

Technical and Bibliographic Notes / Notes techniques et bibliographiques

The Institute has attempted to obtain the best original copy available for filming. Features of this copy which may be bibliographically unique, which may alter any of the images in the reproduction, or which may significantly change the usual method of filming, are checked below.

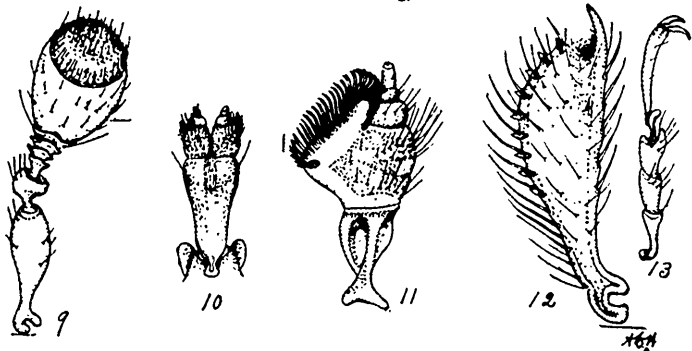
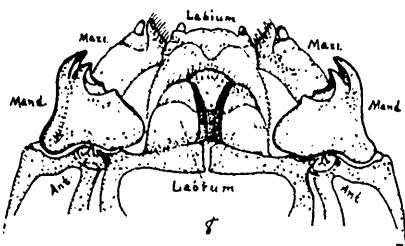
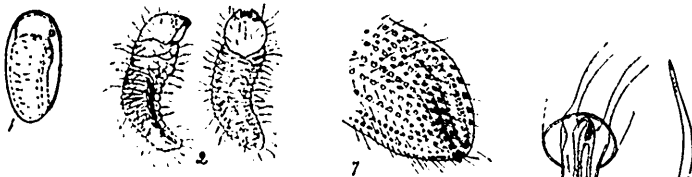
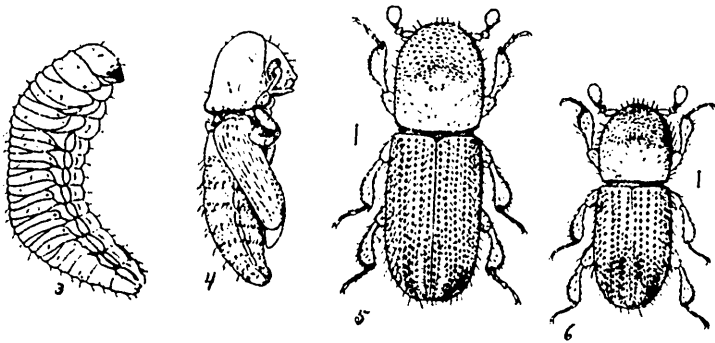
- Coloured covers/
Couverture de couleur
- Covers damaged/
Couverture endommagée
- Covers restored and/or laminated/
Couverture restaurée et/ou pelliculée
- Cover title missing/
Le titre de couverture manque
- Coloured maps/
Cartes géographiques en couleur
- Coloured ink (i.e. other than blue or black)/
Encre de couleur (i.e. autre que bleue ou noire)
- Coloured plates and/or illustrations/
Planches et/ou illustrations en couleur
- Bound with other material/
Relié avec d'autres documents
- Tight binding may cause shadows or distortion
along interior margin/
La reliure serrée peut causer de l'ombre ou de la
distorsion le long de la marge intérieure
- Blank leaves added during restoration may appear
within the text. Whenever possible, these have
been omitted from filming/
Il se peut que certaines pages blanches ajoutées
lors d'une restauration apparaissent dans le texte,
mais, lorsque cela était possible, ces pages n'ont
pas été filmées.
- Additional comments: /
Commentaires supplémentaires:

L'Institut a microfilmé le meilleur exemplaire qu'il lui a été possible de se procurer. Les détails de cet exemplaire qui sont peut-être uniques du point de vue bibliographique, qui peuvent modifier une image reproduite, ou qui peuvent exiger une modification dans la méthode normale de filmage sont indiqués ci-dessous.

- Coloured pages/
Pages de couleur
 - Pages damaged/
Pages endommagées
 - Pages restored and/or laminated/
Pages restaurées et/ou pelliculées
 - Pages discoloured, stained or foxed/
Pages décolorées, tachetées ou piquées
 - Pages detached/
Pages détachées
 - Showthrough/
Transparence
 - Quality of print varies/
Qualité inégale de l'impression
 - Continuous pagination/
Pagination continue
 - Includes index(es)/
Comprend un (des) index
- Title on header taken from: /
Le titre de l'en-tête provient:
- Title page of issue/
Page de titre de la livraison
 - Caption of issue/
Titre de départ de la livraison
 - Masthead/
Générique (périodiques) de la livraison

This item is filmed at the reduction ratio checked below/
Ce document est filmé au taux de réduction indiqué ci-dessous.

10X	12X	14X	16X	18X	20X	22X	24X	26X	28X	30X	32X
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



The Canadian Entomologist.

VOL. XXX.

LONDON, FEBRUARY, 1898.

No. 2.

ON THE HISTORY AND HABITS OF THE "WOOD ENGRAVER" AMBROSIA BEETLE—*XYLEBORUS XYLOGRAPHUS* (SAY), *XYLEBORUS SAXESENSI* (RATZ.) —WITH BRIEF DESCRIPTIONS OF DIFFERENT STAGES.*

BY A. D. HOPKINS, ENTOMOLOGIST, W. VA. AGR. EXPT. STATION.

The Ambrosia beetles of the Scolytid genus *Xyleborus* present many features of interest to the student of systematic and economic entomology¹, and in *Xyleborus xylographus* we find a cosmopolitan species of unusual interest.

History.

It was described by Say in 1826² from specimens "sent to him by the younger Rev. J. F. Melsheimer from the Melsheimer collection, with the manuscript names and notes by the elder Rev. F. V. Melsheimer."³ Say's erroneous reference to the habits and galleries of the species, published with the description, was (as suggested by Schwarz) due to his use of Melsheimer's notes on a different species, probably a *Pityophthorus*, *Pityogenes* or *Tomicus* species. This was the cause of much confusion in subsequent literature on the species. The *Tomicus xylographus* referred to at length by Dr. Fitch⁴, and subsequently quoted by Packard⁵ under *Xyleborus xylographus*, was evidently *Tomicus cælatus*, although the galleries illustrated by Fitch resemble the work of a *Pityophthorus* more than they do that of *T. cælatus*.

Some years after the publication of Say's description, Ratzburg⁶ described the same thing under the name *Xyleborus saxeseni*, which,

*Read by title before the W. Va. Academy of Science, Arts and Letters, Dec. 7th, 1897.

