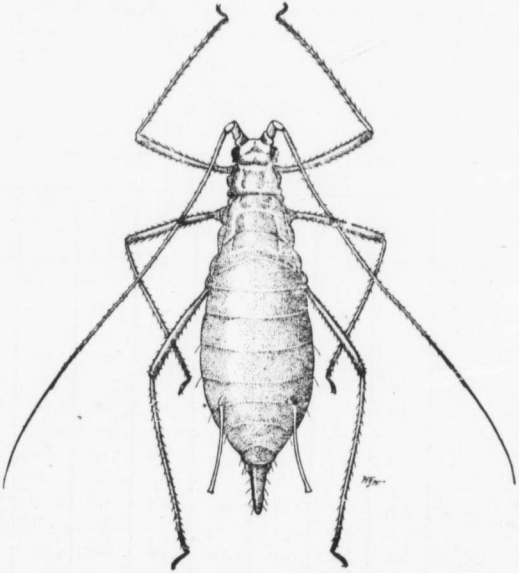


Fig. 10.

tips and the distal half of V and all of VI black; filament of segment VI longest, reaching to or a little beyond tip of body; segment III with 3 to 5 circular sensoria in a row at base, and segments V and base of VI with the usual distal ones. Eyes blood red. Beak barely reaching coxæ of second pair of legs. Legs with femora

pale whitish green with dusky tips, tibiæ pale brownish with black tips, and tarsi black; hind tibiæ very long, being one-half longer than middle tibiæ. Cornicles pale green at basal half, the distal half very pale brownish with blackish tips; reaching a little beyond tip of cauda; narrow and cylindrical, the tip distinctly reticulated. Cauda concolorous with body, ensiform.

Measurements of living and balsam-mounted specimens as follows: Length of body, not including cauda, 2.6—4.0 mm.,* average 3.1 mm. (average of living individuals was 3.3 mm.); length to tip of cauda 3.1—4.5 mm., average, 3.6 mm. (average of living individuals, 3.9 mm.); width 1.04—1.93 mm., average 1.26 mm. (average of living individuals, 1.16 mm.); length of cornicles 1.10—1.31 mm., average 1.23 mm.; length of cauda 0.58—0.71 mm., average 0.64 mm.; length of hind tibia 3.1 mm.; length of middle tibia 2.1 mm. Antennal measurements as follows:

| Locality, date, etc | ANTENNAL SEGMENT NO. 1m. | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | I. | II. | III. | IV. | V. | VI. (base) | VII. (fil't) | Total |
| | mm. | mm. | mm. | mm. | mm. | mm. | mm. | mm. |
| Lovelock, Nevada, May 22, 1911, C. W. Creel | 0.232 | 0.135 | 1.219 | 0.948 | 0.852 | 0.213 | 1.393 | 4.992 |
| La Fayette, Ind. (Utah material) Nov. 22, 1912 | .174 | .097 | 1.219 | .987 | .832 | .213 | 1.451 | 4.973 |
| La Fayette, Ind.(1) (Utah material) Nov. 22, 1912 | .193 | .097 | 1.219 | .948 | .813 | .232 | 1.432 | 4.934 |
| La Fayette, Ind.* (Utah material) Aug. 23, 1912 | .208 | .078 | 1.130 | .904 | .817 | .208 | 1.234 | 4.579 |
| La Fayette, Ind. (Utah material), Aug. 23, 1912 | .191 | .087 | 1.130 | .956 | .800 | .208 | 1.374 | 4.746 |
| La Fayette, Ind.(1) (Utah material), Aug. 23, 1912 | .208 | .087 | 1.130 | .991 | .852 | .226 | 1.460 | 4.954 |
| La Fayette, Ind.(1) (Utah material), Aug. 23, 1912 | .208 | .087 | 1.113 | 1.026 | .869 | .226 | 1.443 | 4.972 |
| La Fayette, Ind.(1) (Utah material), Aug. 5, 1912 | .174 | .097 | .987 | .987 | .755 | .213 | 1.374 | 4.587 |
| La Fayette, Ind. (Utah material), Aug. 5, 1912 | .174 | .097 | 1.045 | .948 | .744 | .194 | 1.355 | 4.587 |
| La Fayette, Ind. (Utah material), Dec 6, 1911 | ..... | ..... | 1.219 | 1.064 | .929 | .251 | 1.471 | .... |

(1) Measurements from living specimens.

*An unusually large specimen collected by Creel in Nevada.

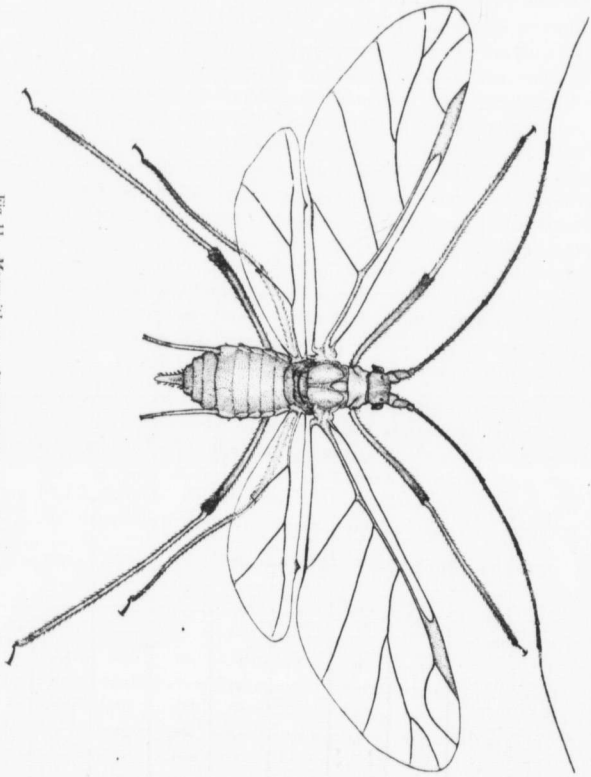


Fig. 11.—*Macrosiphum creelii*, winged viviparous female.

*Winged viviparous female.* Fig. 11.—Plate II, figs. 3, 4.

Head pale greenish yellow. Antennæ black excepting segments I and II, which are pale dusky; filaments of segment VI longest, reaching beyond tip of body; segment III bearing 14 to 21

circular sensoria in a row and usually on basal two-thirds or three-fourths; segments V and base of VI with the usual distal sensoria. Eyes blood red, ocelli brownish. Beak reaching nearly to coxæ of second pair of legs. Thoracic plate yellow or orange yellow. Wings large, with narrow but prominent dark brownish veins, the venation as shown in illustration. Legs with basal half of femora pale green and the distal half becoming dusky to blackish, tibiæ pale brownish with black tips, and tarsi black; hind tibia rather long, being nearly one-half longer than the middle tibia. Abdomen pale green, with a moderately narrow median longitudinal dorsal line of a darker green extending to length of the abdomen; the reddish eyes of the unhatched young often showing through the body wall. Cornicles pale transparent green at basal half, becoming dusky to blackish at the distal end; reaching beyond tip of cauda; cylindrical and rather narrow; the tip distinctly reticulated. Cauda concolorous with abdomen, ensiform.

Measurements of living individuals and specimens in balsam, as follows: Length of body, not including cauda, 2.36—3.56 mm., average 2.72 mm.; length to tip of cauda 2.71—3.83 mm.; average 3.21 mm.; width of body 0.85 to 1.47 mm., average 1.02 mm.; length of wing, average 4.84 mm.; width, average, 1.66 mm.; cornicle, average, 1.75 mm.; cauda, average, 0.46 mm.

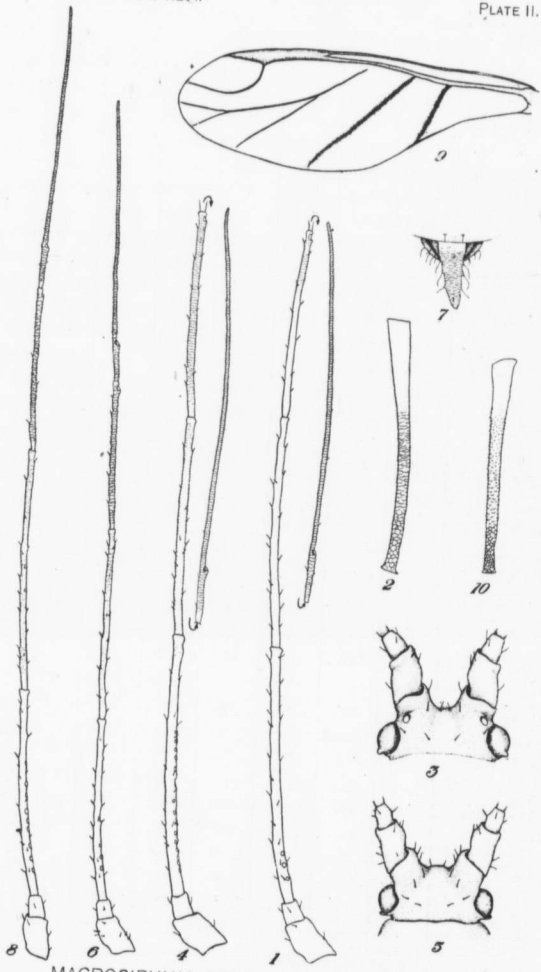
Antennal measurements as follows:

