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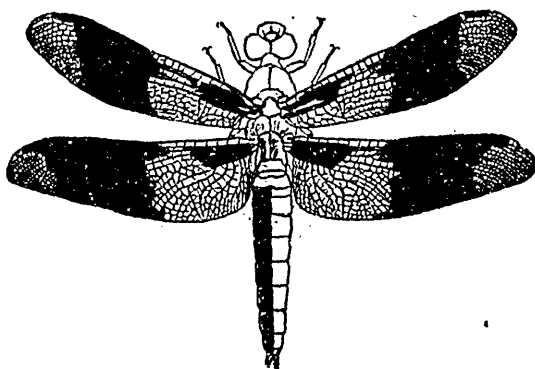
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The  
Canadian Entomologist

VOLUME XXIX.

No. 7.



LIBELLULA TRIMACULATA.

EDITED BY

REV. C. J. S. BETHUNE,

HEAD MASTER OF TRINITY COLLEGE SCHOOL,

PORT HOPE, ONTARIO.



JULY, 1897.

LONDON:

LONDON PRINTING AND LITHOGRAPHING COMPANY.

1897.

## EXCHANGE.

Subscribers are invited to make liberal use of this column. Notices over three lines are liable to be shortened if necessary. All insertions free to subscribers.

Cynipidae and Typhlocybinae wanted, named or unnamed, from all quarters. Will offer, in exchange, Colo. insects in any order. C. F. GILLETTE, Fort Collins, Col.

WANTED.—First An. Report on Nox. Insects of Illinois, by B. D. Walsh, 1868. I have for sale or exchange a complete set of Dr. Fitch's fourteen Repts. on the Insects of New York. Address, M. V. SLINGERLAND, Ithaca, N. Y.

LEPIDOPTERA.—I desire long series of Piusias from all parts of boreal North America. Will purchase or give liberal exchanges. Correspondence invited. R. OTTOLENGUI, 115 Madison Ave., New York.

N. A. LEPIDOPTERA.—Exchange desired. Also a lot of exotic Coleoptera, named and unnamed. What offers? Will collect in other orders. E. V. RIBBON, 109 Hazelton Ave., Toronto.

KERMES.—Desired from North America. Will return identified material. E. E. BOGUE, Agr. Expt. Sta., Stillwater, Oklahoma.

LEPIDOPTERA desired from all parts of N. America. Will collect in other orders in exchange. C. H. TYERS, 227 Front Street East, Toronto.

LEPIDOPTERA.—Exotic and native cocoons and pupæ. Preserved larvæ. Especially Rhoplocera. Correspondence invited. W. S. KEARFOTT, 24 South Water St., Cleveland, Ohio.

WILL COLLECT in many orders of Entomology and Herpetology of Arizona. Address DR. R. E. KUNZE, Phoenix, Arizona.

I OFFER perfect specimens of named diurnals from Central America and Northern South America, in papers, for diurnals from Northwest, Western and Southwestern States. LEVI W. MENGEL, Reading, Pa.

WILL COLLECT any Aquatic insects to exchange for Odonata and Plecoptera, nymphs or imagoes; nymphs preferred. Will determine nymphs or imagoes in these orders for duplicates. JAMES G. NEEDHAM, Cornell University, Ithaca, N. Y.

COLLECTORS OF AQUATIC COLEOPTERA should save all the Aquatic Hemiptera taken with the beetles, dredging or at light. I will give exchange for all such Hemiptera in any order, or purchase. CARL F. BAKER, Auburn, Alabama.

COLEOPTERA.—Exchange desired; only perfect specimens given and received. Will also collect in other orders in exchange for Coleoptera of N. A. R. J. CREW, 105 Oak St., Toronto, Ont.

N. A. LEPIDOPTERA not in my collection wanted; offer Manitoba Lepidoptera and Coleoptera. Send lists to A. W. HANHAM, Bank of B. N. A., Winnipeg, Man., Can.

LEPIDOPTERA FROM MINNESOTA.—To exchange for the same from other localities. Send lists to H. W. EUSTIS, 31 Elbert St., Augusta, Ga.

COLEOPTERA.—Will exchange for species not represented in my cabinet. Coccinellidae and Cicindellidae especially desired. Good returns. FREDERIC ORMONDE, 59 Eustis Street, Boston, Mass.

CANADIAN ICHNEUMONIDÆ.—Will be glad to purchase undetermined material in this family, particularly from the vicinity of Quebec. Will determine or exchange specimens if parties prefer. G. C. DAVIS, Agricultural College P. O., Michigan.

COLEOPTERA.—Wanted, Haliplidae, Gyrinidae, and Rhynchitidae, named or unnamed; also Attelabus genalis. Good returns of named N. American Coleoptera. RALPH HOPPING, Redstone Park, Kaweah, California.

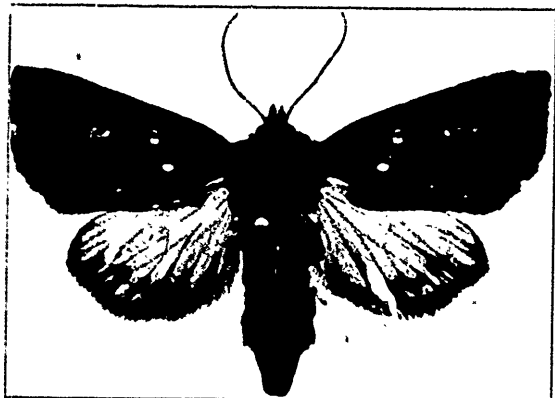
Correspondents desired in any part of the world who will collect Hesperidae (either named or unnamed) in exchange for N. H. Lepidoptera. W. F. FISKE, Mast Yard, N. H., U. S. A.

WANTED.—Diptera of the families Sarcophagidae and Muscidae (sensu stricto) from all localities. Will purchase or exchange for insects of any order. GARRY DEN HOUGH, M. D., 542-County St., New Bedford, Mass.

HYMENOPTERA.—Fossors and Bees wanted from West and South (named or unnamed). Offer in return good American and European Col., Lep. or Hym. S. N. DUNNING, 43 Niles St., Hartford, Ct., U. S. A.