1. Ambrosia Beetles of the United States; H. G. Hubbard; Bull. No. 7, new series, U. S. Department of Agriculture, Div. of Entomology, 1897, pp. 9-30; also Year Book, 1896, pp. 421-430.

2. *Bostrichus xylographus*, Jour. Acad. Nat. Sci., Phila., 1826, Vol. V., p. 256.

3. Catalogue of Insects of Pennsylvania, 1806.

Quotation from Schwarz in Proc. U. S. Nat. Museum, Vol. XVIII., p. 610.

4. *Tomicus xylographus*, Fitch, 4th Rep. Ins. of N. Y., 1858, p. 716.

5. Bull. 7, U. S. Ent. Com., Insects Injurious to Forest and Shade Trees.

according to Eichhoff⁷, was in use in Europe over fifty years before it was determined that Say's name had priority. Schwarz⁸ had previously called attention to the probable priority of Say's name, and the confusion with reference to Say's description of the insect and galleries. The writer⁹ also referred to its identity with *saxeseni* in 1893, and published brief descriptions of the male in 1894¹⁰. This, with descriptions and notes by Zimmermann and Leconte¹, and the publications previously cited, includes about all of the literature in this country, but in Europe the literature is more voluminous and includes, under the synonym *X. saxeseni*, quite full accounts of its habits and distribution.

Geographical Distribution and Host Plants.

According to Eichhoff the distribution of this species extends over "the greater part of Europe, Canary Islands, Japan (?), and North America." The species is evidently indigenous to Central Europe, or wherever it infests the greatest variety of trees. Its recent or remote introduction into any country will probably be indicated by its preference for certain introduced or ornamental trees, and the extent to which it has acquired the habit of infesting indigenous trees.

In Europe, Eichhoff and other observers found that it not only infested the wood of oak, beech, birch, maple, poplar, linden, fruit, and other deciduous trees, but that different conifers were also attacked by it. Hubbard mentions that "it appears to be partial to rather hard wood, like oak, hickory, birch and maple, and is found wherever these trees grow, both in this country and Europe." The results of my observations here in West Virginia would indicate that it is confined almost exclusively to fruit trees, especially to the wood of the apple, in which I have found it to be exceedingly common in the vicinity of Morgantown. In my extended

6. Ratzburg Forstein, 1837, Vol. I., p. 168.

7. Letter from W. Eichhoff to Dr. C. V. Riley in 1892, published in Proc. U. S. Nat. Museum, Ibid p. 609, from which we quote the following: "There cannot be the slightest doubt that the species you sent me as *Xyleborus xylographus*, Say . . . is identical with the European *X. saxeseni*, Ratzburg. It is certainly remarkable that this synonymy comes to light only now, and that Ratzburg's name has to be suppressed after it has been in use for more than fifty years. *X. fini*, Eich., must now again take its rank as a distinct species."

8. Ento. Amer. II., p. 41.

9. Bull. 31, W. Va. Agr. Expt. Station, p. 136.

10. Sexual Characters in Scolytidæ, CAN. ENT., Vol XXVI., p. 279. The male had been previously described by Wisemann, Stett. Ent. Zeit., 1846, p. 24.

1. Trans. Amer. Ent. So., Sep. 1868, p. 145 and 160.

search for wood and bark beetles of all kinds in different sections of the State, I have only one record of this species or its work in the wood of an indigenous tree, and that was in a hemlock drift log, near an old orchard in which the insect was abundant. Fitch, Leconte and Packard referred to the abundance of *X. xylographus* and *Tomicus xylographus* under the bark of pine, but they were evidently referring, as Say did, to the habits of *Tomicus caelatus*, which, while a true bark-boring beetle, is also a wood engraver.

Breeding and Feeding Habits.

The habits of *X. xylographus* are quite fully and accurately described by Eichhoff¹, and recently Mr. Hubbard, in his excellent paper on the ambrosia beetles of North America, has contributed additional information, especially with reference to the ambrosia fungus upon which it feeds, from all of which, together with what I can add from personal observations, we are enabled to present the following :

The fertilized females pass the winter in their brood chambers and emerge in the spring (April and May, near Morgantown, W. Va.). They are then attracted to sickly, dying or felled trees, in the living or moist dead wood of which they prefer to excavate their brood galleries. A crevice or opening in the bark, such as may be made by other insects, or, as I have observed, those made by the yellow-bellied woodpecker, but more commonly the edge of a wound, or a dead place on a living tree, is selected as a favourite point of attack. Here a female will commence the excavation of a mine, and after she has penetrated the wood a short distance, another female (as I have observed) will come to her assistance, one working at the excavation, while the other guards the entrance and assists in expelling the borings. The primary or main gallery is usually extended into the heartwood before eggs are deposited. When the primary gallery is completed (according to Hubbard) a bed is provided on the sides of the gallery for the propagation of the special species or variety of ambrosia fungus which is to furnish food for the future broods. The first set of eggs are few in number (five to ten) and are placed without any protection on the sides near the end of the main gallery, or in cavities or short branching galleries (Plate 3, fig. 7, 8), one-half to one inch from the end, where, upon hatching, the young larvæ find a supply of ambrosial food. After the first set of larvæ have attained considerable size, another set of eggs are deposited, and so on at intervals until a

1. W. Eichhoff, European Barkenkafer, Berlin, 1881, pp. 280-281,

large family is reared, in which eggs, larvæ of all stages of development, pupæ, and young and old adults are found crowded promiscuously in leaf-like brood-chambers, which are continually broadened or extended by the adults and possibly by the larvæ, to make room for the increase. It appears that the brood-chambers are broadened and extended by the adults, and that the borings, mixed with the fungus, are softened and furnish additional food for the larvæ and young beetles.'

Mr. Hubbard records the discovery of a death chamber, or a kind of catacomb, in which the dead mother beetles and other dead friends or foes of a large colony are consigned by the survivors. In some fresh specimens of galleries before me (Plate 3, fig. 2 b b), I find the same thing, but it appears that in addition to a resting place for the dead, it is also utilized for the disposal of all objectional and refuse matter, which, owing to the crowded condition of the chamber, cannot be conveniently expelled from the entrance. One of the males found in this set of chambers was excavating a burrow in the mass of material in the death or garbage chamber. Whether he was excavating his own tomb, or simply providing bachelor quarters, I cannot say.