| | ANTENNAL SEGMENT NO. 1m | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Locality, date, etc | I. | II. | III. | IV. | V. | VI. (base) | VII. (fil't) | Total |
| | mm. | mm. | mm. | mm. | mm. | mm. | mm. | mm. |
| Lovelock, Nevada, May 22, 1911, C. W. Creel..... | 0.174 | 0.097 | 1.084 | 0.871 | 0.774 | 0.193 | 1.161 | 4.354 |
| Lovelock, Nevada, May 22, 1911, C. W. Creel..... | .174 | .116 | 1.045 | .890 | .793 | .232 | ..... | ..... |
| La Fayette, Ind. (Utah material), Nov. 6, 1912.... | .174 | .097 | 1.239 | 1.122 | ... | .... | .... | .... |
| La Fayette, Ind. (Utah material), Nov. 6, 1912.... | .... | .... | 1.200 | 1.103 | .832 | .213 | 1.355 | .... |
| La Fayette, Ind. (Utah material), Nov. 7, 1912.... | .155 | .097 | 1.142 | 1.006 | .832 | .232 | 1.374 | 4.838 |

| | ANTENNAL SEGMENT NO. 1m. | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Locality, date, etc | I. | II. | III. | IV. | V. | VI. (base) | VII. (fil't) | Total |
| | mm. | mm. | mm. | mm. | mm. | mm. | mm. | mm. |
| La Fayette, Ind. (Utah material), Nov. 7, 1912.... | .155 | .097 | 1.161 | .968 | .813 | .213 | 1.374 | 4.781 |
| La Fayette, Ind. (Utah material), Nov. 15, 1912.. | .174 | .097 | 1.161 | 1.064 | .929 | .213 | 1.548 | 5.186 |
| La Fayette, Ind. (Utah material), Nov. 15, 1912... | .174 | .097 | 1.161 | 1.064 | .929 | .... | .... | .... |
| La Fayette, Ind. (Utah material), Nov. 15, 1912... | .174 | .116 | 1.084 | .909 | .871 | .290 | 1.374 | 4.818 |
| La Fayette, Ind. (Utah material), Nov. 15, 1912... | .174 | .116 | 1.054 | .909 | .852 | .213 | 1.393 | 4.711 |
| La Fayette, Ind. (Utah material), Nov. 22, 1912... | .155 | .096 | .968 | .909 | .852 | .232 | 1.393 | 4.605 |
| La Fayette, Ind. (Utah material), Nov. 22, 1912... | .155 | .096 | .987 | .909 | .832 | .213 | 1.374 | 4.566 |
| La Fayette, Ind. * (Utah material), Dec. 6, 1911.... | .155 | .096 | 1.054 | .890 | .832 | .... | .... | .... |
| La Fayette, Ind. * (Utah material), Dec. 6, 1911.... | .155 | .096 | 1.103 | .871 | .871 | .251 | 1.103 | 4.450 |
| La Fayette, Ind. * (Utah material), Dec. 6, 1911.... | .174 | .096 | 1.200 | .987 | .909 | .232 | 1.471 | 5.009 |
| La Fayette, Ind. * (Utah material), Dec. 6, 1911.... | .174 | .096 | 1.200 | 1.026 | .909 | .232 | 1.451 | 5.098 |
| La Fayette, Ind. * (Utah material), Dec. 6, 1911.... | .174 | .096 | .938 | .909 | .832 | .271 | 1.122 | 4.342 |
| La Fayette, Ind. * (Utah material), Dec. 6, 1911.... | .174 | .096 | 1.006 | .909 | .852 | .251 | 1.122 | 4.410 |
| La Fayette, Ind. * (Utah material), Dec. 6, 1911.... | .174 | .096 | .987 | .968 | .929 | .232 | 1.471 | 4.857 |
| La Fayette, Ind. * (Utah material), Dec. 6, 1911.... | .174 | .096 | 1.006 | 1.006 | .948 | .232 | 1.509 | 4.971 |
| †La Fayette, Ind.* (Utah material), Jan. 23, 1913 ..... | .193 | .096 | 1.161 | 1.064 | .929 | .232 | .... | .... |
| †La Fayette, Ind.* (Utah material), Jan. 23, 1913 ... | .193 | .096 | 1.161 | 1.045 | .890 | .232 | 1.355 | 4.872 |

* On alfalfa in greenhouse.

† Measurements from living specimens.




MACROSIPHUM CREELII AND M. CORYLI.

*Pupa.*

General colour pale green, the head thorax and distal half of abdomen appearing to be scantily pulverulent, giving these parts a slight whitish tint; the rather prominent median longitudinal dorsal line of a darker green colour than that of the body and extending the entire length of the abdomen and thorax. Segments I and II of the antenna whitish green; the remaining segments pale, with a slight brownish tint, excepting the extreme tip of III and IV, the end of V, and all of VI, which portions are blackish. Eyes red. Legs with femora pale green, with an apparently light pulverulence; tibiæ of a very faint brownish tint, the tips dark brown; tarsi black. Basal one-half or one-third of cornicle pale green, the remainder with a pale brownish tint, and the tip darker. Cauda concolorous with abdomen.

*Oviparous female.*

In a lot of live specimens received from Mr. G. I. Reeves, November 20, 1911 (collected on alfalfa at Salt Lake City, Utah, November 15, 1911), two wingless females with typical oviparous female characters, namely, swollen hind tibiæ bearing numerous sensoria, were found, but upon closer examination one of these was found to be filled with young and no eggs, while the others appeared to contain no eggs and the eye spots of a single young within the body were to be seen. Later on specimens from this lot were reared which proved to be both physiologically and morphologically oviparous, but specimens were not preserved. These females differed from the usual wingless viviparous females by bearing 75 or more small, rather inconspicuous sensoria on the hind tibia and by having 7 to 11 circular sensoria on segment III of antenna.

The eggs are deposited on the foliage of alfalfa and from all observations the aphidid occurs on alfalfa, which is evidently its prime host, the year round.

This large green *Macrosiphum*, which so closely resembles the destructive pea aphis (*Macrosiphum destructor* Johns.) was first received from Mr. Cecil W. Creel of this bureau, who found it very abundant on alfalfa at Fernley and Lovelock, Nev., May 20 and 22, 1911. From reports this species is already a more or less troublesome pest on alfalfa in Utah and Nevada, and may become

as great a pest in the West as the destructive pea aphis is to peas in the East. This aphidid has been received from Messrs. G. I. Reeves, T. H. Parks, H. S. Smith, and E. J. Vosler, who collected it on alfalfa at Salt Lake City, Utah. It has also been collected by Mr. J. A. Hyslop on alfalfa at Pullman, Wash., May 25 and 26, and June 4 and 9, 1909.

## Macrosiphum coryli.

*Wingless viviparous female.* (Fig. 12.—Plate II, figs. 5, 7.)

Head orange-red to brownish. Antennæ black, excepting segments I and II, which are concolorous with head; placed on

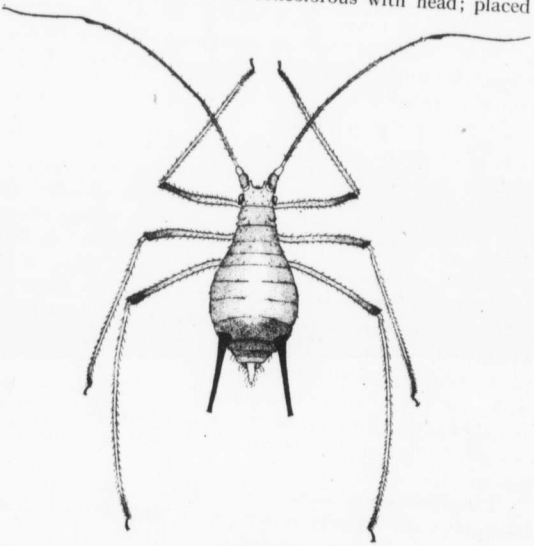


Fig. 12.

conspicuous frontal tubercles; sparsely hairy; very long, being about one-half longer than the body; filament of segment VI the longest; segment III with 3 or 4 circular sensoria in a row near the base; segments V and base of VI with the usual distal sensoria. Eyes dark red to reddish brown. Beak almost wholly black and

reaching to slightly beyond coxæ of third pair of legs. Prothorax concolorous with head; the mesothorax and metathorax brownish, the latter sometimes greenish, especially toward the posterior margin. Legs with femur pale yellowish brown, the tip blackish, tibia pale brown with black tip, and tarsus black; the hind tibiæ very long. Abdomen pale greenish, with a few pinkish dots which indicate the eyes of the embryos within; dusky patches around bases of cornicles; sides of abdomen usually more or less brownish to blackish, although this coloration is sometimes almost wholly wanting; dorsum of the last three abdominal segments usually more or less dusky. Older females have a slight pinkish tint intermixed with the green colour of the abdomen. Cornicles black, cylindrical, the distal fifth strongly reticulated, and very long, reaching the length of the cauda beyond the tip. Cauda pale to whitish green, moderately covered with long hairs, ensiform, and scarcely more than one-third the length of the cornicles.