VANCOUVER ISLAND.—Lepidoptera for sale or exchange—*C. gigas*, *M. Taylori*, *A. rhodope*; *New noctuidæ*. W. H. DANBY, P. O. Box 314, Victoria, British Columbia.

EUROPEAN COLEOPTERA.—I have a large quantity of European Coleoptera which I wish to exchange for American. Lists furnished. PAUL J. ROELOFS, 90 Rue van Straelen, Antwerp, Belgium.



THE COLUMBINE BORER, *HYDROECIA*  
*PURPURIFASCIA*, G. & R.

# The Canadian Entomologist.

VOL. XXIX.

LONDON, JULY, 1897.

No. 7.

## THE COLUMBINE BORER (*HYDRECIA PURPURIFASCIA*, G. & R.).

BY M. V. SLINGERLAND, CORNELL UNIVERSITY, ITHACA, N. Y.

In 1894, Mrs. J. J. Glessner, Littleton, N. H., called my attention to a "worm" which was feeding in the roots and stems of her columbines. It was not until July, 1895, however, that she succeeded in getting specimens of the "worm" for me. The "worm" proved to be a caterpillar which was unfamiliar to me, and in accordance with my usual practice in such cases, it was described and photographed. The photographs, giving dorsal and lateral views of the caterpillar, twice natural size, are reproduced on the plate.

The full-grown larva measured one and three-eighths inches in length. Its general colour is mars brown, much lighter on the venter of the first two thoracic and last four or five abdominal segments. The head is of a light russet colour, black about the eye-spots. Mandibles dark brown, black-tipped. Thoracic shield concolorous with the head on the dorsum, but merging into black on the sides and sometimes into a narrow black cephalic border; the shield is divided by a narrow whitish mesial line. Anal shield large, black, merging into brown mesially. The true legs are brownish-black, and the bases of the pro-legs are marked with blackish areas. Short light brown hairs arise from conspicuous, comparatively large blackish spots; the piliferous spots on the dorsum of the last two abdominal segments are considerably larger than the others. The spiracles are black. There is a continuous narrow white mesial stripe extending along the dorsum. A similar white stripe extends along the subdorsum on each side, but it is not continuous, being entirely obsolete on the first four abdominal segments, and sometimes on the last thoracic segment also. The discontinuance of these two white side stripes gives the larva a rather curious appearance, as the figures show.

One of the caterpillars, which was received in the latter part of July, 1895, pupated on or about August 8, and the adult insect (the beautiful moth shown twice natural size on the plate) emerged September 3, 1895.

The moth proved to be the one described by Grote and Robinson in 1868 as *purpurifascia*. Imagine the light spots in the figure to be of a delicate creamy white colour, the other shades as various shades of orange, purple, and russet brown, and you will have a faint conception of the rather uncommon but beautiful combination of colours presented on the wings of this insect.

I can find no reference in the literature to the early stages or habits of this insect. On account of its destructive work in Mrs. Glessner's columbines, it may be appropriately called "the Columbine borer." The moth has been recorded as occurring in Maine and Massachusetts in September and October, and in New York in August; it is also known to occur in Illinois and Colorado. Mrs. Glessner writes that she has found that rich soil, cultivation, and Fowler's solution of arsenic (diluted one-half with water) poured around affected plants seemed to check and control the pest.

### THE RASPBERRY CANE MAGGOT (*PHORBIA RUBIVORA*, COQUILLET).

BY M. V. SLINGERLAND, CORNELL UNIVERSITY, ITHACA, N. Y.

This new raspberry pest has been discussed in detail in Bulletin 126, issued in February, 1897, from the Cornell Agricultural Experiment Station. The life-history and habits of this Anthomyiid are fully illustrated in the Bulletin. At the time the Bulletin was written, however, the name of the insect had not been determined. In April, 1897, I reared several more of the flies and sent some to Mr. D. W. Coquillett at Washington. He soon reported that the insect was a new species of *Phorbia*, and sent me the following technical description of the fly, which he had drawn up from the specimens I sent him.

*Phorbia rubivora*, Coquillett, n. sp.—♂. Ground colour black, sides of front and of face white pollinose, eyes sub-contiguous, more approximated to each other than are the two posterior ocelli, frontal vitta at the narrowest part linear; third antennal joint less than twice as long as broad, slightly over twice as long as the second, arista thickened on the basal third, the penultimate joint slightly longer than broad. Thorax grayish pollinose, marked with three black vittæ; three postsutural and three sterno-pleural macrochaetæ. Abdomen quite thickly covered with suberect bristly hairs; narrow, subcylindrical, greenish-gray pollinose,

marked with a black dorsal vitta, tip of abdomen greatly swollen, bearing a subconical process in front of the hypopygium. Front and middle tibiae each bearing two bristles on the posterior and one on the outer side below the middle besides those at the tip, hind tibiae each bearing a single bristle on the inner side near the distal third, three on the front side and two on the outer side, in addition to those at the tip; under side of each hind femur bearing a row of bristles, those at the base the shortest. Wings hyaline, tinged with gray at the base and less distinctly so in the marginal cell, costa strongly arcuate along the costal cell, costal spine shorter than the small cross vein, the latter beyond the middle of the discal cell, hind cross vein nearly straight and subperpendicular, last sections of the third and fourth veins distinctly diverging; calypteres whitish, halteres yellow, the extreme base of the peduncle brown.

♀. Front three-fourths as wide as either eye, frontal vitta destitute of a pair of macrochaetae, sides of front yellowish gray pollinose; abdomen ovate, pointed at the apex, almost bare, destitute of a black dorsal vitta; costal spine slightly longer than the small cross vein; otherwise as in the male.

Length, 4 to 5.5 mm. Two males and two females, bred by Mr. M. V. Slingerland, from larvae boring in the stems of the cultivated raspberry at Ithaca, N. Y.

The male will be easily recognized by the narrow abdomen and the arrangement of the bristles on the legs; the female, by the absence of the usual pair of macrochaetae on the upper part of the frontal vitta.

D. W. COQUILLETT.

Mr. R. H. Meade, of England, sends me the following report upon some of the flies which were sent to him at the same time: "I have examined the flies carefully, and they seem to be an undescribed species of *Phorbia*. I cannot identify them with any European species that I know, and I think you may describe them as new. You might call them *P. rubi* or *P. ruborum*."