The proportion of males in this, as in all other species of the genus *Xyleborus*, is remarkably small. There are usually not more than three males in the largest colonies, or groups of brood-chambers. It would appear from observations made by Swiner and Eichhoff in Germany, and the numerous colonies I have examined in this country, that there is, on an average, about one male to twenty females. The males have no wings, therefore probably do not leave the brood-chambers, but remain with the over-wintering colony until all have emerged in the spring. They are then left to be smothered in overabundant ambrosial food, or to the tender mercies of predatory insect enemies which had previously been prevented from entering the brood-chambers by one or more female sentinels at the entrance. A few females may emerge from time to time during the summer to start new colonies, but from the excessively crowded condition of the brood-chambers during the fall and winter months, it

1. NOTE.—In a brood-chamber before me just cut from a near-by apple tree, I find a pupa minus an abdomen. No predaceous enemies can be found, but two or three half-grown larvæ are in such a position as to make the circumstantial evidence quite plain that they are to blame for the mutilation. The remaining portion of the pupa is in a normal condition, which would indicate that the attack had been recent and when the victim was alive. This would also indicate that the helpless pupa may furnish food for the larva in case of a scarcity of ambrosia, or that they may be thus disposed of to prevent an overcrowded brood-chamber.

would appear that the older adults of the broods excavate branching chambers in which new broods are developed, and that in these old and new chambers they all pass the winter.

Enemies.

A number of predaceous beetles and their larvæ may find their way into the brood-chambers at unguarded moments and destroy a portion or all of the colony. This, like other species of ambrosia beetles, appears to be aware of the danger from this source, at any rate, from the time the first eggs are deposited until all the individuals of a colony have developed and emerged from the brood-chambers, one or more adult females serve on guard duty at the entrance, where their armed elytral declivity (as shown in Plate 2, fig. 7; Plate 3, fig. 9) completely fills the entrance gallery, thus presenting an impenetrable barrier against intruders. It is therefore only at unguarded moments that the enemy can enter, except, perhaps, the very young, microscopic larvæ of the predaceous beetles, which may possibly pass the sentinels unobserved. This guard duty is an interesting feature of intelligence in the habits of all Scolytids. In the case of bark beetles and other species in which the sexes are about equally divided, the male is the sentinel, while the female excavates the brood gallery. Perhaps there is no better example of unselfish devotion to paternal duty than the male bark beetles, since they not only spend their lives on guard, but die at their posts in order that their dead bodies may continue to blockade the entrance to the brood galleries. In Xyleborous, and others in which the females greatly predominate, one or more females serve on guard duty.

The excessively crowded brood-chambers doubtless offer favourable conditions for diseases, which may, as indicated by evidence before me¹, destroy an entire colony.

Relation of the Insect to the Health of the Trees Infested by It.

Eichhoff² was undecided as to whether or not the species did any damage to the trees infested by it, but mentioned that it might prove destructive to orchards or nursery trees. Hubbard³ states that it "breeds only in dying trees," but does much injury to the timber, causing defects in the wood, and the writer⁴ mentioned that it probably hastens the death

1. In a brood-chamber before me a number of dead larvæ and pupæ are found, which have evidently died quite recently from a disease of some sort which cannot at present be studied or determined.

2. European Bark Beetles, 1. c.

3. Ambrosia Beetles of North America, 1. c.

4. Bull. 31, W. Va. Agri. Expt. Sta., 1. c.

of injured trees. Recently specimens were received from Dr. Fletcher with the following statement in the letter accompanying them :

" I now send you a few specimens and will ask you for a line or two on them. It is named *Xyleborus saxoseni* by European specialists, and is doing considerable harm to plum trees in England. Miss Ormerod showed me the work and gave me the specimen. I told her . . . I would submit it to you. . . . It was alive, with several others of different ages, in a large flat cavity in a plum branch two inches in diameter."

The evidence I have been able to obtain from a somewhat extensive study of the habits of this and other species of *Xyleborus*, leads me to conclude that while they must have moist wood in which to develop a brood and propagate the fungus upon which they feed, they all have a decided preference for that of dead, dying, or at least unhealthy trees, be they standing or felled, and in no instance have I found any species of the genus entering the wood of any part of an uninjured and healthy living tree. Even *X. dispar*, which has been recorded as infesting healthy wood of fruit trees in Europe and this country, has not been observed by me in healthy wood, although I have found examples of a species determined by Eichhoff as *X. dispar* in the wood of a great variety of trees in West Virginia'. *X. xylographus* comes nearer to attacking healthy wood of living trees than any other species I have observed. It will attack living trees, and has been frequently found in apparently healthy sapwood, but in such instances it had entered through the dead or dying wood of a wound or dead spot in the bark of the trunk or branches, as shown in Plate 3, fig. 1.

Even if it did attack perfectly healthy trees, it could scarcely be the primary cause of their death, unless the insects should occur in such vast numbers as to completely fill the sapwood with entrance galleries and brood-chambers, which in large trees is hardly possible, and in small trees not at all probable. In fact, they seem to prefer to excavate their brood-chambers in the heartwood, which, as is well known, is not a vital part of the plant structure. If the healthy living sapwood is penetrated at

1. This statement is not meant to even suggest the inaccuracy of the records of other writers, since I have reasons for doubting that the species I observed is a true *X. dispar*, and even if it is, habits of the same insect may differ under different environments.

all, it is usually by the primary or entrance galleries, which could cause only the slightest detriment to the vitality of the tree. The most vital part of a tree (the healthy living cambium) is seldom if ever touched by these insects, since they make their entrance through the dead bark or wood. If they did penetrate the healthy cambium, it would be no more than a pin-hole, which, even in great numbers, could scarcely do harm, since in healthy, growing trees such wounds would rapidly heal.

This and other insects with like habits may, however, hasten or even insure the death of unhealthy trees, since their entrance galleries may contribute to the attack of harmful micro-organisms (bacteria and fungi) which are ever ready to attack exposed plant tissue, and especially if the vitality of the growing parts becomes in the slightest degree impaired. This, it would seem, is the only way in which *X. xylographus* could affect the vitality of the trees infested by it, but to what extent it may do so is a problem for future investigation. It may, however, as suggested by Hubbard, be the cause of serious defects in lumber manufactured from trees or logs containing its pin-hole galleries and broad, leaf-like brood-chambers.

Preventives and Remedies.

From what is known of the habits of the insect, it would appear that the best methods of preventing its attack is to keep all fruit trees in nurseries and orchards in a vigorous, healthy condition, and during the winter, or previous to the first of April each year, destroy by fire all the unhealthy or dying or dead branches on trees, thus destroying the colonies before they emerge in the spring. Wounds or dead places on valuable trees may possibly be protected from the attack by the removal of the dead bark and painting the dead surface, especially the edges, with a strong solution of soap and water, undiluted kerosene emulsion, melted grafting wax, or like substances.

Different Stages Briefly Described.

(See Plate 2.)

Egg (fig. 1): Length, .52-.55 mm.; width, .24-.26 mm.; yellowish to pearly white; shining; ovate.