Measurements from specimens preserved on slides in balsam: Length of body to tip of abdomen 1.74–2.21 mm., average 1.95 mm.; width of body 0.81–1.08 mm., average 0.97 mm.; length of middle tibia 1.80 mm.; length of hind tibia 2.4 mm.; length of tarsus 0.097 mm.; length of cornicle 0.83—1.00 mm., average 0.90 mm.; length of cauda 0.30 mm. Antennal measurements as follows:

ANTENNAL SEGMENT NO. 1m.

| I. | II. | III. | IV. | V. | VI. (base) | VI. (filament) |
|---|---|---|---|---|---|---|
| mm. ..... | mm. ..... | mm. 0.956 | mm. 1.061 | mm. 0.783 | mm. 0.174 | mm. ..... |
| ..... | ..... | .852 | .869 | .695 | .164 | 0.931 |
| ..... | ..... | .852 | .939 | .695 | .164 | .982 |
| 0.174 | 0.096 | .852 | .939 | .748 | .174 | ..... |
| .174 | .096 | .852 | .947 | .730 | .191 | ..... |
| ..... | ..... | .991 | 1.104 | .748 | .174 | ..... |
| ..... | ..... | .956 | 1.026 | .765 | .164 | .991. |
| .174 | .096 | .921 | .921 | .713 | .157 | 1.113 |
| .174 | .104 | .921 | .956 | .721 | .157 | 1.165 |
| .157 | .096 | .765 | .800 | .643 | .157 | 1.043 |
| .157 | .096 | .765 | .783 | .609 | .157 | 1.009 |

*Winged viviparous female.* (Plate II, figs. 8, 10.)

Head pale to reddish brown, sometimes with a faint greenish tint, especially at the margins. Antennæ brownish to black, excepting segments I and II, which are dusky; sparsely hairy; filament of segment VI the longest; total length much more than body length; 9 to 13 (usually 9 to 10) circular sensoria in a row on III and the usual ones on V and base of VI. Eyes dark red. Thorax pale brown. Fore wings with the usual twice-branched media; first anal and cubitus conspicuous and with a prominent border. Legs as in the wingless form. Abdomen pale green, with a blackish ring on the dorsum surrounding each cornicle and a dusky area extending across the dorsum posterior to the cornicles. Cornicles black, cylindrical, gradually tapering toward the apex, which is about one-half the diameter of the base, extending much beyond tip of abdomen, and with the tip reticulated. Cauda pale yellowish green, ensiform, and moderately hirsute.

Measurements from specimens on slides: Length of body 1.62–2.05 mm., average 1.9 mm.; width of body 0.70 to 0.90 mm., average 0.79 mm.; length of fore wing, average, 3.17 mm.; width of fore wing, average, 1.08 mm.; length of middle tibia, average, 1.82 mm.; length of hind tibia, average, 2.34 mm.; length of hind tarsus, average, 0.097 mm.; length of cornicle, average, 0.87 mm.; length of cauda, average, 0.25 mm. Antennal measurements as follows:

ANTENNAL SEGMENT NO. 1m.

| I. | II. | III. | IV. | V. | VI. (base) | VI. (filament) |
|---|---|---|---|---|---|---|
| mm. 0.156 | mm. 0.087 | mm. 0.852 | mm. 0.887 | mm. 0.678 | mm. 0.156 | mm. 1.009 |
| .156 | .087 | .852 | .974 | .678 | .174 | 1.009 |
| .156 | .096 | .904 | 1.026 | .713 | .174 | ..... |
| .156 | .087 | .782 | .817 | .678 | .156 | ..... |
| .156 | .087 | .748 | .782 | .678 | .156 | ..... |
| .156 | .087 | .835 | .817 | .661 | .156 | 1.009 |
| .156 | .087 | .956 | .974 | .756 | .165 | ..... |
| .156 | .087 | .904 | 1.026 | .782 | .174 | ..... |
| .156 | .087 | .782 | .819 | .696 | .174 | 1.026 |
| .156 | .087 | .748 | .800 | .678 | .174 | 1.061 |

Immature individuals are entirely pale green.

This species lives gregariously on the underside of the leaves and tender terminal shoots of hazel (*Corylus americana*). Described from specimens collected at La Fayette, Ind., July 5, 1912. The writer has also collected this aphidid at Chicago, Ill., May 20 and July 10, 1908.

(To be continued.)

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## WISCONSIN BEES OF THE GENUS PERDITA. GEOGRAPHICAL DISTRIBUTION AND RELATIONS TO FLOWERS.

BY S. GRAENICHER, PUBLIC MUSEUM, MILWAUKEE.

In 1896 Prof. T. D. A. Cockerell[1] published a paper on this genus, containing a vast amount of information, and dealing with the various aspects of taxonomy, variation, distribution, relations to flowers, etc.

The centre of distribution is located in the arid region of the Southwestern United States, New Mexico having an especially large percentage of species in its fauna. Prof. Cockerell states "that in the main we have to do with an austral series of types. which have spread northward and become largely differentiated into species since the glacial epoch." A splitting up into a great variety of forms is evident, and, as Prof. Cockerell puts it, "we have indeed the process of evolution going on under our eyes, the puzzling forms being those which have only lately segregated themselves, and have not yet developed striking peculiarities."

Another characteristic feature of this genus lies in the fact that all of the species, so far as their habits are known, are oligotropic, i.e., most of them depend for their pollen-supply on a single species of flower, and those that collect pollen from a number of plant species, favour closely related forms, belonging either to the same genus, or at least to the same family. New Mexico and Colorado offer extremely favourable opportunities for the study of the close relations between the various forms of Perdita and the

1. Proc. Acad. Nat. Soc. Phil., Vol. 48, pp. 25-107. Two years ago the author published "A list of the bees of the genus Perdita Smith" in Psyche, Vol. 18, pp. 134-143 (1911).

various forms of flowers, and Prof. Cockerell's paper referred to above is full of details on this particular subject.

At the time of its publication only two out of a total of seventy-one species were known to inhabit the States east of the Mississippi River, viz., *P. octomaculata* (Say.), a northern species, ranging according to the records then on hand from Illinois to New Hampshire, and *P. obscurata* Cr., a southern species, occurring in Georgia and Florida. None had been reported from Wisconsin. Our present knowledge brings the number of eastern species up to twelve, the following six of which belong to the Wisconsin fauna: *pallidipennis* Græn., *bruneri* Ckll., *maura* Ckll., *maculipennis* Græn., *citrinella* Græn., and *gerhardi* Vier.

*P. pallidipennis* Grænicher. This was described[2] from specimens taken in Burnett Co., Wis., at various places on the St. Croix River, a tributary of the Mississippi, which forms throughout the greater part of its course the boundary between Wisconsin and Minnesota. It has since been found at a number of points on the Mississippi River as far down as Rutledge in the southwestern corner of Wisconsin. I have also come across this species in the Waukegan-Kenosha dune region along Lake Michigan in northeastern Illinois and southeastern Wisconsin. Like the western *P. albipennis* Cr., it favours the sunflower-type of Compositæ, and has been observed gathering pollen from the sunflower *Helianthus occidentalis* Riddell, *Rudbeckia hirta* L. (black-eyed Susan), and *Lepachys pinnata* (Vent.) T. & G. (gray-headed cone-sunflower).

In 1907 Professors M. H. Swenk and T. D. A. Cockerell[3] described *P. lacteipennis*, a species from Nebraska, taken most frequently on the common sunflower *Helianthus annuus* L., and of which they state that it "is quite close to *albipennis* but differs at once in its larger size and in a reduction of the yellow markings." Last year Mr. J. C. Crawford[4] described *P. canadensis* from Medicine Hat, Alberta, Canada. This species forms together with *lacteipennis* from Nebraska and *pallidipennis* from Wisconsin a group of very closely related forms, all of which are to be considered recent offshoots of the sunflower visitor *albipennis*, or at

2. Can. Ent., Vol. 42, pp. 101-104; 157-160 (1910).
3. Ent. News, Vol. 18, pp. 51-58.
4. Can. Ent., Vol. 44, p. 359-360 (1812).

least as having arisen from the same stock that produced the latter. Compared with *albipennis* the three species under consideration all show a reduction of the yellow markings, in which the face, the legs and the abdomen are mainly involved; so far as the reduction of the face marks is concerned, *canadensis* has reached the point, where the face is entirely free of yellow.

The species mentioned above favour, so far as their habits are known, flowers that are typical elements of the Prairie Province. According to Pound and Clements [5] the vegetation centre of the prairies is situated in Nebraska, Iowa, Kansas and the Dakotas, and as one moves away from this centre in a northerly or southerly direction, a decrease in the number of characteristic plant species is noticeable. The Prairie Province, as defined by Pound and Clements forms a broad strip, bounded on the west by the Rocky Mountains, and extending from the Canadian Provinces Athabasca, Alberta, Saskatchewan, Assiniboia and Manitoba down through Montana and North Dakota and the states south of these into Texas. From this strip an arm runs off eastwardly through southern Minnesota and Iowa into southern Wisconsin, northern Illinois and a very narrow portion of western Indiana.

The known range of *albipennis* occupies a part of the vegetation centre (South Dakota and Nebraska), and passes through Colorado and New Mexico into Texas. It occurs, according to Swenk and Cockerell, all over the State of Nebraska, while *lacteipennis* covers the western part of that state only. *Canadensis* is an inhabitant of the most northern outposts of the Prairie Province, and *pallidipennis* is a species of the eastern extension of the prairies in Wisconsin and Illinois. As regards the distribution of this species in Wisconsin, attention is called to the fact that floral elements of the prairie extend their range northward to the sandy areas along the St. Croix River, the so-called "pine-barrens." At the mouth of the Yellow River (a tributary of the St. Croix) in the northern part of Burnett Co. (latitude about 46°) there is quite an assemblage of prairie-plants, and this, the type locality of *pallidipennis*, marks the most northern point at which the bee has been found.