I shall be glad to send a copy of Bulletin 126 to anyone who may be further interested in this raspberry-cane maggot.

The annual meeting of the Association of Economic Entomologists will be held at Detroit, Mich., on Thursday and Friday, August 12th and 13th.

## PRELIMINARY STUDIES OF N. AMERICAN GOMPHINA

BY JAMES G. NEEDHAM, CORNELL UNIVERSITY, ITHACA, N. Y.

Examples of the emphasized importance of larval life better than that furnished by the subfamily Gomphinae of Odonata are few even among insects. The nymphs live under the sediment (mostly organic debris) which falls to the bottom of ponds and streams. They are aquatic burrowers which live at such slight depth that their anal respiratory orifice is never beyond the reach of clean water. This thin stratum, which forms their home and which they only leave to transform, is one of great biologic richness. In it they have found room for development in enormous numbers and necessity for extreme specialization. They are, at least when well-grown, among the more powerful members of its teeming hidden population. The imagoes emerge, flit about under cover for a few days, lay their eggs and die. They emerge largely by daylight and are subject to great decimation of numbers at this time, and are sought later by numerous powerful enemies. The females which live to oviposit lay a very large number of eggs. A female of *Gomphus fraternus* laid for me in a watch glass of water over 5,000 at one time. The imagoes of the ancient genus *Gomphus* are regarded as a race of weaklings. Their nymphs, on the contrary, are splendidly equipped for the battle of life. And it is to the perfection of their adaptation that the prevalence of Gomphines with us is due.

These conditions have developed a large and very uniform series of imagoes, with one colour pattern, one plan of venation, one *habitus*, consisting of many very closely related species difficult to study. Specific characters, though slight, are yet constant. The slight specific variations of an ancient colour pattern long retained are unusually reliable. Secondary sexual characters reach here their maximum of importance and of specific individuality. This is as one would expect, recalling the vicissitudes of adult life and that its chief concern is with reproduction.

The real competition of life, however, is carried on by the nymphs, and the outcome of it is that they have become specialized. They have developed along several lines and have become segregated into well-marked natural groups which are not so obvious among the imagoes



De Selys separated from the great genus *Gomphus*\* as he found it three genera represented in our fauna, *Ophiogomphus*, *Herpetogomphus* and *Thromogomphus*, and divided the remainder into groups of species. My breedings of the nymphs during the past three seasons in the main confirm these groups and show that three of them at least are worthy to rank as genera.

One of the genuine surprises of this season was the finding here, at Ithaca, of nymphs like those described by Hagen from Rocky Creek, Ky., (Trans. Amer. Ent. Soc., XII., 281, 1885) and doubtfully referred by him to *Tachaptrex Thoreyi*, and the rearing from them of *Gomphus parvulus*, Selys. "This extraordinary nymph combines head and antennæ of *Hagenius* with legs and abdomen of *Gomphus*," wrote Hagen in the beginning of his very careful description. The length of the wing pads showed the nymphs not to be young, as Hagen supposed, and made it impossible to consider them as belonging to *Tachaptrex*, but that they should yield this dainty little Gomphine was still a surprise.

In June and July, 1896, I bred *Gomphus fraternus*, Say, in numbers at Havana, Ill. The nymphs are exactly described by Hagen (loc. cit., p. 262) as No. 13, *G. adelphus* (supposition). In May, 1895, I bred *Gomphus grastinellus*, Walsh, at Galesburg, Ill. These, especially the former, are very near to the typical *G. vulgatissimus* of Europe.

\**Nomenclatural.* In the case of *Aeshna* vs. *Gomphus* I have examined the evidence and find it is as follows: Linnæ included all dragonflies known to him in one genus, *Libellula*. Fabricius (1775, Syst. Ent., pp. 420-426) divided the genus into three, *Libellula*, L., *Aeshna*, Fabr., and *Agrion*, Fabr., placing under *Aeshna*, among other species, *L. grandis*, L., and *L. foreipata*, L. It is worthy of note that he left *L. vulgatissima*, L., in *Libellula*. Illiger (1802, *Magazin für Insektenkunde*, p. 126) corrected the spelling to *Aeshna*, merely to accord with its etymology. Latreille was the first to designate types. He specifies (1802, Hist. Nat. Gust., Ms. III., 286) *L. depressa*, L., as the type of *Libellula*; *L. vulgatissima*, L., as the type of *Aeshna*, and *L. virgo* as the type of *Agrion*. With regard to the second, which alone concerns us here, *L. vulgatissima*, L., was described and figured by Latreille under the name "*Aeshna foreipata*, Fabr.," as was shown later by both Hagen and De Selys. Kirby's Catalogue of Neuroptera Odonata (1893) gives the correct synonymy and thus contains in itself the evidence which condemns the substitution it proposes. For if the type named by Latreille for *Aeshna* was *vulgatissima*, L., this species having been included by Fabricius when he founded the genus, cannot be its type. Leach (1815, Edinburgh Encycl. VIII, part 2, p. 726, of Amer. reprint) founded the genus *Gomphus*, with *L. vulgatissima* L., for its type and placed under *Aeshna*, Fabr., the sole species *L. grandis*, L. However, Cuvier had previously (1798) characterized *Aeshna* (as pointed out by De Selys, C. R. Ent. Soc. Belg., 1890, p. CLXI.) and described under it the sole species *grandis*, L. This usage has since been universally followed until 1890, and one is glad to find there is now no reason for change.

I follow De Selys in using the name *Ophiogomphus* Sel., which seems to have been quite properly given.

In the *pallidus* group I find another type of nymph very distinct in the two species I have reared (*pallidus*, Ramb., at Galesburg, Ill., May 1895; *villosipes*, Sel., Ithaca, N. Y., May 1897).

The *plagiatus* and *notatus* groups of De Selys together present another type of nymph, already pointed out by Hagen (loc. cit., p. 269) as perhaps of more than subgeneric value. The bred nymphs of this group are of *plagiatus*, Sel., *notatus*, Ramb., *spiniceps*, Walsh, and *segregans*, n. sp. (vid. sub finem.)