Larva, first stage (fig. 2.): Length, .60-.66 mm.; width, .20-.22 mm.; white; head broader than thoracic segments, and yellowish, with pale brown mandibles; body slender, narrowing to last abdominal segment; head and each segment clothed with long, fine white hairs, longest on the last three abdominal segments. Intermediate stage: Length, 1.5-1.8

mm.; width, .50-.55 mm.: yellowish-white: slender; thoracic and abdominal segments to seventh equal width (dorsal to ventral) and narrowing from seventh to last; hairs fewer and shorter than in first stage; head with brown, longitudinal line in front and short longitudinal groove above; mouth-parts darker. Matured larva (fig. 3.): Length, 2.8-3 mm.; width (lateral view) about .88 mm. at third thoracic segment and seventh abdominal, and .80 mm. at second to third, and narrowing from seventh to .30 mm. at last abdominal; colour, yellowish-white to yellow; head darker, with dark brown mandibles and brown longitudinal line, depression less than in intermediate stages; body stouter, thoracic segments much larger and head much smaller in proportion to body than in first and intermediate stages; segments and head sparsely clothed with short, fine hairs; mouth-parts as shown in fig. 8.

Pupa ♀ (fig. 4.): Length, 2.4-2.5 mm.; width (lateral) about .8 mm.; colour, yellowish-white to yellow; prothorax with dorsal posterior margin elevated, forming a conical hump; mesoscutellum prominently elevated and slightly bent forward; wing pads extended to posterior ventral margin of the fourth abdominal segment, the tips meeting or sometimes separated by a narrow space; antennæ prominent, tip of clubs extending beyond the middle of the front coxæ and to the base of the front tibia; hind tarsi with tips extending to tips of wing pads. The hairs, with which the front, the lateral and dorsal surface of the prothorax and dorsal surface of the abdominal segments are sparsely clothed, are fine and do not rise from tubercles.

Pupa ♂: Length, 2 mm.; width (lateral) .7 mm.; easily distinguished from the female pupa by its smaller size and bent form; the abdomen is narrower and the tip bent down until it is even with the ventral edges of the wing pads; the hairs are fewer but stiffer and longer than on the female pupa.

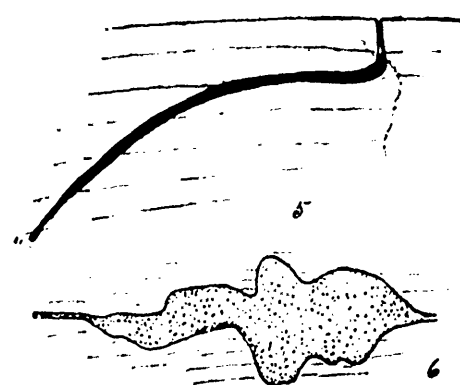
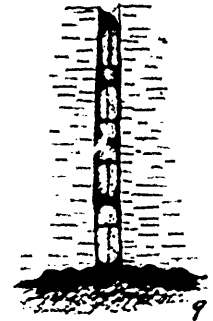
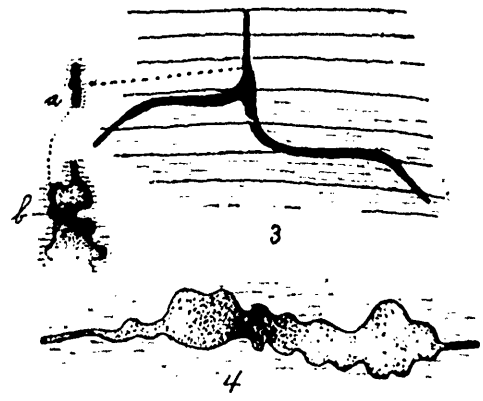
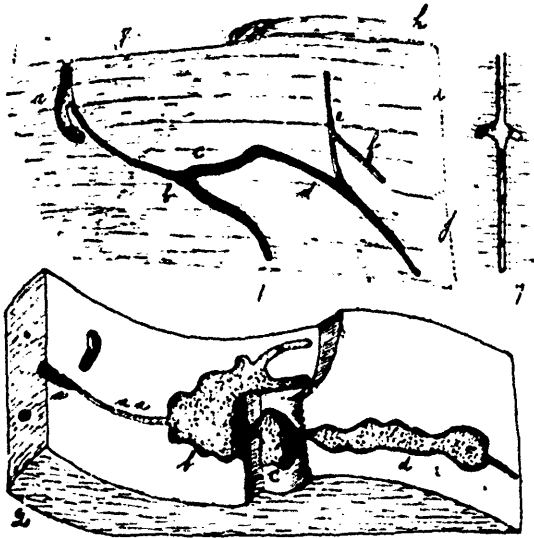
Imago ♀ (fig. 5): Length, 2.3-2.5 mm.; width (dorsal) .73-.74 mm.; colour varies from yellowish-brown to black; easily distinguished from all other known species of the genus by its size and the sculpture of the elytral declivity and the regular rows of small teeth on the first, third, fourth, and sometimes the fifth interspaces, as shown in fig. 7. There is considerable variation in colour and in the number and rows of teeth.

1. Female—*Bostrichus xylographus*, Say, 1826, 1 c.

Bostrichus saxeseni, Ratzburg, 1837, 1 c.

Tomicus dohrnii, Woll., 1854, Ins Mad., p. 290.

Xyloborus dryographus, Ferrari, 1867, Barkenk., p. 20.



H.S.H.

Imago ♂² (fig. 6): Length, 1.66–2 mm.; width (dorsal) .86–.88 mm.; easily distinguished by its general resemblance to the female, its small size, slightly flattened and bent form.

Galleries (Plate 3, fig. 1): Width of entrance on primary galleries, .8–.9 mm.; width of brood-chambers from 1 to 20 mm.; length, 1–7 mm.; diameter, .9–1.1 mm.

Explanation of Plates.

Plate 2.—1. Egg x 25 diameters. 2. Larva, 1st stage, x 25 diameters. 3. Matured larva x 12½ diameters. 4. Pupa x 12½. 5. Imago ♀ x 15. 6. ♂ x 15. 7. Elytral declivity x 25. 8. Mouth-parts of larvæ x 100. 9. Antenna x 100. 10. Labium x 100. 11. Maxilla x 100. 12. Front tibia x 100. 13. Tarsus x 100. 14. Genitalia x 50.

Plate 3.—1. Entrance gallery and brood-chambers in transverse section: a, gallery of *Stenoscelis brevis*, Bok., utilized by *X. xylographus*; b 1st, c second, d third, brood-chambers; e, incompleated exit gallery; f, branching gallery evidently for a fourth brood-chamber; g, dead and partly dried wood; h, living bark; i, living sapwood; j, heartwood; slightly curved transverse lines represent annual growths of wood.

2. Same as fig. 1 in vertical section; 2 b, 1st brood-chamber, showing death or garbage chamber at b b.; 3 and 4, transverse and vertical view of set of brood-chambers all in living and partly living wood; 5 and 6, entrance in dead wood, brood-chamber in living wood; 7, primary gallery with two egg chambers; 8, egg chamber enlarged; 9, female sentinels as found at *aa*, fig. 2; 10, ambrosia fungus. All original and from fresh or living material except 10, which is after Hubbard.