5. Bot. Gaz., Vol. 25, pp. 381-394 (1898).

*P. bruneri* Cockerell. The type locality of the species is West Point, Nebraska, and it has also been reported by Swenk and Cockerell from Lincoln in the same state. A single specimen of this bee, a visitor of the Compositæ, was collected by the writer from the flowers of *Rudbeckia hirta* near the Kettle River rapids of the St. Croix River in Burnett Co.[6] It is quite common in the Waukegan-Kenosha dune region of northeastern Illinois and southeastern Wisconsin, where it has been taken mostly at the flowers of *Helianthus occidentalis*, and occasionally at those of *Liatris scariosa* Willd. (Large Button Snake-root).

*P. maura* Cockerell, a visitor of the ground-cherry (species of Physalis) was described from Cedar Bluffs, Nebraska, and has since been reported by Swenk and Cockerell from other parts of that state.

In Wisconsin it was first met with at Milwaukee, and it has been found also at various points along our western border from Hudson on the lower St. Croix River (about 15 miles east of St. Paul, Minn.) down along the Mississippi River to Rutledge in the southwestern corner of the state. In Nebraska it has been observed late in the fall, at a time when the ground-cherries were probably out of bloom, on the flowers of Aster, but in Wisconsin I have never seen it visiting the flowers of any other plant except those of the ground-cherries *Physalis heterophylla* Nees, and *P. pubescens* L.

*P. maculipennis* Grænicher. Just south of the present city limits of Milwaukee, and a short distance from Lake Michigan is a sandy area of small extent, and this is the type locality of the species. In addition to the specimens collected here, and in a sandpit to the west of Milwaukee, a single specimen was taken two years ago in the Mississippi valley near Genoa, Vernon Co., about 12 miles south of La Crosse. Although I have observed this bee in its type locality for a number of years, it was not until last summer that I succeeded in finding the source of its pollen-supply, viz., the flowers of the white melilot (*Melilotus alba* Desv., Fam. Leguminosæ). On account of the fact that this plant has come to us from the Old World not long ago, we are led to the conclusion that *P. maculipennis* depended originally on some native plant of

6. Reported in Bull. Publ. Museum Milwaukee, vol. 1, pp. 221-248.

our region for its pollen, undoubtedly one of the Leguminosæ, and that through the gradual disappearance of that plant from our immediate surroundings, the bee was forced to turn its attention to some other suitable plant. A number of prairie plants still inhabiting this particular area 30 or 40 years ago have been driven out by the change of conditions due to the activity of man; other species have invaded the area, and among these the white melilot has been quite successful.

*P. maculipennis* was described from the female sex; a description of the male is given herewith.

Male.—Length 5–6 mm. Differs from the female as follows: Flagellum conspicuously light yellow underneath, labrum and face entirely yellow; this colour extends for a short distance above the antennæ, and runs obliquely up along the anterior orbits. A yellow stripe along the posterior orbits, narrow above, and widening out abruptly below. In addition to the yellow marks on tubercles, tegulæ and collar, there is a large yellow spot on the prosternum, a smaller one on the mesosternum, and one on the metapleura; in the smaller specimens these markings are poorly developed. In the larger specimens two yellow interrupted abdominal cross-bands on segments 5 and 6, besides those on segments 2 to 4. Front and middle legs yellow, black only on posterior surfaces of femora and tibiæ. Hind legs black with a broad yellow band anteriorly on the femur, and a narrow one on the tibia. Knees yellow. The black spot in the stigma is very conspicuous, rather more so than in the female.

Four specimens taken June 29, 1913, in the type locality near Milwaukee, Wis., flying around the flowers of the white melilot (*Melilotus alba* Desv.) in search of the females.

*P. citrinella* Grænicher. This species, a visitor of the flowers of a leguminous plant. *Petalostemum villosum* Nutt. is known from two localities in Wisconsin: North Hudson, St. Croix Co. (type locality), and Prescott, Pierce Co., about 15 miles south of North Hudson. Last year it was reported by Mr. J. C. Crawford (loc. cit.) from Medicine Hat, Alberta, Canada.

It belongs to a group of yellow Perditas, and, as has been pointed out in the description of the species, it stands in exceedingly close relationship to two western species. One of these (*perpallida*

Cockerell, Nebraska) visits, like *citrinella*, the flowers of a species of Petalostemum; the other (*wootonæ* Cockerell) occurs in New Mexico, Colorado and Nebraska, and is a visitor of *Nuttallia* (Fam. Rosaceæ). A more extended acquaintance with the bees of this group inhabiting the prairies east and north of Nebraska may prove that *citrinella* is simply a colour variety of *perpallida*.

*P. gerhardi*, Viereck. Up to the present time this species has not been found outside of the Lake Michigan dune region. A visitor of the horsemint (*Monarda punctata* L.), it was described from specimens collected at East Chicago, Indiana, by Mr. Wm. J. Gerhard of the Field Museum of Chicago. Last year several specimens were taken by the writer in the dunes south of Kenosha, Wis., on the flowers of the horsemint. I have come across this plant in the Mississippi Valley as far north as Prescott, Pierce Co., Wis., in some places growing in abundance, but in spite of a sharp lookout for the bee *P. gerhardi*, no specimens were obtained.

This species, a yellow Perdita, belongs to the *perpallida—wootonæ—citrinella* group discussed above; it has, in the female sex (I do not know the male of *citrinella*), very much the appearance of a small *citrinella*, differing from the latter in the size and arrangement of the black markings on the yellow background. We are dealing with a species derived from the same source as *citrinella*, but depending for pollen on the flowers of a plant belonging to a different family (Labiatæ) than that visited by *citrinella*, and to a different region; it is a plant of the eastern United States, the western range of which brings it in contact with elements of the prairie region.

## SUMMARY

Of the six species of Perdita known from Wisconsin, two are visitors of the Compositæ, two of the Leguminosæ, one of the ground cherries (species of Physalis), and one of the horsemint (*Monarda punctata*).

They are derived from the bee fauna of the Prairie Province, and have followed in the wake of the floral prairie elements that invaded the Wisconsin area. *Albipennis*, a western form, occupies the centre of vegetation of the prairies, and ranges southward to Texas. Grouped around this are three forms, one of which, *lacteipennis*, occurs together with *albipennis* in western Nebraska; the

other two inhabit ,according to our present information, the outskirts of the Prairie Province, *canadensis* being known from the northern end of that province in Canada, and *pallidipennis* from the eastern extension of the prairies in southern Wisconsin and northern Illinois. *Pallidipennis* and *bruneri*, both of them oligotropic bees of the Compositæ favour the sunflowers (species of Helianthus), and flowers of the same structural type, such as Rudbeckia and Lepachys.

Maura visits in Wisconsin Physalis, the same as in Nebraska. *Citrinella* and its Nebraskan representative *perpallida* are both prairie-clover visitors, the former favouring the flowers of *Petalostemum villosum*, and the latter those of *P. violaceum*.

In its type locality in the vicinity of Milwaukee, *maculipennis* obtains its pollen from the white melilot, a species of Leguminosæ introduced from Europe. This means, of course, an adaptation to new conditions brought about by the fact, that the native plant or plants visited originally by this bee do not occur in the type locality at the present time. In all probability the bee will be found in some other part of its range at the flowers of some small-flowered species of Leguminosæ of the genera Petalostemum, Amorpha or Lespedeza.

While *citrinella* has remained true to a plant of the prairie region (Petalostemum), *gerhardi*, a near relative of the former has entered into relations with the horsemint (*Monarda punctata*), a species of eastern distribution.

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## *PROSOPOTHRIPS COGNATUS*, A NEW NORTH AMERICAN THYSANOPTERON.

BY J. DOUGLAS HOOD,
U. S. Biological Survey, Washington, D. C.

The genus *Prosopothrips* was erected by Uzel in 1895 for the reception of a single Bohemian species of anomalous structure, to which he gave the specific name *vejdovskyi*. The species is now known only from females taken in Bohemia (Uzel), Finland (Reuter), and Italy (Buffa). Consequently, the occurrence in North America of what appears to be a second species of the genus, and the discovery of the male, are matters worthy of record, especially since Mr. E. O. G. Kelly, who collected the

species, says in a recent letter that he has worked up an interesting paper on its economic importance. It is regretted that specimens of *P. vejdovskyi* could not be secured for comparison with the American form.

**Prosopothrips cognatus** sp. nov. Figs. A and B.

*Female.*—Length about 1.2 mm. Head and prothorax dark chocolate brown, nearly black; pterothorax and abdomen orange yellow, the last abdominal segment and the anterior angles of the mesothorax tipped with brown or gray; antennæ yellow, darkened with brown beyond middle of segment 6; fore legs largely brown, middle and hind legs yellow.

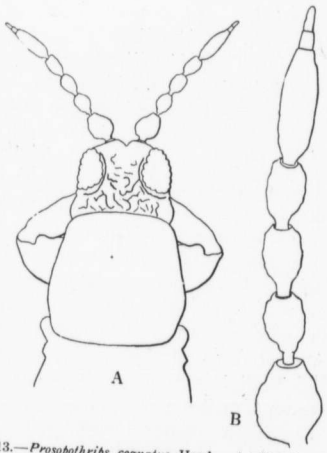



Fig. 13.—*Prosopothrips cognatus* Hood. A—Head and prothorax, female. B—Right antenna, female.