Believing that the immature stages throw much light on the relationship of the imagoes, and that the study of this large and homogeneous group will be facilitated by the setting apart of distinguishable sub-groups, I propose three new genera which need here have no further characterization than that of the following tables: *Lanthus* (λανθωνη contracted), type *G. parvulus*, Selys, *Orcus* (nomen proprium), type *pallidus*, Ramb., and *Stylurus* (στυλος and οἶρα), type *plagiatus*, Selys. With these apart *Gomphus* is still somewhat polymorphic. The *dilatatus* group, characterized by extreme dilatation of the apex of the abdomen in the imago and correspondingly greater width to the 9th abdominal segment in the nymph, may yet, with advantage, be set apart. A clear line of demarcation, however, is not yet apparent.

I now hazard a table for separating these subdivisions of the *Legion Gomphus*, Selys. It is to be regarded as preliminary and tentative, the more so as I have endeavored to base it on characters common to both sexes. This legion is distinguished from others of Gomphinæ by the absence (normally) of cross veins from all the triangles and supra-triangular spaces.

TABLE FOR IMAGOE OF THE LEGION GOMPHUS, SELYS.

1. Outer side of triangle of fore wing distinctly angulated at the origin of the cross vein between the two upper discoidal areolets.....2.
- Outer side of triangle of fore wing straight or nearly so.....3.
2. Inferior abdominal appendages of ♂ recurved upward in their apical half; vulvar lamina of ♀ shorter than half the 9th abdominal segment ..... *Herpetogomphus*, Selys.
- Inferior abdominal appendages of ♂ recurved upward only at their extreme apices; vulvar lamina of ♀ almost equalling the 9th segment. .... *Ophiogomphus*, Selys.

3. Upper sector of the arculus arising from its upper end; *i. e.*, the part of the arculus above the sectors shorter than the part below them.....*Lanthus*, gen. nov.

Upper sector of arculus arising from its middle; *i. e.*, the part of the arculus above the sectors longer than the part below them.....4.

4. Hind femora with 5 to 7 long spines intermixed with smaller ones.....*Dromogomphus*, Selys.

Hind femora with numerous shorter spines.....5.

5. Ninth abdominal segment a little longer than 8th. Segments 7, 8 and 9 very little enlarged.....6

Ninth abdominal segment not longer, generally shorter, than the 8th; segments 7-9 more or less enlarged....*Gomphus*, Leach.

6. Dorsum of thorax pale with darker stripes; 8th abdominal segment cut obliquely at apex, longer on the dorsum than at the sides. abdominal appendages of ♀ hardly longer than the 10th segment.....*Orcus*, gen. nov.

Dorsum of thorax dark with paler stripes; 8th abdominal segment not longer on the dorsum than at the sides; abdominal appendages of the ♀ at least one half longer than the 10th segment.....*Stylurus*, gen. nov.

Nymphs of four of our N. American Gomphine genera remain to be discovered. *Tachaptryx* and *Dromogomphus* of the eastern U. S., *Gomphoides* of Texas and *Octogomphus* of California. I venture now a preliminary table for our known nymphs. Doubtless many modifications of it will be necessary as the unknown nymphs still largely in the majority are discovered.

#### TABLE FOR GOMPHINE NYMPHS

1. Wing-cases strongly divergent.....\*2.  
Wing-cases laid parallel along the back....4.

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\*This will not apply to gaping *exuvie* in which originally parallel wing-cases have been forced apart

2. One third or more of the length of the abdomen, formed by the 10th abdominal segment .....(supposition). *Aphyllia*.  
Tenth abdominal segments not longer than the other segments...3.
3. Middle legs less distant at base than fore legs.....*Progomphus*.  
Middle legs not less distant at base than fore legs.....(These apparently not separable) *Herpetogomphus* and *Ophiogomphus*.
4. Third joint of antennæ flat, circular .....5.  
Third joint of antennæ cylindric, at least twice as long as wide..6.
5. Abdomen flat, subcircular .....*Hagenius*.  
Abdomen ovate, twice as long as wide .....*Lanthus*.
6. Abdominal appendages longer than the 10th segment, front border of median lobe of labium straight (or in *Gomphus* occasionally very slightly rounded), with the usual fringe of flat scales, but without teeth. Abdomen not abruptly narrowed before 9th segment.....7.  
Abdominal appendages shorter than the 10th segment; front border of median labial lobe produced into a prominent rounded lobe which is generally armed with a conic apical tooth. Abdomen rather abruptly narrowed to the base of its 9th segment, more slowly tapering to the apex .....*Orcus*.  
Body spindle-shaped, little flattened; fore and middle tibiæ with small external apical hooks or with none .....*Stylurus*.  
Ninth abdominal segment one half longer than the 8th, its lateral margins nearly parallel. A minute middorsal apical spine on the 9th segment only. Lateral lobe of the labium with a strongly incurved end hook and teeth on the inner margin increasing in size posteriorly.  
Body flat, lanceolate; fore and middle tibiæ with strong external apical burrowing hooks. Ninth abdominal segment hardly longer than the 8th, much narrowed posteriorly. Rudimentary dorsal hooks on some of the segments before the 9th. ....*Gomphus*.

(To be continued.)

## THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

## XXV. THE CERAMBYCIDÆ OF ONTARIO AND QUEBEC.—(Continued.)

## ATIMIA, Hald.

Represented by *A. confusa*, Say, the only Canadian species of the group Atimioides. Aside from the structural peculiarities given in the table of genera, it may be characterized by the blackish colour and the punctate surface clothed with rather long yellowish pubescence, which is irregularly disposed so as to leave abraded smooth spots. The elytra are broader than prothorax, truncate at tip. Length, .33-.40 inch.

## NECYDALIS, Linn.

This genus, by the short elytra, bears some resemblance to *Molorchus*. The third and fourth antennal joints together are distinctly longer than the fifth. Our species is *N. mellitus*, Say, unknown to me, but described by Mr. Leng as being of variable colour, "usually rufo-testaceous, head, antennæ (base and tip tinged with rufous), thorax, scutellum and abdomen above black; elytra punctate, more coarsely toward the margin; reddish-brown, with paler spot at tip or entirely rufo-testaceous." The elytra are marked by an oblique impression which is not deep and does not reach the tip. Length, .60-.84 inch.