-
2. Male—*Bostrichus saxoseni*, Wiesm., 1846, Stett., Ent. Zeit., p. 24.
Bostrichus decolor, Boield, 1859, Ann Soc Ent. Fr., p. 479.
Xyleborus aescuii, Ferrari (1867?), Barkenk., p. 22.
Xyleborus subdepressus, Rey, Rev. d'Ento. par Fauv. 2, 142.
Xyleborus xylographus, Hopk., 1894, CAN. ENT., vol. XXVI, p. 279.

PANURGINUS CLYPEATUS.

In CANAD. ENTOM., 1897, p. 290, I referred the *Calliopsis clypeatus*, Cresson, to *Panurginus*. I had considered it probable that *Panurgus clypeatus*, Eversmann, 1852, was really a *Panurginus*, but was not sufficiently sure to venture upon changing the name of our insect. There has just come to hand, however, an excellent little monograph of the palæarctic species of *Panurginus*, by Mr. H. Friese, and on p. 19 the Eversmann species is definitely referred to that genus. *P. clypeatus* (Cress.) may therefore be called *P. cressoniellus*, n. n.

Mesilla Park, N. M., Jan. 11, 1898.

T. D. A. COCKERELL.

FOUR NEW SPECIES OF PHLEPSIUS.

BY CARL F. BAKER, AUBURN, ALA.

Phlepsius arcolatus, n. sp.

♀.—Length 6.5 mm. Form of *cinereus*: Head narrower than pronotum. Vertex distinctly angulate, a little longer than half width between eyes or half the length of pronotum; nearly flat, slightly broadly depressed on either side, the edge distinctly compressed. Front a half longer than wide, nearly two and a half times the length of the clypeus, sides rather strongly incurved at antennal sockets. Clypeus gradually enlarged towards the truncate tip, its length once and a half the width at tip. Width of pronotum nearly two and a half times the length, surface neither punctured or wrinkled.

Colour cinereous. Vertex with two large fulvous clouds, a triangular black spot either side of tip, and two black dots at base. Ocelli large, white. Clypeus with two black dots near tip, loræ and genæ irregularly dotted, and front with poorly-defined arcs. Pronotum anteriorly with four indistinct fulvous blotches, posteriorly and scutellum irrorate with fulvous. Elytra milky white, veins dark brown, the supernumerary veins distinct and numerous; the other dark colouring bordering the cells, but usually not touching the veins, producing a strongly areolate appearance; with darker costal dots. Legs with the following more conspicuous markings: Fore femora with a black spot before near the apex, fore tibiae with three black spots before; behind both are heavily irrorate with black; middle femora with a longitudinal black stripe behind, middle tibiae trimaculate; hind femora and tibiae with a longitudinal stripe before. Sternum with three dark spots on either side. Venter, except along the middle and dorsum, irrorate with dark.

Last ventral segment twice the length of preceding, hind margin truncate, with a small median notch; lateral angles rather sharp.

The type specimen of this interesting species was collected at Onaga, Kansas, by Mr. F. F. Crevecoeur. It is very distinct from anything in the *spatulatus* group.

Phlepsius personatus, n. sp.

♀.—Length 6 mm. Form very closely resembling that of *spatulatus*, but smaller. Head narrower than pronotum. Vertex very obtusely angulate, length three-fifths of width between eyes, or somewhat over half the length of the pronotum; surface gently convex, evenly rounded on to the front, entirely without a compressed edge. Front nearly a half longer

than wide, two and one-half times the length of the clypeus, sides gently incurved at the antennal sockets. Clypeus gradually enlarged towards the truncate tip, basal suture obsolete. Width of pronotum scarcely two and one-fourth times the length, surface sparsely punctured.

Colour pale cinereous. Head washed with fulvous, with few dark marks, but the arcs on front distinct; antennal pits, eyes, and a narrow longitudinal area on the pleura back of eyes, dark brown, giving the insect a very unique appearance. Pronotum obscurely irrorate with fulvous. Basal angles of scutel broadly fulvous. Elytra milky white, vermiculations very fine, faint, and evenly distributed; without supernumerary transverse veins; legs without marks, except the usual dots at bases of spines.

Last ventral segment twice the length of preceding, hind margin truncate, with a small median notch; lateral angles very obtuse.

Described from a single specimen collected at Yuma, Ariz., July 6th, 1897, by Prof. A. P. Morse. This species resembles a small *spatulatus*, which is its nearest relative, but differs in size, colour and genital characters.

Phlepsius texanus, n. sp.

♀.—Length 7.5 mm. Form nearest to that of *punctiscriptus*, which it also resembles in some other characters. Head slightly broader than pronotum. Vertex little produced, very obtusely angulate, length one-third of the width between the eyes, or somewhat more than one-third the length of the pronotum; surface sloping, slightly transversely depressed, meeting the front in a very obtuse angle, edge not at all compressed. Front a third longer than wide, sides evenly curved from the vertex to the clypeus, not at all bent opposite the antennæ. Clypeus slightly enlarged towards the truncate tip, length once and three-fourths the width at tip. Width of pronotum once and seven-eighths the length, surface obscurely punctured.

Colour cinereous, with a faint fulvous tinge on vertex, pronotum, and scutel. Vertex irrorate with brown, face dark fulvous, except numerous small round light dots all over, and several larger light spots on front; the ocelli in white dots. Pronotum coarsely irrorate with brown, more strongly so in an irregular band between the hind angles of the eyes. Scutel with two black dots on each lateral margin. Elytra milky, and, except in frequent small irregular areas, marked with fine dots and very fine vermiculations, the latter short, rather few in number and radiating from

the veins, without supernumerary transverse veins. Commissural and apical costal margins each with two larger dark spots. Femora more or less completely heavily triannulate with dark, the fore and middle tibiae more or less completely quadriannulate; hind tibiae with large dots at bases of spines and tip, black.

Last ventral segment once and a half times as long as preceding, hind margin black and slightly sinuate, hind angles narrowly, somewhat acutely, produced nearly a third the length of the segment.

♂ more slender. Length 7 mm. Plate short, broadly triangular. Valves short, each about as broad as long, outer edge obtusely angled below, tips bluntly rounded, far exceeding the extremely short pygofer.

Described from several specimens in the National Museum collection, from Texas. This species is very distinct from any described North American form. It resembles *punctiscriptus* somewhat, but differs in structure of head, genitalia of both ♀ and ♂, and in markings.

Phlepsius Rileyi, n. sp.