Head about 1.4 times as wide as greatest exposed length, prominently reticulate-rugose, with a dark chitinous line bordering the eyes within; vertex sulcate, two prominent projections overhanging the basal segments of the antennæ; cheeks swollen, but without spine-bearing tubercle; no macrochætæ present. Eyes not prominent, not protruding, slightly flattened laterally. Ocelli wanting. Antennæ one and two-thirds time as long as width of head; segment 1 short, distinctly shorter than 2 and very broad; 2 unusually large, narrowed toward apex and with short, slender pedicel; 3-5 slender, equal in length, similar in form, each with about four encircling lines of sculpture; 6 slender, longest in entire antenna, with about six encircling chitinous lines; 7 and 8 short and slender, forming a stylus; segment 1 brownish yellow; 2 orange; 3-5 yellow; 6

yellow in basal half or third, beyond nearly black; stylus nearly black.

Prothorax very slightly broader than long and about one and one-fourth times as long as width of head, broadest at posterior third; surface roughened; bristles short, scattered. Meso- and metathorax yellow, without differentiated dorsal plates, the former with anterior ventral angles darkened with brown or gray. Wings totally lacking. Legs short, stout, rugose; fore femora brown, fore tibiæ yellow apically and along middle, tarsi yellow; middle and hind legs yellow.

Abdomen rather large and heavy, about 1.6 times as wide as prothorax, broadest at segment 6; segment 10 with a longitudinal dorsal suture; all bristles very short and inconspicuous.

Measurements of holotype: Length 1.16 mm.; head, length of exposed portion .108 mm., width .150 mm.; prothorax, length .192 mm., width .204 mm.; pterothorax, width .220 mm.; abdomen, width .324 mm. Antennal segments: 1, 27$\mu$; 2, length 42$\mu$, width 34$\mu$; 3, length 36$\mu$, width 22$\mu$; 4, 36$\mu$; 5, 36$\mu$, 6, 56$\mu$; 7, 10$\mu$; 8, 13$\mu$; total length of antenna, .26 mm.

*Male.*—Much like female, but smaller (length .7 mm.). Segment 9 of abdomen with two pairs of dorsal spine-bearing tubercles, the posterior pair more widely separated than the anterior.

Measurements of allotype: Length .696 mm.; head, length of exposed portion .090 mm., width .116 mm.; prothorax, length .138 mm., width .152 mm.; pterothorax, width .160 mm.; abdomen, width .196 mm.

Described from two females and one male, taken at Wellington, Kansas, August, 1910, on wheat, by E. O. G. Kelly.

Though apparently very close to *P. vejdovskyi* Uzel, an uncommon European species, it differs in several important respects from the description and figures given by Uzel in his "Monographie." *Cognatus* has much stouter antennæ, with the first segment completely hidden in dorsal aspect by the vertical protuberances; the eyes are less prominent; the genal tubercle is flattened and the spine borne conspicuously at the tip in *vejdovskyi* is greatly reduced in size in *cognatus;* and, finally, the mesothorax of *cognatus* is yellow instead of black.

# A NEW GENUS OF *SCELIONIDÆ* FROM AUSTRALIA.

BY ALAN P. DODD, NELSON, QUEENSLAND.

Subfamily *Baliné*.

**Acolomorpha,** nov. gen.

♀.—Head transverse, a little wider than the thorax; mandibles broad, tridentate; maxillary palpi 2-jointed. Antennæ 6-jointed (really 7-jointed since a small ring-joint is present), scape, pedicel, 3 funicle joints and a solid club. Thorax and forewings as in *Acolus* Forester. Abdomen broadly sessile, no wider or longer than the thorax; first and second segments short, transverse; third segment occupying two-thirds of the abdominal length.

Type: *Acolomorpha minuta* described herewith.

**Acolomorpha minuta,** n. sp.

♀.—Length 0.75 mm.

Shining black; legs and antennæ black.

Head and thorax with very fine polygonal sculpture. Abdomen with first and second segments striate; third segment smooth. Antennæ short; scape equal to pedicel and funicle joints combined; pedicel one-half longer than wide; first funicle joint as wide as the pedicel and almost as long; second and third much narrower than the first, short, transverse; club large, one-half longer than wide, as long as the scape. Forewings reaching some distance beyond apex of abdomen; narrow, infuscated; longest marginal cilia equal to two-fifths the greatest wing width; discal cilia fine and dense; submarginal vein attaining the costa about the middle of the wing; marginal vein as long as the stigmal, which is short, a little oblique; basal vein rather short, perpendicular.

[From 1 specimen ⅔ inch objective, 1 inch optic, Bausch and Lomb.]

*Habitat:* North Queensland (Nelson, near Cairns). Described from one ♀ caught by sweeping in forest, 12th August, 1913 (A. P. Dodd).

*Type:* In the South Australian Museum, a female on a slide.

# NOTES ON THE WINTER AND EARLY SPRING COLEOPTERA OF FLORIDA, WITH DESCRIPTIONS OF NEW SPECIES.

BY W. S. BLATCHLEY, INDIANAPOLIS, INDIANA.

In 1911, and again in 1913, I spent the time from January 10 to April 15 in Central and Southern Florida, collecting especially Coleoptera, Orthoptera and Hemiptera, but also taking what came readily to hand in other orders. In the Canadian Entomologist for November, 1912, and January, 1913, I made mention of the places where I collected the first trip and described with notes a number of apparently new species.

In 1913 I made my headquarters at Dunedin, a small town on the Gulf Coast about twenty miles northwest of Tampa, and the bulk of my collecting was done in the immediate vicinity of that place. However, on February 18, a companion and I placed a small boat in Lake Tohopekaliga at Kissimmee, and with tent, cooking outfit and supplies, made our way down through three or four lakes, the largest of which was Lake Kissimmee, then down the river of that name to Lake Okeechobee, around the northern and eastern sides of that large body of water, then across it and down the Caloosahatchee River to the Gulf Coast below Fort Myers. Our trip occupied twenty-six days and was somewhat hurried, as my companion was a fisherman and hunter, little interested in entomology. As a consequence, most of my collecting was done in early morning, at the noon stops, and in the evenings after the camp duties had been completed. However, I had one full day at Kissimmee, three on the west shore of Lake Istokpoga, and a like number on the southwestern end of Pelican Bay, Lake Okeechobee, just east of Kreamer Island.

From the town of Kissimmee to the upper end of Lake Okeechobee the distance, as the crow flies, is about eighty miles; but, as the river runs, it is 240, the channel winding its way back and forth across a swamp, twenty to twenty-five miles in width, for the whole way. In only a few places are the banks of this river and Lake Okeechobee five to eight feet above the water, in most places not averaging that many inches. Cypress and bay trees, with branches thickly loaded with the long pendent "Spanish moss," scrub live oak, elbow brush and swamp elder, covered with

semi-tropical vines of many kinds, form the prevailing vegetation along the banks, while pickerel weed, water hyacinth, arrow heads, sawgrass and spatterdock fill the marshes. Along Lake Okeechobee a custard apple and wild papaw become plentiful, while here and there a rubber tree with spreading branches rears its head above the underbrush. My main collecting was done by beating and by overturning drift along the shores, though in a few places I was able to do some sweeping and sifting.

At Dunedin, and later on at Sanford, Eustis and Ormond, collecting was done in all possible ways. Of the insects taken during the trip of 1913 only the Coleoptera have been mounted and studied. About 900 species of these were secured during the two seasons. Could I have remained through May, probably as many more could have been taken, as the spring broods were just coming out in numbers when I had to leave.

Brief notes on the occurrence of a few of the rare or little known species will be given in this and a succeeding paper, together with descriptions of a number of forms apparently hitherto undescribed.*

209.**—**Pasimachus strenuus** Lec. A single example of this large Scaritid was taken near Ormond, March 24, from beneath a chunk in open pine woods. Length 37.5 mm.

**Scarites californicus** Lec. A half dozen or so from beneath logs half buried in the beach sand. St. Petersburgh, January 23; Dunedin, January 20. Smaller than *subterraneus* Fab., much more shining and with the striæ of elytra almost obliterated. The two can be separated at a glance, though *californicus* is not recognized in our lists. Length 15—17 mm.

535.—**Pterostichus morio** Dej. A single specimen at Dunedin, January 17, from beneath chunk near border of lake.

536.—**Pterostichus faber** Germ. This was the most common species of *Pterostichus* taken, having been secured in six widely separated localities. Schwarz lists it as "very rare." It occurs singly or in pairs beneath rubbish along streams or ponds. Of this genus and *Evarthrus* I took but five species in the two winters,

*Notes on 55 other species of Coleoptera taken by me at Ormond in the early spring of 1899 will be found in the appendix to my "Nature Wooing at Ormond by the Sea."

**The numbers are those of the Henshaw Check List and Third Supplement.

and Schwarz lists but six, three of which are identical with mine. In Indiana thirty species have been taken, while in individuals they are here among the most common of the Carabidæ.

**Diplochila nupera** Casey. A single example from the border of Arch Creek (eight miles north of Miami), March 21. Readily distinguished by its small size and the rectangular hind angles of thorax. Length, 10 mm.

719.—**Dicælus quadratus** Lec. One specimen at Fort Myers, March 6.