## DESMOCERUS, Serv.

*D. palliatus*, Forst., is found on the elder (*Sambucus*) in July. It is a very showy beetle, with narrow head, deeply impressed above, bell-shaped prothorax, and faintly costate elytra. Colour blue except the base of the elytra, which is broadly orange or yellow. Length, .70-.90 inch. This insect can be mistaken for no other Longhorn.

## TOXOTUS, Serv.

"This genus is sharply defined by the spurs of the hind tibiæ, which are inserted at the base of a deep excavation instead of at the extreme end."—(Leng.) This character is of easy verification, and is in itself sufficient for the separation of *Toxotus* from other Lepturoides. A modification of Mr. Leng's table may be used for the Canadian forms.

A. Elytra striped, black with marginal and discal yellowish vitta. .60-.68 in . . . . . *trivittatus*, Say.

AA. Elytra unicolorous or nearly so.

b. Third joint of antennæ much longer than the fourth.

Larger species, legs bicoloured. .76-1.00 in. . *Schaumii*, Lec.

Smaller species, legs unicoloured. .40-.60 in. . *vestitus*, Hald.

bb. Third joint of antennæ but slightly longer than the fourth.

Tips of elytra obliquely truncate, sub-bidentate. .87 .90  
in. . . . . *cylindricollis*, Say

The name *trivittatus* replaces that of *vittiger* in accordance with the synonymy proposed by Mr. Leng.

#### RHAGIUM, Fabr.

*R. lineatum*, Oliv., is often common under pine bark or in lumber piles. It has scarcely the appearance of being a Longhorn at all, the antennæ being so short as to usually fail of attaining the base of the elytra. The prothorax is much narrower than the elytra, armed on each side with a strong spine or acute tubercle. The elytra are narrowed behind, sharply costate. In colour the insect is black or nearly so, the prothorax appearing gray from the pubescence which clothes it, excepting a smooth stripe on each side (including the spine) and one on the median line. The elytra are marked by a few reddish or yellowish spots, and the pubescence is irregular, giving a mottled appearance. Length, .54-.80 inch. My small specimens are from the Lake Superior region, while the large ones came from the forests of the mountains of Arizona.

#### CENTRODERA, Lec.

A large species, *decolorata*, Harr. (Fig. 26), is our only representative. The head, prothorax, under surface and appendages are reddish-brown, the elytra lighter. The eyes are more prominent than usual, the prothorax shining, nearly smooth at middle, closely punctate and somewhat opaque at sides, lateral tubercle large and acute. Elytral punctuation coarse at base, becoming finer to tip, sides nearly parallel. Mr. Leng describes the antennæ as "about as long as the body," but they may fall one-third or more shorter. Length, 1.20 to 1.25 inch. Rather rare. Found on beech by Mr. Harrington.



FIG. 26.

#### PACHYTA, Serv.

A. Elytra reticulate with raised smooth lines, the intermediate spaces coarsely punctured. Black, subeneous, antennæ, femora and base of tibiæ ferruginous. .51-.64 in. . . . . *rugipennis*, Newm.

## AA. Elytra simply punctured.

Punctuation finer, surface of elytra finely pubescent, opaque or nearly so. Black, legs and antennæ often reddish, elytra yellow, four spots on each and tip black. .35-.38 in. *monticola*, Rand.

Punctuation coarse, surface of elytra glabrous, shining, colour black, elytra sometimes testaceous, or more or less distinctly maculate with black. .60-.72 in . . . . . *liturata*, Kirby.

I am unacquainted with *P. rugipennis*, and the description is taken from Mr. Leng's synopsis. *P. monticola* is to be found on blossoms of wild rose, while I have taken *liturata* in numbers on piles of sawed pine lumber.

## ANTHOPHILAX, Lec.

Three Canadian species are recorded, only one of which, *A. attenuatus*, Hald., is known to me. The others, *A. viridis*, Lec., and *A. malachitus*, Hald., are suspected by Dr. Horn to be respectively the ♀ and ♂ of one species. Following his table they separate thus: all belonging to that section of the genus in which the antennæ are slender, the third joint much longer than the fourth.

"Elytra coarsely punctate scabrous, more or less metallic.

Elytra greenish-blue, legs black. .70 in . . . . . *viridis*, ♀.

Elytra cupreo-æneous to blue, legs pale. .52 in . . . . . *malachitus*, ♂.

Elytra testaceous, irregularly maculate with piceous spots. Surface coarsely sparsely punctate and with small spaces which are distinctly pubescent; median line of thorax distinctly impressed. .56 in . . . . . *attenuatus*."

Mr. W. H. Harrington has taken the last mentioned insect at Ottawa on beech.

## ACMEOPS, Lec.

Only two species, *pratensis* and *protens*, are recorded in the Society's lists and additions. I have, however, seen *bivittata* with the label "Quebec," and recently Mr. Chagnon sent a specimen of *subpilosa* as coming from Montreal; *longicornis* is known from the far north of Canada, and is included in the subjoined table, which is in the main equivalent to those prepared by Dr. Leconte and Mr. Leng.

A. Front and mouth much prolonged, body moderately robust, prothorax bell-shaped, sides sinuate but not tuberculate. Black, elytra variable, either blackish, reddish or clouded, occasionally indistinctly vittate. .24-.34 in . . . . . *pratensis*, Laich.

## AA. Front not greatly prolonged.

b. Body short and stout, antennæ thicker, hind tarsi stout, the joints 1-3 equally pubescent beneath. Prothoracic tubercle distinct, elytra closely punctured. Colour varying from entirely black to almost entirely testaceous; or the thorax may be yellowish while the elytra are black. Typical form has yellowish elytra, each with two black stripes. .24-.36 in. *bivittata*, Say.

bb. Body more slender, antennæ more delicate, hind tarsi slender, pubescence wholly or in part lacking beneath on second and sometimes on first joint.

c. Disk of prothorax convex, slightly channeled, densely punctured.

Prothorax longer than wide, elytra rather sparsely punctured, pubescence short and scant. Colour extremely variable, black to testaceous, elytra often vittate. .36-.44 in. . . . . *longicornis*, Kby.

Prothorax broader than long; blackish, pubescence very long. .36-.44 in. . . . . *subpilosa*, Lec.

cc. Disk of prothorax flattened behind and prolonged into two dorso-lateral tubercles. Colour variable, blackish to testaceous, legs variable, but apparently with the base of the femora at least always rufous. .24-

.36 in. . . . . *proteus*, Kirby.