♀.—Length 7.5 mm. Nearest *texanus*. Head slightly broader than pronotum. Vertex rather strongly angularly produced, length little less than one-half of the width between the eyes, or about one-half the length of the pronotum; surface sloping, slightly transversely depressed, meeting the front in a very obtuse angle, edge not at all compressed. Front somewhat less than a third longer than wide, sides evenly curved from vertex to clypeus, not at all bent opposite the antennae. Clypeus slightly enlarged towards the truncate tip; length once and three-fourths the width at tip. Width of pronotum nearly twice the length; surface sparsely punctured.

Colour pale fulvous. Markings as in *texanus*, except paler and more uniform on vertex, and no indications of a band on the pronotum; the whole insect of a more distinctly fulvous cast.

Last ventral segment twice the length of the preceding, entire hind margin in two large evenly rounded lobes, the notch between them V-shaped.

Described from material in the National Museum, collected in Texas. This species has no relative nearer than the *texanus*, from which it differs in proportions of head and pronotum and in the genitalia. The genitalia of the female resemble somewhat those of *incisus*, but that species differs widely in form and coloration. Named after Dr. Riley, in whose collection it first occurred.

NOTES ON COLLECTING "AT LIGHT."

BY A. W. HANHAM, WINNIPEG, MAN.

Until last year (1897), owing to the lack of suitable surroundings, I had made no attempt at systematic collecting "at light." Now, as the result of this one season's capture, I am firmly convinced that this method of collecting is the very best way in which to make a large collection quickly and to secure in abundance species hitherto rarely met with or entirely new. For all night-flying species no other way of collecting has ever proved so profitable with me, and a short account of my experiences, with notes of some of the captures made, may be of interest. To begin with, this was my fourth collecting season in Manitoba, but until this year the good things taken at light were few and far between. Locality is everything, and my surroundings in previous years consisted of too much brick and mortar and too little of nature's clothing. At the end of May this year I moved to Fort Rouge, a suburb of Winnipeg, situated between the Red and Assiniboine Rivers. Formerly the whole of this was "bush," with some good timber along the river banks. I am glad to say that a goodly portion of Fort Rouge is still "bush," with here and there a little clearing, sufficient to allow of a residence or so; sometimes just enough only for the house, which when the trees are in full foliage may be completely shut in. Where I live the place is more settled, but still plenty of thick bush about, here and there, if only in small pieces. In June my yard (out of politeness perhaps it should be styled garden) was full of wild rose bushes, the flowers of which adorned our tables and perfumed our rooms for more than a month. The children stepped outside the back gate to pick flowers and wild strawberries; at the side of the house and along the roadway in front on both sides, white clover was everywhere in profusion, and the air was laden with the scent. And yet the road is block-paved, and the electric cars pass along it, and a ride of eight minutes on my wheel will take me to my office in the heart of this city of 40,000 or more people.

I may say here that all my collecting "at light" was done from an upstairs window—that of my sanctum—facing nearly west; at one side of the window is a small poplar, and on the other, further away, close to the house is a good-sized oak tree, denuded of most of its boughs, and a few other small trees. What will some day (all too soon) be a road along the side of the house is still covered with bushes, with here and there a tree. To the right looking out of the window are three arc lights, all within

about 100 yards of the house, the nearest perhaps not more than 50 yards from the front door. What effect these lights had on my collecting is entirely conjectural; sometimes I have been inclined to think that it was owing to the quantity of things drawn to the neighbourhood by them that I did so well; at others, that owing to their superior brilliancy or attractiveness I got but a small share of the things that were flying, in which case the quantity of insects around these electric lights some nights must have been enormous. I must confess that sometimes a wish entered my mind that these lights would go out, so that my small one might have no opposition.

Enough of the surroundings, now for the experiences or results.

My first venture was made on the evening of the 27th of June, and with the exception of a few nights when the moon shone too brightly, I tried light nearly every evening, for a longer or shorter time, according to "the profits," until I went to Brandon, Man., on the 5th of August. On my return at the end of that month I resumed collecting in this way until well on in September, but the weather was very unfavourable and I took little, as compared with the July catches; the nights were either too light outside or too windy, and during the whole month no rain fell, so that the conditions can hardly be said to have been suitable, not affording a fair test. Though I am well satisfied with the gifts showered upon me, it is still a matter of regret that I did not commence a month earlier in the season and that I lost nearly the whole of August as well, for I have no doubt that I missed many a good thing not yet represented in my collection.

It was owing to my inability to get out for any day or evening collecting during June (due to pressure of business and domestic disarrangements) that I bethought me of collecting "at light"; had it been otherwise, I dare say my light collecting would never have seen a beginning, nor a continuation, had not I met with such unexpected, surprising and encouraging success at the outset.

The very first captures at light on June 27th were *Leucania albilinea*, and *Plusia Putnami* and *striatella*; these were followed after an interval by *Plusia insolita* and *ampla*; the Sphingidæ were represented by *Smerinthus geminatus* and *Paonias excæcatus*; the Bombycidæ, by *Cerura occidentalis*, *Tortricidia testacea*, several species of *Schizura*, *Edema albifrons*, *Nadata gibbosa*, *Notodonta elegans*, *Pheosia dimidiata*, *Crocata immaculata* by the dozen, etc.; the Noctuidæ, besides those already men-

tioned, included such nice things as *Pseudothyatira cymatophoroides*. *Charadra deridens* (1), *Diphthera fallax* (1), *Raphia frater*, in plenty, several species of *Acronycta*, *Microcœlia*, *Rhynchagrotis*, and a fair proportion of common things; the *Geometridæ* were also well represented, such hitherto rare species (with me) as *Metanema inatomaria* and *Phasiane mellistrigata* being among the commonest, while several large, handsome species put in an appearance; these are new to my local list and still await identification. The "Micros" were almost without number, and selection was a difficult matter. My diary records that the evening was warm and moist, and that it was 3:30 a. m. before I sought my couch.

June 28th was another good evening, while it lasted, but I retired at a much earlier hour.

June 30th: I have called this a beetle evening in my diary, nothing else coming in until quite late. *Agonoderus pallipes* was a nuisance, as were also several species of small water beetles; among the good things were some species of *Lebia*, a new "Longhorn," weevils, etc.

July 1st was another capital evening, my notes say; three species of *Sphingidæ* new to the district—one of these was *Sphinx albescens*; more new *Bombycidæ*, including *Phyllodesma americana*, etc.

July 2nd: On this evening the *Sphingidæ* stayed at home, or at any rate remained outside, but their place was well filled by more *Plusia striatella* (5) and *ampla* (2); also another *insolita*; *Putnami* and *æreoides* were plentiful; *Abrostola urentis* and *Deva purpurigera* also made their first call; *Metathorasa monetifera* was more timid, only one putting in an appearance, and this species did not occur again. Two species of *Caradrina* were taken, *miranda* and *punctivena*—the latter being quite abundant—also *Noctua Treatii* (3); *Pyrrhia exprimens*, *Leucania commoides* and *Cucullia florea* were well represented. *Carneades divergens* and *Mamestra lorea* came in in such numbers as to be almost a nuisance. The *Bombycidæ* included a single *Halisidota maculata* and *Argyrophytes cilicoides*; the latter species I understand is quite a rarity.