720.—**Dicælus carinatus** Dej. One specimen from near St. Petersburgh, January 17. Both this and the preceding from beneath chunks in low damp woods.

935.—**Pinacodera platicollis** Say. A number were beaten from large bunches of "Spanish moss" (*Tillandsia usneoides* L.) at Dunedin, Lake Okeechobee and Ormond.

992.—**Chlænius herbaceus** Chev. Twenty or more specimens of this beetle, usually regarded as very rare, were taken from beneath boards, etc., along the borders of some small fresh water lakes just back of Dunedin. January 21-April 1.

1132.—**Selenophorus fossulatus** Dej. Common beneath dried cow dung in open pine woods near Sarsota. February 15—March 2.

1152.—**Acupalpus longulus** Dej. Taken by sifting at Dunedin, Lake Okeechobee and Sanford, January 24—March 30.

**Canthydrus floridanus,** sp. nov.

Short, ovate, strongly convex. Head and thorax reddish-yellow, with a blackish or fuscous cloud on occiput and middle of apical half of thorax; elytra dark brown; antennæ, under surface and legs pale reddish-yellow. Head and thorax without punctures except a few coarse ones along the basal half of latter. Elytra with numerous irregularly placed, very shallow punctures. Length 2—2.2 mm.

Described from five specimens taken from beneath rubbish at Kissimmee and on the southeastern shore of Lake Okeechobee, February 16—March 6.

Shorter and more strongly convex than either *gibbulus* Aube or *puncticollis* Crotch. Prosternal process between the front coxæ narrower and elytral punctures finer and more shallow than in either.

**Cælambus princeps,** sp. nov.

Broadly oval, subdepressed above, strongly convex beneath. Head, elytra and narrow front and hind margins of thorax dark reddish or piceous brown; disc of thorax, under surface and legs pale reddish brown; antennæ and palpi still paler. Eyes very finely granulate, separated by one and one-third times their own diameters. Clypeus broadly rounded, finely but distinctly margined. Head and thorax finely, sparsely and irregularly punctured; elytra conjointly one and one-fourth times longer than wide, a little more coarsely, more regularly and aciculately punctate; both they and the under surface very finely and indistinctly alutaceous. Meso- and meta-sterna and abdomen finely, sparsely and irregularly punctate, the punctures shallow. Length 4.5 mm.; width 2.8 mm.

Described from a single example taken March 6 from beneath decaying water hyacinth on the southeast shore of Lake Okeechobee.

Mr. John D. Sherman, Jr., of Mount Vernon, New York, a special student of the Dytiscidæ, to whom the specimen was sent for examination, says, "It is undoubtedly a new and very striking species, in size and shape reminding me of *Pachydrus brevis* Sharp from Porto Rico."

1661.—**Helopeltis larvalis** Horn. One, March 4, from beneath chunk half buried in the mud of a tide-water marsh near Sarasota.

**Megilla fuscilabris decepta,** var. nov.

Form of the common *fuscilabris* Muls. (*maculata* DeG,.) but smaller. Ground colour above a paler red. Head wholly black; thorax with four small black spots on the basal half, these arranged either obliquely in pairs in the form of a little crown, or with the front pair united behind to form a small V, or with all four united making an irregular crescent which encloses a small red spot in front of scutellum; elytra with the subapical spots of *fuscilabris* usually united to form a common spot on the suture; tibiæ more or less reddish, especially so near base. Length, 5 mm.

Swept from low herbage. Sanford, March 28; Ormond, April 14. Mr. Chas. W. Leng, of New York City, has nine specimens from the Angell collection taken at Key West, Fla., without date. Both *fuscilabris* Muls. and *floridana* Leng have a large pale triangular

spot on head, this very rarely wanting in the former. *Fuscilabris* has two common sutural spots and four spots on each elytron; *floridana*, one sutural spot and five spots on each elytron, while *decepta*, in all but one or two of the known specimens, has three sutural spots (scutellar, postmedian and subapical) and three spots on each elytron. The spots are much larger than those of *floridana* and, excepting the scutellar one, more subequal in size than in either of the other forms. The upper surface is much less distinctly alutaceous than in either. I found *floridana* to be quite common in February on the spatter-dock (*Nymphæa advena* Soland.) along the Kissimmee River.

**Neoharmonia venusta dissimila,** var. nov.

Differs from the typical *venusta* in being more rotund; in having the head wholly black, the black spots of thorax enlarged and coalesced to form a single large three-lobed discal blotch, the median lobe of which reaches the front margin; and in the four median black spots of elytra being wholly wanting, thus leaving the two basal spots on each, and the common irregular subapical cross-bar. Length 6.5 mm.

One specimen beaten from elder blossoms on the southeast shore of Lake Okeechobee, March 6. Mr. Wm. T. Davis, of New Brighton, Staten Island, New York, reports that he has a specimen of var. *dissimila* very similar to the one above described, but having the thorax coloured as in typical *venusta*. It was beaten from the black willow (*Salix nigra* L.) on the shore of Plummer's Island, Maryland. June 25, 1911.

**Neoharmonia notulata** Muls. One beaten from oak shrubs on Istokpoga Creek, February 26. It has the thorax coloured as in the above variety of *venusta*, the elytra black with a large irregular red spot on middle of each.

**Psyllobora 20-maculata pallidicola,** var. nov.

Smaller and paler than *20-maculata*, not alutaceous and much less distinctly punctate; thorax wholly pale, without the spots seen in that and other described forms. Elytra without common sutural spots, the others rather large and well defined, with three near middle of disc more or less connected. Length 1.8—2 mm.

Beaten from foliage of the wax-myrtle or bayberry (*Myrica cerifera* L.), Dunedin, January 18; Lake Istokpoga, February 25; Ormond, April 13.

I have followed Leng in making this a variety of *20-maculata* Say, though it is my opinion that in time all the more southern non-alutaceous and finely punctate forms will be recognized as distinct from that common northern species, though closely related among themselves.

3086.—**Axion tripustulatum** DeG. Quite common on oak and myrtle near Dunedin; also at Bassenger, Arch Creek and other places. January 24—March 30.

9906.—**Novius cardinalis** Muls. Five examples of this introduced species were beaten from wild grape along the borders of a large orange grove near Dunedin, January 20.

**Aditoma bifida** Casey. This peculiar Colydiid was taken in small numbers both at Sanford and near Oneca, January 13—February 10. It occurs beneath the bark of dead pine in open woods.

**Trogoderma fascifera,** sp. nov.

Oblong-oval, robust. Black, feebly shining; elytra with a common broad dark red antemedian band, the hind edge of which is concave on each elytron, and the front one more broadly and obliquely so; tibiæ, tarsi and basal joints of antennæ reddish-brown. Eyes entire, rather small, widely separated. Antennæ of male serrate from the fourth joint. Head finely and densely reticulate-punctate. Thorax nearly twice as wide as long, as wide at base as elytra, sides feebly rounded into apex; disc with middle third finely and sparsely punctate, its sides punctate like the head. Elytra sparsely and finely punctate, each puncture bearing a short, prostrate grayish hair. Pro- and meso-sterna with large shallow variolate punctures; abdomen finely and rather densely articulate-punctate. Length 4.5 mm.; width 3 mm.

Described from a single male taken February 25 by sifting on the west shore of Lake Istokpoga. Readily known by its large size and the reddish cross-band of elytra which reaches from the middle more than half way to base, and sends a spur along each side of suture nearly to the scutellum. The prosternal process is feebly concave and finely carinate for its entire length, and the antennal fossæ are wider and more shallow than in our other species.

(To be continued.)

## THE CASE OF *VANESSA CALIFORNICA*.

BY E. J. NEWCOMER, STANFORD UNIVERSITY, CAL.

The controversy between Prof. F. M. Webster and Dr. J. McDunnough over the occurrence of *Vanessa californica* in Northern California and Southern Oregon, and regarding its larval food plants, has interested me because I was in the region affected during a large part of July, 1911. Their articles appeared in the Canadian Entomologist for April, July and October of last year. Without antagonizing either gentleman by remarks concerning his statements, let me give an account of what I saw and recorded.

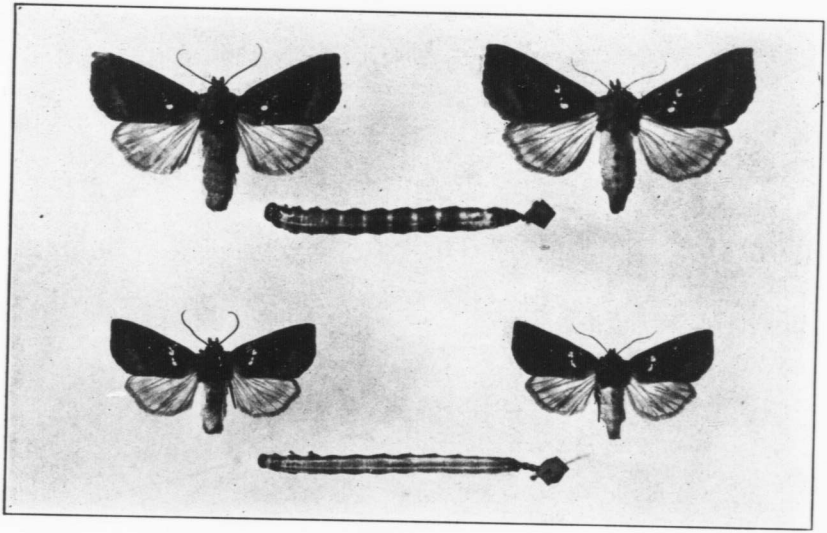
I spent two weeks, from the twelfth to the twenty-seventh of July, 1911, near Susanville, in Lassen Co., California, only a hundred miles or so south of Lakeview, Oregon, and in exactly the same sort of region—namely, open, arid country, irrigated and devoted largely to the raising of alfalfa, and bounded on the west by the wooded range of the Sierra Nevada. At the end of the two weeks, I went south through the Sierras for a hundred and fifty miles.