While definite information is lacking, it is probable that *A. proteus* and *A. pratensis* breed in pine, since they are so frequently found on piles of pine lumber. *A. bivittata* (Fig. 27) is to be collected on flowers of *Anemone pennsylvanica*. Mr. Leng calls the punctuation "sparse," but it is rather close and coarse.

## GAUROTES, LEC.

*G. cyanipennis*, Say, is readily known by its brilliant colour. The body is black, shining often with a purplish tinge, the elytra bright green, polished, the antennæ, legs and mouth-parts yellowish. The head is distinctly but sparsely punctured, the prothorax almost smooth except at sides, the elytral punctuation very distinct but widely separated. Length, .36-.40 in. In Wisconsin I found this insect almost confined to Sumac blossoms. It is said to have been found ovipositing on butternut,

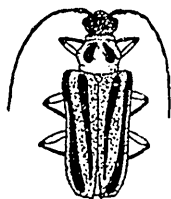


FIG. 27.

Sumac blossoms.



## ENCYCLOPS, Newm.

*E. coruleus*, Say, belongs here. It is smaller than most of the Lepturoides, and of slender parallel form, the elytra scarcely tapering to tip. The head is broad, squarish, the constriction far behind the eyes. Lateral thoracic tubercle distinct. Colour usually blue, varying to greenish, legs testaceous, antennæ with the bases of the joints (especially the distal ones) more or less testaceous. Punctuation strong, rugose. .28-.32. inch.

FOOD PLANTS OF THE SAN JOSE SCALE (*ASPIDIOTUS PERNICIOSUS*) IN OHIO, EXCLUSIVE OF FRUIT TREES.

BY F. M. WEBSTER, WOOSTER, OHIO.

The following list includes forest and ornamental trees and shrubs; upon which the San José scale has been found breeding in Ohio\*. Nearly all of these have been found either by myself or my assistant, Mr. C. W. Mally, in sufficient numbers to indicate that the insect might thrive on any of them. The Cotoneaster was sent for inspection, it having been recently received from a Long Island nursery firm, and when received was literally covered with the scale :

Grape, <i>Vitis labrusca</i> .	Willow (imported), <i>Salix viminalis</i> .
Linden, <i>Tilia Americana</i> .	Cut-leaved Birch, <i>Betula</i> , sp.
European Linden, <i>Tilia Europæa</i> .	Lombardy Poplar, <i>Populus dilatata</i> .
Sumac, <i>Rhus glabra</i> .	Carolina Poplar, <i>P. monilifera</i> .
Japan Quince, <i>Pyrus japonica</i> .	Golden-leaf Poplar, <i>P. Van Geerti</i> .
Cotoneaster, <i>C. frigidum</i> .	Catalpa, <i>C. speciosa</i> .
Flowering Peach, <i>Prunus</i> , sp.	Chestnut, <i>Castanea sativa</i> .
Flowering Cherry, <i>Prunus</i> , sp.	Osage Orange, <i>Maclura aurantiaca</i> .
American Elm, <i>Ulmus Americana</i> .	Snowball, <i>Viburnum opulus</i> .
Black Walnut, <i>Juglans nigra</i> .	

To these must be added the several varieties of roses, currants, gooseberries and raspberries. The Early Richmond cherry I believe to be exempt from attack, as I have found trees whose branches interlocked with those of a pear that had been killed by the scale, yet the cherry was uninfested; and in two cases that came under my observation, where this variety of cherry had been grafted upon mahaleb stock, and shoots had sprung up from below the graft, the shoots were badly infested with scale, while none at all could be found on the trees themselves.

\*The determinations have been kindly verified by Dr. L. O. Howard, of the Division of Entomology, Department of Agriculture, Washington, and his assistants,

## THE HIND WINGS OF THE DAY BUTTERFLIES.

BY A. RADCLIFFE GROTE, A. M., HILDESHEIM, GERMANY.

I wish to offer here a few remarks on the structure of the hind wings of the diurnals especially, in extension of my recent paper on the Butterflies of Hildesheim.\*

The first point relates to the fact that the hind wings are more specialized as compared with the primaries. The probable explanation I offer is, that the hind wings bear more of the weight of the body (abdomen), and that they regulate the downward stroke of the fore wings. A parallel suggests itself with the vertebrates in which the hind legs are more specialized; and the cause is then, in both cases, a mechanical one. This specialization in the hind wings of the day butterflies manifests itself primarily in the inequality of the wings, of which the secondaries have the Radius 1 branched, the primaries 3 to 5 branched. In the second place by an advance over the front wings in the process of the absorption of the median veins, so that the radius or cubitus of the secondaries draws the branches nearer to itself than the corresponding vein of the primaries. Vein IV<sub>2</sub>, in the case where its condition is not permanently generalized (*Lycaenida*, *Riodinida*, *Hesperiida*), is thus usually more drawn out of its original central position on the secondaries; it submits also first to degeneration (*Hesperiida*) on the hind wings, showing that here the cross vein has degenerated for a longer period than in the primaries, isolating the vein and depriving it of nourishment over a longer ancestral line. The cross vein itself vanishes first on the secondaries. Here the cell may be open, all trace of the scar vanished (*Araschina*, *Melitaea*), while on the fore wings the degenerate vein is present, closing the cell.

The progress in the evolution of the neuration is evidently taking place in identical directions on both wings. The generalized condition of the radius (it being 5-veined) of the primaries in *Papilio* gives way to a specialized condition (4-veined) in *Parnassius*, with an intermediate 5-veined state in *Thais*, in which latter the upper branch of the median series, vein IV<sub>1</sub>, which has left the cross vein to emerge from the radius in *Parnassius*, leaves the cross vein near the upper angle of the cell.