July 3rd: *Arctia virgo* and *Dryopteris rosea* came in first on this date. On the 5th my diary records the running out of pins and the making of new setting-boards, as one result of the quantity of "stuff" taken.

July 6th: A *Dryopteris irrorata* gladdened my eyes on this evening. (The second one of these caught came in on the 8th.)

July 7th: *Pallachira bivittata*, a handsome and very rare "snout" moth, appeared on the scene. I got two; during the next few evenings I took more of them; in all, six being secured.

July 8th : The most noticeable things were *Ceratonia undulosa* and several large species of *Acronycta* and *Mamestra*.

July 9th : The first species of *Ichthyura*, namely, *albosigma*, was captured on this evening.

The next few evenings were too light outside and I got little, but I mention the capture on the 10th of *Crambidia pallida* ; this species became fairly common later on in the month.

July 15th : This evening I took four fresh *Plusia bimaculata* and some *striatella*, several *Mamestra assimilis* and *Hadena impulsula*, a fine *Cerura occidentalis*, *Clisiocampa fragilis*, more *Dryopteris rosea*, and another pair of the tiny white Bombycid, *Argyrophytes cilicoides*, etc.

July 18th : Another *Cerura*, *Arctia Saundersii*, *Carneades flavicollis* and *silens*, and *Orthosia Conradi* (?) were among my visitors this evening.

July 19th : This was my record evening of the season, and one in another way as well, it being 4 o'clock when I put out my light and retired for the night (?). It was another wet night, and stormy at intervals. I was first of all deluged with mosquitoes, and a small green tree-hopper ; these were soon joined by swarms of *Crambidae*, among which *Crambus unistriatellus* was the most conspicuous. The larger moths included a dozen or more of the two species of *Arctia* already recorded, half a dozen *Parorgyia plagiata*, three species of *Ichthyura*, *Cerura cinerea* (the only example taken), more of the little white Bombycid, several species of *Schizura* and *Ianassa lignicolor* ; the three specimens of the moth last named appeared on the scene almost at the same moment. Some of the common Noctuids, such as *Feltia jaculifera*, *Noctua fennica* and *haruspica*, *Hadena lignicolor*, *Mamestra lilacina*, *Hydræcia nictitans*, and others, were becoming troublesome. This was a great evening for Noctuids ; some of the particularly showy species were *Hadena adjuncta* and *miseloides*, *Trachea delicata*, *Mamestra lubens*, *Plusia striatella*, *bimaculata* and *viridisignata* (1), the last *Plusia* being an addition to my local list. I also took one *Acronycta hamamelis*, and *impressa* was quite plentiful. *Senta defecta* turned up for the first time, and in extraordinary abundance ; I could easily have bottled 100 of them ; a *Tineiid*, somewhat smaller, but mimicking this species in colour and markings, was nearly equally common. In Geometers, I got six or more *Plagodis rosaria*—previously represented in my collection by a single specimen, taken at Brandon in 1896—and several large green Geometers, for which I have not yet succeeded in getting a name ; and there were many other species.

[TO BE CONTINUED.]

THE COLEOPTERA OF CANADA.

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

XXVIII. THE CERAMBYCIDÆ OF ONTARIO AND QUEBEC.

LIOPUS, Serv.

Resembles the preceding genus in form, but the angulation or tuberculation of the prothoracic flanks is better marked. The Canadian species are few. Mr. Leng has thus defined them, following, in the main, a previous arrangement of Dr. Horn :

- A. Front flat, mouth in same plane. Elytra without angular mark posteriorly, sides of thorax arcuate, the spine small and acute. Elytra without erect scales. .24-.48 in. *variegatus*, Hald.
- AA. Front convex, mouth slightly retracted ; lateral spine of prothorax rather distant from base. Elytra without distinct tufts of erect scales.
- b. Elytra with an acutely angular band behind the middle, which is, however, sometimes wanting.
- Surface finely punctured, almost impunctured behind the band. .16-.28 in. *alpha*, Say.
- Surface more coarsely punctured, very distinctly so behind the band. .16-.28 in. *cinereus*, Lec.
- bb. Elytra with a feebly marked post-median band of whitish pubescence in place of the angulate line. .20-.25 in. *punctatus*, Hald.

Liopus alpha and *cinereus* are united by Mr. Leng under the former name, the differences given above becoming evanescent in long series. *L. variegatus* is said to breed in box elder, *L. alpha* in apple, and *L. cinereus* in hickory and locust.*

LEPTURGES, Bates.

In this genus the spine of the prothorax is quite near the base. The following table has the same origin as the preceding :

- A. Lateral spine of prothorax rather broad, very close to the base. Colour usually pale with short gray pubescence, black marks as follows: Four spots on the thorax, two on each elytron near the base and close to the suture, a lateral stripe before the middle connected with a broad irregular transverse band, and three (often

*In the table of genera the genus *Leptostylus* is said to have the prothorax "fully tuberculate." It should read "feebly tuberculate."

united) spots near apex arranged in the arc of a circle. These markings may vary in either direction, so that specimens may be nearly black or almost entirely pale. .28-.36 in. .*symmetricus*, Hald.

AA. Lateral spine more slender, less close to base, tip recurved. Elytra fasciate with black.

b. Post-median fascia incomplete, broadly interrupted at suture. .24-.36 in.*signatus*, Lec.

bb. Post-median fascia entire, not interrupted, broad.
Fasciæ oblique on each elytron, apex not black. .18-.24 in.*querci*, Fitch.
Fasciæ transverse, apex also black. .12-.16 in. .*facetus*, Say.

A few notes have been published on food habits: *L. signatus* has been found on dead sumach twigs, *L. querci* on oak, butternut and hickory, *L. facetus* on juniper. The last has also been bred from beech and hickory.

HYPERPLATYS, Hald.

H. aspersus, Say. and *H. maculatus*, Hald., occur in Canada, according to the Society List. They are considered by Mr. Leng as races of one species, which should be called by the former name. The ground colour appears to be of a brownish or bluish-gray, the upper surface maculate with numerous small roundish black spots. For convenience the characters on which the names are based are copied from Dr. Horn.

Elytra twice as long as wide at base. Antennæ in both sexes at least twice as long as the body.*aspersus*, Say.

Elytra broader, not twice as long as wide. Antennæ not reaching twice the length of the body in either sex*maculatus*, Hald.

Length, .14-.26 inch. Breeds in poplars and apple twigs.

ACANTHOCINUS, Steph.