At Susanville, during the early part of my stay, I found numerous patches of "buck brush" or "snow brush" (*Ceanothus* sp.) in the timbered regions literally alive with the black, spiny, half-grown caterpillars of *Vanessa californica*. Frequently the bushes would be practically stripped, and the caterpillars would be found migrating in search of other bushes. By the time I was ready to start south, many of the caterpillars had pupated, and there were a few adults flying about. I saw numbers of skeletonized bushes with chrysalids suspended from their branches, and if a bush were shaken or disturbed, the chrysalids immediately started swinging back and forth, and would continue this motion for several seconds, producing a curious rattling sound. As I went farther south, I saw more of the butterflies, but I did not observe any large swarms, though a week or so later there were accounts in various newspapers concerning these swarms, and they were described to me by several persons who saw them.

Now for the worms which attacked the alfalfa and other field crops. While I was at Susanville, a farmer, hearing that I knew

something about insects, asked me to come down to his alfalfa patch and see what the worms were that were destroying the alfalfa. On the way I noticed considerable numbers of the butterfly *Colias eurytheme* flying about over the alfalfa, and I thought the worms might be the larvæ of this species, but an examination of the alfalfa failed to show any of them. However, on arriving at the farm house, I was taken out to a large field where the first crop of alfalfa had been cut and was lying on the ground in piles. The farmer turned over one of these piles, and beneath it were hundreds of half-grown cutworms, smooth, and of a greenish or gray colour, with some dark markings. By carefully looking around, I was able to find some of these scattered about the open field, but most of them were congregated under the piles of hay. The young shoots of the second crop of alfalfa, which begin to grow as soon as the first crop is cut, were being eaten back as fast as they grew, and it was evident that there would be little, if any, second crop. The field looked as dry and barren as a stubble field. Such were conditions in this particular patch. In the next field, which was separated from the first by an irrigating ditch, the second crop was flourishing and the field quite green. I failed to find more than a few cutworms in this field. Apparently but few eggs had been deposited here, and the worms in the adjacent land were unable to cross the ditch. During the same day I saw and heard of several other fields badly ravaged by the cutworm, but, though where present it was very numerous, it was by no means universally distributed through the alfalfa region in the vicinity of Susanville. The worms were without doubt cutworms or army-worms of the family *Noctuidæ*. I brought specimens to Stanford University, but was unable to determine the species. As I remember them, however, they were very similar in appearance to the common army-worm.

The farmers were at a loss to account for the sudden appearance of this pest, as they had not noticed the worms until they were half-grown, and one of them ventured the suggestion that they had come down in the last rain storm. He also suggested that a heavy roller passed over the field would kill many of the worms, and this, combined with a careful use of poisoned baits, would undoubtedly be the most effective means of controlling the pest.



PAPAIPEMA LYSIMACHIAE AND P. PURPURIFASCIA.

# NEW SPECIES AND HISTORIES IN PAPAIPEMA SM. (LEPID.)

BY HENRY BIRD, RYE, N.Y.

(Continued from Vol. XLV, p. 126.)

More than ten years ago the writer encountered a *Papaipema* larva at Rye boring Loosestrife, *Lysimachia quadrifolia*, and in the interim a wide occurrence of its work has been noted. At that time the imago was successfully reared, and there was surprise that it appeared to be but a small form of the well-known *P. purpurifascia* G&R, which was known to have an indigenous foodplant in Columbine, *Aquilegia canadensis*. In 1902 (Can. Ent., vol. XXXIV, p. 118) attention was called to a difference between these larvæ, but the moths seemed so nearly identical except in size, it was believed the small diameter of the Loosestrife stems might account for the reduced size of the resultant moth.

As the years go by and more extended observations on the habits of the genus accrue, it is noticed how the Columbine feeders begin to emerge weeks in advance of the other, being one of the earliest of the local species in that respect. True, it continues to emerge for over a month and overlaps the Loosestrife feeder but there seems always two weeks difference with the earliest ones of the respective forms. The *Papaipemæ*, as with most mid-season moths, are quite prompt on the dates of their first appearance, and as these two larvæ often flourish within a few feet of each other, such discrepancy was a point to be considered. It is found the latter is much the commoner and more generally diffused, due doubtless to a more widespread foodplant. Finally, a familiarity with a large series of moths, resultant of personal field work from southern Canada to Delaware, makes clear the points of difference that are constant with the imago, and careful comparisons of the larvæ through their various stages, establishes the fact that we have clearly to do with two well-defined species. Of some weight in a general summing up, the Loosestrife feeder is found to be kept down by a parasite all its own, while *purpurifascia* falls to the general ones, mainly the *Hemiteles* and a *Ceromasia* fly, that are common checks throughout the genus.

Before considering more specifically this smaller, narrower winged species, which is clearly the more primitive of the two, it

is important to refer to the synonymy, since they have been always confused.

In 1862 Harris described the Columbine feeder as *Gortyna leucostigma*, (Ins. Inj. Veg.,p. 440), but this name was preoccupied. Grote and Robinson advanced the name *purpurifascia* in 1868 (Trans. Amer. Soc., vol. I, p. 341), describing from two specimens, and they clearly had both forms before them. They first, and at much length, described the Columbine form, a female, and their figure (plate 7, fig. 51), confirms what they clearly intended as representing their species. They described their other specimen, a male, last and in a few words, noting, however, the differences of ornamentation that are distinguishing features between the two forms. While it seems very clear, lest future questions arise, the name *purpurifascia* G&R, is herewith restricted to the above-mentioned female type of their description. This will accord agreeably to later interpretations and uses of the name, in the more important references where figures have been given. Slingerland, Can. Ent., vol. XXIX, 161 ; Holland, Moth Book, pl. XXVI, fig. 7; Hampson, Cat. Lep. Phal. Br. Mus., pl. CXXXVIII, fig. 25, all figure the Columbine borer as *purpurifascia*.

For the Loosestrife borer the following specific name is proposed:

**Papaipema lysimachiæ,** n. sp.

Size small, form and pattern typical, sexes similar. Head reddish purple, white scales at base of ciliate antenna; thoracic tufts and patagiæ edged in deeper purple. Abdomen of the luteous yellow of the secondaries, the tufts minute. Primaries rich yellow powdered with red brown, the basal, subterminal and median shade lines defined with the latter colour, and of usual delineation, the post median line double, the inner very finely drawn with red brown, the outer rather fasciate, dark purple or blackish, its course inwardly oblique and quite rigid after a sharp turn below the costa; subterminal line lunulate, fine, outwardly dentate on veins, emphasized as defining the glistening purplish subterminal space from the redder terminal area; a marginal line at base of purplish cilia. Basal spots, median field and apex of the bright yellow ground colour, the inner basal area and subterminal space reddish purple, the latter darkest and rather iridescent, but contrasts are not strong. The orbicular and double claviform show as three super-

imposed, pure white spots, united, except where cut by median vein, and linear, longer then with near ally. Reniform is of ground colour, inwardly marked at top and bottom by a white dot, never wholly white. Secondaries pale, luteous yellow with rows or purplish reflection that deepens in a marginal band. Beneath powdery, shaded with purplish. Size is very constant with no disparity in the sexes. Expanse, 27.5 to 31 mm. The male genitalia conform to the usual type pattern of the yellow species, the irregular, spinulated cucullus, the long curved harpe, dorsally edged in part with fine teeth, indicate the common generic features here. Habitat: Southern Canada and eastern United States generally through range of foodplant. Montreal and north shore of Lake Erie, Can.; Webster, N.H.; Buffalo, Albany, Staten Island, Rye, West Chester Co., N.Y.; Fairfield Co., Conn.; Newfoundland, N.J.; New Brighton, Pa.; Wilmington, Del. Type locality: To meet the desired exactitude, the locality of the particular male type example thus labelled is Polly Park Wood, N. 42 deg. W. 530 meters intersection of Purchase St. and Polly Park Road, Town of Harrison, West Chester Co., N.Y., U.S.A.

Twenty specimens showing equally the sexes are at hand. Paratypes will be placed in the U. S. National and British Museums; the male type with the author.

The larval period extends from the first week of June to Aug. 15, the larva hatching from the hibernated egg. As an instance of disparity, early *purpurifascia* moths begin to emerge by this last date. By the second larval stage the continuous dorsal stripe is conspicuous, that alone being unbroken. The colour is a warm shade of brown seemingly deeper on the middle by reason of the absence of side lines. In these early features it is similar to a dozen other species.

Stage IV.—Characteristics normal; head golden yellow, side marking not always present; body cylindrical, colour sienna brown, lines cream white, dorsal alone entire, a wide well-defined stripe; tubercles brown, IV the largest, about three times the size of spiracle, on joint ten III and IIIa tend to coalesce, IV large and low down, IVa above the line of spiracle and smaller.