The absorption of the veins is everywhere attended by the same indications of a physiological process which, in its external manifestations, it is easy to trace. It is the same with veins II. and III. of the hind

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\*Mittheilungen a. d. Roemer Museum, No. 8, Feb., 1897.

wings. The greater the extent of absorption of II. by III. (the radius), from the base of the secondaries outwardly, the more specialized is the form. In the *Limenitini* (*Nymphaline*) the absorption is carried forward to the point of issue of the rudiment of I., so that the subfamily *Nymphaline* may apparently be separated from the *Argynnine* by this character. While I have in various places in my paper correctly stated the change in the position of II. and III., owing to this basal fusion of the two veins. I have in others written of a withdrawal of I. towards the point of junction of II. and III., which, in fact, is the reverse of what takes place, although the effect seems the same. I. probably remains constant, or nearly so; in the cases where it is reduced to a mere scar it seems still to occupy the same relative position on vein II. It is extinguished by absorption. At the same time the fusion of II. and III. constantly changes in extent. In low forms, such as *Leptidia*, the two veins seem wholly separate at the base of the wing. In *Argynnis*, which is the lowest Nymphalid I have examined, the fusion at base is very limited, whereas in the highest Nymphalids the fusion is carried up to the point of issuance of I. In the Pierids the fusion is generally limited, and here, as I have pointed out in my essay, they lag behind the Nymphalids. The extent of the absorption is everywhere the measure of the specialization.

The last point to which I would here draw attention is the junction of the cross vein on hind wings with  $IV_3$ , or rather  $V_1$ . Here the Pierids have again lagged behind, the cross vein reaching  $IV_3$ , although the portion of the base of  $IV_3$ , between the junction of the cross vein and  $V_1$ , must be held to belong to the cross vein. In the *Parargine* and *Nymphalidae* the cross vein is withdrawn to the point of issuance of  $V_1$ . The lower Meadow Browns agree with the *Limnadiidae* and *Pieridae* in the position of the cross vein of secondaries. In the *Riodinidae* (I have only examined the type) the cross vein is specialized as in the Nymphalids, while it is slightly removed outwards in the *Theclinae* and *Lycæninae*. Where the cross vein fails to meet the point of issuance of vein  $V_1$ , lying outside of it, we must describe  $IV_3$  as issuing from the cross vein, to which the base of  $IV_3$  morphologically belongs.

A study of both fore and hind wings shows that on both the same processes are repeated, but the initial impetus for the changes seems to be always given by the hind wings. It is as if a wave passed over the wings, coming from the hind pair and breaking over the primaries, carrying these frail creatures further along their airy paths into their unknown future.

FURTHER NOTES ON SECTIONS OF *Augochlora*.

BY CHARLES ROBERTSON, CARLINVILLE, ILLINOIS

Since my note on the Mexican bees of the genus *Augochlora* was published I have been informed by Prof. Cockerell that he would not reply in this journal, but probably elsewhere. This conclusion seems to me to be remarkable, but I shall take this occasion to say what more I have to say on the subject and then leave it.

When I suggested two sections of *Augochlora*, in Trans. Am. Ent. Soc. XX., 147, I did not base my conclusion on the hind spurs alone, but because the two sets of species also agreed in other characters. I was too well acquainted with the characters of *Halictus* to suppose that a valid section of *Augochlora* could be maintained unless the spurs of a certain form were associated with other characters which indicated affinity. For example, *Halictus coriaceus* and *H. Forbesii* form a natural group of the genus and have finely serrate hind spurs. If I remember correctly *H. fuscipennis* belongs to the same group, but *H. parallelus*, which also has finely serrate spurs, does not. The sections of *Augochlora*, as I formed an idea of them at the time I mentioned them, might be defined as follows:

1. Slender species, having the sides of truncation of metathorax rounded above; hind spur of ♀ finely serrate; ventral segments of ♂ not metallic, or more or less metallic medially.

2. More robust species, having sides of truncation sharp; hind spurs of ♀ with 4-5 long teeth; basal ventral segments of ♂ metallic.

These characters belong to the species I indicated as coming in these sections, but it does not necessarily follow that other species with the same spur forms belong to either of them. Thus *A. splendida*, with basal fasciæ on second and third abdominal segments, may not belong to my second section.

That Prof. Cockerell did not know that the peculiar spur forms were secondary sexual characters of the females is shown by his failure to indicate the fact in the table; by his insisting that *A. viridula* and *A. ferrida* could not belong to the second group on account of their spurs, by the use of the terms "ciliate or simple," which I think were taken from the males; and by his comparison of types through Col. Bingham. Smith's male types were referred to the first group without regard to any except their spur characters, which were of no value. If the types of *A. aspasia*, *A. aurora* and *A. splendida* had been males these species would have been referred to the first so-called subgenus; in other words, the author could not tell to which one of his own subgenera an *Augochlora* belonged. He failed to indicate valid characters of any natural group of *Augochlora*, and, in fact, showed that he had no idea of them.

## SUCCESSFUL COLLECTING AT ELECTRIC LIGHT.

BY J. ALSTON MOFFAT, LONDON, ONT.

I herewith give a full list of the Lepidoptera new to the Society's collection, taken by Mr. J. W. Bice at electric light during the season of 1896.

Mr. Anderson and I picked out from amongst Mr. Bice's captures of about 2,000 mounted specimens of good material what seemed to be new to us; and after comparison with named specimens, or illustrations, having failed to recognize them, they were laid aside for others more competent than we to decide upon them.

I am greatly indebted to Dr. J. B. Smith for the patient endurance, amidst his multitude of professional duties, with which he attended to and promptly returned a number of small lots sent to him by mail—the unreasonable demands of the U. S. customs officer at the boundary line prohibiting their being sent in bulk by express, and thus increasing the labour connected with it. And not only for the names of the specimens, but also for interesting and instructive remarks upon many of the species; Dr. Hulst also assisting me with the Geometers. Most of those new to the collection were in single specimens of their kind, and Mr. Bice has generously donated them to the Society.

The names and their sequence are in accordance with Dr. Smith's list of 1891.

*Protoparce carolina*, Linn.

*Cisthene unifascia*, G. & R.

*Lithosia bicolor*, Grote.

*Parorgyia parallela*, G. & R.

*Oedemasia badia*, Pack.

*Acronycta dactylina*, Grote.

*Acronycta impressa*, Walk.

*Cerma cora*, Hub. Upon this species, Dr. Smith remarks: "Distinctly rare."

*Semiophora tenebrifera*, Walk.

*Agrotis catherina*, Grote.

*Pachnobia salicarum*, Walk.