Stage V.—Similar, the proportions cylindrical and attenuated.

Penultimate stage.—Little change, the ground colour lighter

and more of a pinkish hue, the cream-coloured lines hold their prominence, the subspiracular strong on thoracic joints; tubercles the same.

Maturity.—An exceedingly cylindrical larva of small diameter; the colour fades to a yellowish translucence, the demarkation of the lines is lost. Thoracic and anal plate of usual proportions, the former edged with black; tubercles have deteriorated in size, except on joint eleven I and II are the merest dots, IV holds its prominence, on ten IVa is sometimes wanting, but III and IIIa usually coalesce, on eleven their union is more clear. Setæ are weak and unnoticed without a lens. Larval length for the above stages: 24, 28, 31, 39 mm., respectively. General dates for pupation are August 12 to 18; for emergence, September 5 to 20.

The pupa is small and slender, light brown and shining, the white spots easily seen when about ready to disclose the moth; the cremaster is two fine spines curved at the point. Length 15 to 18 mm.

*Lysimachiæ* larvæ differ from *purpurifascia* in the character of the dorsal line, the size and colour of the body, while the tubercles of the latter are larger and black. The dorsal stripe is a larval character in the genus offering ready aid in differentiating certain sections. This line may be broken abruptly on the first four abdominal segments; it may cross this as a mere thread, or it may be a broad even stripe in its entirety. The Loosestrife borer is of the latter class, while *purpurifascia* has a narrow, thread-like line, indistinct and reduced on the joints in question especially in the earlier stages. They differ more autopically than the larvæ of such dissimilar species in the moth state, as *necopina* and *harrisii*. Throughout the month of June particularly the browned foliage of the Loosestrife here and there point out the presence of this larva where a stem has been bored, and died. It is always the upland, whorled, or four-leaved species, *quadrifolia*, that is selected by this larva, *L. terrestris*, a frequenter of wet places not being infested, though its stem would be more commodious. The latter is often bored by a straggling *cataphracta* or *marginidens*, but my experience is negative as concerns *lysimachiæ*. The former is very persistent, its running rootstocks often matting an area to the exclusion of other plants. The even whorled foliage massed in clumps quickly catches the eye, and forms a background on which

the leathery brown leaves of the bored stem stand out strongly. So one may note the presence of this borer in new territory, even from trolley car or railway train. The principal and only parasite found so far subsisting on this species has not yet been obtained in the imago. There are two or more broods of them surely, since as early as stage four many of the borers have succumbed and the parasites hatched by June 30. The parasitic larvæ that mature by August 10 hybernate after spinning up in a tough cocoon. It is an hymenopterous species, with a larva in miniature like that of *Sphecius*, having pointed, extensile, anterior segments, and attacks the host externally. They attain a length of four millimeters, subsist on the juices of the dead host, and mature rapidly, a necessity under the circumstances. From two to ten may infest one host, and they spin their flattened, tapering cocoons together in a mass in a nearby portion of the larval tunnel. At a late date in the fall they are yet unchanged to a pupal form. In our rather extended breedings of this group heretofore this parasite has not been encountered with any other species.

## BOOK NOTICE.

THE BOMBIDÆ OF THE NEW WORLD. — Transactions of the American Entomological Society, XXXVIII, pp. 177-486, issued Feb. 4, 1913; XXXIX, pp. 73-200, issued July 17, 1913; 22 plates. By H. J. Franklin, Ph. D.

That this extensive monograph of the genera *Bombus* and *Psithyrus* has taken its turn as one of the regular series of papers published by the American Entomological Society, and has therefore appeared without any flourish of trumpets, will not obscure the fact that it is not only a work of great merit, recording the author's painstaking investigations into structural and other characters whereby the species of this somewhat difficult group are well separated with the aid of the material at his disposal—about 5000 North American and about 1000 South American specimens comprising many public and private collections, but also a work that is of especial value to Canadians because of the important position that bumble-bees occupy in the insect fauna of Canada. Of the 47 species of *Bombus* recorded from the region north of Mexico 37 have been found north of the United States

(*B. morrisoni* may be added, for it has been taken by the Rev. W. M. Roger at Ashcroft, B.C.), while no less than eleven of these have not been taken south of Canada. It can almost be said that no part of this vast country is without the bumble-bee, for the author mentions that *B. kirbyellus* Curtis has been taken at Port Foulke in 78¼ North Latitude. The same species has been met with on a high peak in New Mexico. In the Andes *B. opifex* has been taken at an altitude of 4000 metres and *B. coccineus* at 13,600 feet. Franklin says these are the highest New World records.

Like other modern workers on the Bombidæ, Dr. Franklin founds his classification mainly upon the structure of the genitalia of the males and finds that the New World species of *Bombus* fall into seven groups:

1. The Terrestris group, containing four species, the best known being *terricola* Kirby of the east and *occidentalis* Greene of the West, both energetic and prolific forms, as is *terrestris* in the palearctic. *Terricola* is probably heavily parasitised—it might more truly be said dragooned—here, as *terrestris* is in Europe by *Psithyrus vestalis* (sens. lata), of which the American form *ashtoni* Cr. has a similar distribution to that of *B. terricola*, though, as Franklin states, "there is not yet a single true New World account of a *Psithyrus* having been found in a *Bombus* nest."

2. The Borealis group, better known in Europe as the Subterraneus or Distinguendus group, comprising *borealis* Kirby in the northeast and *appositus* Cr. in the northwest.

3. The Dumoucheli group, containing four species north of Mexico, including the common Eastern species *pennsylvanicus* De Geer (= *americanorum* Fab.), which does not extend far into Canada, and the widely distributed *fervidus* Fab.

4. The Kirbyellus group, including five arctic and sub-arctic species.

5. The Pratorum group, containing no less than 23 species, or apparently distinct forms, in Canada and the United States.

The remaining two groups are made up of the species in which the males have bulging eyes, for which Robertson in 1903 erected the genus *Bombias;* (6) The Auricomus group comprising *auricomus* Robt. and *nevadensis* Cr. and (7) The Fraternus group, consisting of seven species, of which only three have occurred in

Canada, *separatus* Cr., *morrisoni* Cr., and the widely distributed and chameleonic *rufocinctus* Cr.

A second part of the work treats of the species south of the United States. Here we find as many as twenty species of the Dumoucheli group, if we include the four northern forms, of which two have already been taken in Mexico, sixteen of the Fraternus group, only four of the Pratorum group, and no representative of any other group.

Dr. Franklin follows five of his groups into the Old World, but thinks that the Auricomus and Fraternus groups are not certainly known to be represented there. He has probably not seen the male of *Bombus cullumanus* Kirby, a rare and little known European species, of which *rufocinctus* appears to be the nearctic representative. The name *dumoucheli* Rad. is not employed by European workers, but it appears to be synonymous with *armeniacus* a Central Asiatic form allied to *pomorum* Panzer, the type of a well known group in Europe. Reference is also made by Dr. Franklin to five other groups occuring in the Old World, but, so far as is known, absent from America.

The author treats the genus *Psithyrus*, consisting of the parasitic bumble-bees in the same thorough and liberal manner as *Bombus*. Eleven forms of *Psithyrus* have been separated in the region north of Mexico, but three of these are unpaired sexes. The only record of a *Psithyrus* from South America is that of F. Smith from Brazil, but Dr. Franklin doubts if it was ever taken there.

In his work Dr. Franklin introduces new names for six Bombid species north of Mexico and for ten species south of the Mexican border. In the case of some forms the relationships are so close that Dr. Franklin considers "it must be entirely a matter of personal opinion whether they should be given full species rank or considered only a subspecies," a view with which none at this date will quarrel. The author also buries as synonymous a large number of old names. That he is well qualified to do this is evident from the fact that he has seen and examined "practically all of the types of species described by the New World workers on the group."

The twenty-two plates consist of illustrations of various structures, chiefly camera-lucida drawings of the genitalia and of

the hidden seventh and eighth ventral segments of the males of the different species. These two segments are called by Franklin the inner and outer spathæ, a term to discover the meaning of which a new reader anxious to determine specimens may spend a minute or two.

Painstaking monographs of a small group such as this—Swenk's *Bee Genus Colletes* may be cited as another though much smaller example—in which structure is used as the basis of specific distinction and careful descriptions are freely supplemented by good drawings, published without either undue haste or delay, constitute construction work of the best kind, and entomologists must accord Dr. Franklin a hearty vote of thanks for the results of several years of patient labour. Who will treat in a similar manner other groups of bees and wasps now calling for revision, and thus help to reduce the heaps of half-worked ore that have accumulated in hymenopterology to ingots of bright metal? Careful investigators who undertake such work should receive the liberal support of collectors and curators. But to follow the suggestion of a speaker at the recent Convention of the American Association for the Advancement of Science at Cleveland, who proposed that a committee should be formed to apportion to each scientific investigator his task, would be to rob such work of its main attraction.

Dr. Franklin hopes at a later date to present a further paper on the Bombidæ, dealing chiefly with habits and phylogeny. This will be eagerly looked for.

F. W. L. S.

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We regret to learn that PROFESSOR JOHN HENRY COMSTOCK, who has been for thirty-nine years instructor and professor of Entomology at Cornell University, and the author of various text-books and works on the subject, will retire from duty at the end of the presentacademical year. His many friends throughout America join in wishing him many years of rest from educational duties, while no doubt he will continue his scientific work.

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Mailed February 9th, 1914.