*Dicopsis muralis*, Grote.

*Dicopsis Thaxterianus*, Grote. Dr. Smith says: "Very good indeed, not in my collection."

*Eutotype bombyciformis*, Smith.

*Eutotype Rolandi*, Grote.

*Mamestra assimilis*, Morr.

*Hadena passer*, Guen.

*Hadena indirecta*, Grote. Dr. Smith remarks: "Quite a new locality for this species. I have it from British Columbia and the Rocky Mountain region, but have never had it from anywhere near you."

*Hadena diversicolor*, Morr.

*Taeniocampa vegeta*, Morr.

*Homoglaea hircina*, Morr.

*Cucullia florea*, Guen.

*Melothis (Chloridea) rhexia*, S. & A.

*Galgula hepara*, Grote. I took my first specimen of this insect in July, 1896, and sent it to Prof. Fernald, under the impression that it was a Tortricid, who kindly named it for me; Mr. Bice's specimen was so dissimilar that I did not recognize it.

*Homoptera Woodii*, Grote.

*Palthis asopialis*, Guen.

*Brotis vulneraria*, Hub.

*Semiothisa dislocaria*, Pack.

*Boarmia pampinaria*, Guen.

*Eubyia cupidaria*, Grote.

Besides those altogether new, there were many interesting and unexpected varieties of common things brought to view by Mr. Bice's collection; which when disclosed were quite surprising to one not familiar with the extent and direction variation may go in some species, emphasizing with special force what Dr. Skinner gives in the subjoined extract as his experience with the butterflies:

"When I commenced my collection I was satisfied to have a single pair to represent the species, but now I cannot get enough individuals to represent all manner and kinds of variation brought about by natural causes. In the past I, therefore, knew this species or that, but now in many of our genera I nearly get brain fever in trying to determine where a species begins or ends."

## BOOK NOTICES.

THE PARASITIC DISEASES OF POULTRY: by Fred V. Theobald, A. M., F. E. S.; 12 mo., pp. 120. Gurney & Jackson: 1 Paternoster Row, London, 1896.

It is encouraging to see a growing interest in applied entomology in England, and Mr. Theobald has given, in this handy little volume, a popular account of not only insect parasites but all other parasitic troubles likely to confront the poultry breeder. Not only is the little manual especially fitted for the wants of such, but it will doubtless find its way to the library of many other gentlemen who rely upon their estates to furnish fowls for their tables. The book is divided into several parts, relating to protozoan parasites, insect parasites, mite parasites, worm parasites, and vegetable parasites. Besides containing twenty-three illustrations, appendix I. gives a list of the parasites of *Gallus domesticus*, with the part of the fowl attacked by them; appendix II. a quite full bibliography of the literature of the subject, which, with a very complete index, renders the volume of scientific as well as practical value, and Americans will find it of interest to them as well as Englishmen. We wish Mr. Theobald success in his efforts to add to the practical entomological literature of his people.

F. M. W.

ÜBER DIE PALPEN DER RHOPALOCEREN. Ein Beitrag zur Erkenntnis der Verwandtschaftlichen Beziehungen unter den Tagfaltern; mit 6 Tafeln: von Dr. Enzio Reuter. Acta Societatis Scientiarum Fennicæ. Tom. XXII., No. 1. Helsingfors, 1896.

Entomologists in general, and lepidopterists in particular, will be interested in this work of Dr. Reuter's, occupying as it does a folio volume of 577 pages, the investigations, upon which the facts are chiefly based, requiring the examination of 3,557 palpi, belonging to 670 species, contained in 302 genera of the Rhopalocera. The work is divided into two parts: the first dealing with the direct microscopical examinations in descriptive form, while in the second is given the conclusions based on the same, as well as a discussion of other taxonomic characters allied to those brought out by himself, and their values. The plates are very fine, and the sixth of especial interest generally, as it presents, in the form of an evolutionary tree, the relations of the various groups and genera to each other.

Dr. Reuter calls attention to the fact that at the base of the basal joint on the inner side of the palpi of butterflies is found a clearly distinguishable, naked spot, which he proposes to term the basal spot, on the surface of which are fine grooves and ridges as well as sparsely placed foveæ, and great numbers of peculiar, subconical, hairy rugosities. These last, though occurring normally in the Diurnals, and especially in the Nymphalidæ, and being clearly distinguishable with a low power lens, have formerly remained unknown, or if known have not been mentioned in entomological literature.

These ridges were by Landois considered as stridulating organs, and the two last structures in analogy with those observed by Kræplin, Forel, Häuser, and others, on the antennæ of various insects and looked upon as being sense organs; but whether the peculiar structures in question served to convey the sense of smell, or, perhaps, some other and nearly related sense, is still an open question.

The Rhopalocera especially, of all the lepidoptera, have a special interest, because in them these cones present the greatest variations in form and are here the most highly developed.

Through further research, Dr. Reuter was convinced that a thorough study of the palpi, and especially of the basal spot, would afford a not inconsiderable basis for a knowledge of the family affinities of the individual genera and groups contained in the Rhopalocera, and he therefore determined to direct his especial attention to them, extending his studies over all of the families, and where possible over the smaller groups, as also to study the material at his disposal from a direct and thoroughly morphological point of view.

F. M. W.

#### OVIPOSITION OF DORYTOMUS SQUAMOSUS (Lec.).

This is a very common beetle upon cottonwoods in Colorado, but I have never known anything of its injuries until recently, when I had the good fortune to come upon a female preparing a burrow for her eggs in a terminal flower bud. When first observed she had her beak in the side of the bud up to her eyes. The twig was broken from the tree and carried in the hand without in the least disturbing the work of the beetle. After about ten minutes she removed her beak, turned quickly about and applied the tip of her abdomen to the hole she had made. After remaining in this position for about two minutes she ejected a small amount of a dark brown, thick liquid, which completely covered and hid the opening in the bud. This done she walked away.

The bud contained the catkin of a staminate flower which was nearly ready to burst forth, and immediately beneath the puncture in the bud scales, on the axis of inflorescence, were found three eggs lying close together.

The eggs were light yellow in colour, with a very thin, flexible shell, and although somewhat irregular in shape, measured about .85 mm. in length by .5 mm. in breadth.

C. P. GILLETTE.