Only one species occurs with us, *A. obsoletus*, Oliv., found about pine lumber. It is a grayish beetle, .40-.60 in. long, the elytra coarsely, not closely, punctured, with a rather indistinct raised line (costa) on each. The ornamentation consists of a number of small dark blotches and three undulated elytral bands, which are often more or less broken up. The resemblance to some beetles of neighbouring genera is quite close, so that careful reference should be made to the characters given in the preceding table,

GRAPHISURUS, Lacordaire.

The Canadian records include *G. fasciatus*, DeG., and *G. triangulifer*, Hald., but it is quite likely that the latter reference is incorrect, the species being more essentially southern, and occurring from Missouri and Ohio to the Gulf States.

Stouter, pubescence of upper surface mostly ochreous. Prothorax pale at sides, this pale area enclosing a few small black spots; median stripe broad, dark, and in turn enclosing three (2 sub-apical, 1 sub-basal) ochreous spots. Elytra with ochreous pubescence marked by many very small black spots, especially towards the sides, scutellar area black, as is also a sub-humeral blotch, a large many-angled, intensely black post-median blotch, not extending quite to the suture, and a sub-apical angulate mark. Tarsi equal in width in both sexes. .52-.54 in. *triangulifer*, Hald.

More elongate, pubescence of upper surface chiefly grayish, except for dark markings, which consist of small, closely-placed spots and blotches. These form a tolerably distinct line on each side of the middle of the prothorax, and usually also an ante-median and post-median irregular elytral fascia. Ante- and middle tarsi of male broader than in female. .32-.56 in. (Fig. 3.) *fasciatus*, DeG.

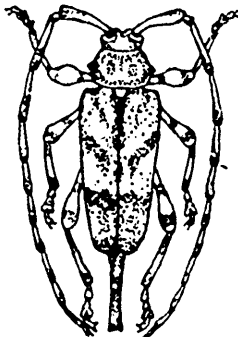


FIG. 3.

G. fasciatus is common in the lake regions, and is said to breed in oak and maple. *G. triangulifer* was found in the larval state boring under bark of injured hackberry trees (*Celtis texana*) by Mr. Schwarz.

CERATOGRAPHIS, Gahan.

Here belongs *C. biguttata* (*Liopus biguttatus*, Lec.), which is unknown to me. Aside from the generic characters, it is stated to be "elongate, scarcely depressed, testaceous, pubescence brownish. Elytra indistinctly mottled, each with an oblique black band behind the middle." Length, .36 in.

DORCASHEMA, Lec.

Represented in Canada by *D. nigrum*, Say, which has been bred from hickory limbs. It is easily recognized by the long antennae, entirely black colour and cylindrical form, the prothorax tubularly narrowed behind the middle, and with rugose disk. The elytral punctures are clear

and deep, not very large nor crowded. Under surface clothed with pale pubescence, which gives a leaden effect. Length, .32-.40 in.

ONCIDERES, Serv.

The "hickory girdler," *O. cingulatus*, Say (fig. 4), is the only Canadian species. It is variable in colour, but the northern forms will approximate the following description: Brownish or reddish yellow, prothoracic spine blunt or wanting; elytra with a broad transverse band of (usually) cinereous pubescence and with scattered yellow spots, these latter sometimes forming tolerably regular rows. Length, .56-.68 in. Dr. Hamilton says that it occasionally girdles pear, apple, plum, linden, elm, and various other trees.

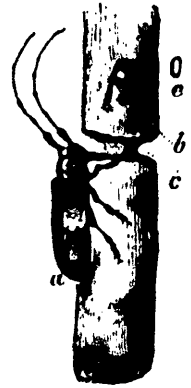


FIG. 4.

AMPHIONYCHIA, Lec.

A. flammata, Newm., is .24-38 in. long, black, clothed with erect dark hairs, the head with two yellow spots or stripes; the sides of the thorax are broadly, those of the elytra (usually nearly to tip) narrowly, yellow. The elytral punctuation is very close and coarse. Antennæ clothed with long hairs. Care should be taken not to mix this species with *Eupogonius subarmatus*, which it very closely resembles.

SAPERDA, Fabr.

All of the North American species have been found in Canada, so we reproduce entire the table given by Dr. Hamilton in Trans. Am. Ent. Soc., LXIII. The larvæ of all mine in living trees, hence they are extremely destructive.

- A. Elytra separately acuminate at tip. Colour yellowish-brown, with oblique dark bands. .64-.76 in. *obliqua*, Say.
- AA. Elytra rounded at tip, with an acute sutural spine. Pubescence cinereous, variegated with fulvous (or nearly uniform brownish-yellow in the var. *adspersa*, Lec.), shot with numerous black denuded points, thorax vittate. 1.00-1.25 in. *calcarata*, Say.
- AAA. Elytra obliquely narrowed and prolonged at tip, slightly dehiscent, coarsely punctate. Pubescence thin, cinereous, variegated with fulvous patches. Thorax trilineate with fulvous. Antennæ conspicuously annulated with white. .36-.60 in. *mutica*, Say.

AAAA. Elytra rounded at tip.

b. Elytra vittate or with lateral stripes.



FIG. 5.

Pubescence silvery white; thorax and elytra with three broad pubescent brown vittae. .60-.80 in. (Fig. 5.) *candida*, Fabr.

Pubescence cinereous; head and thorax with bright yellow pubescence, six black denuded spots on thorax. Elytra with broad marginal and sutural stripe bright yellow. .37-.40 in. . *puncticollis*, Say.

Pubescence grayish. Elytra with broad submarginal stripe, and sometimes also the suture narrowly yellowish-scarlet. A broad stripe on each side of thorax. Surface colour piceous, punctures coarse. .36-.60 in. *lateralis*, Fabr.

Pubescence grayish. Elytra with broad submarginal stripe (extending also along sides of thorax) yellowish-scarlet, connected with which are three oblique bands, which may reach the suture or be reduced to mere short projections, surface colour piceous, punctuation finer. .36-.52 . *tridentata*, Oliv.

bb. Elytra with white pubescent spots. Surface brown.

Thorax with two white stripes, besides a narrow discal white line. Elytra each with two large white spots, sides of under surface white. .40-.80 in. *crotata*, Newm.

Thorax with two white stripes, no discal line. Elytra each with a humeral and two subsutural white spots, sometimes becoming obsolete in the male. Under side altogether or with sides white. .40-.48 in. *fayi*, Bland.

bbb. Elytra each with three small denuded spots, sometimes wanting. Pubescence dense, uniformly olivaceous or yellowish-brown. .48-.76 in. *vestita*, Say.

bbbb. Elytra with a transverse undulate fascia; surface colour piceous to ferruginous, punctuation coarse and deep. .60 in. *discoidea* (♀), Fabr.

bbbbb. Elytra unicolorous, not variegated.

Thorax with a broad denuded stripe each side of the median line. Piceous to ferruginous, under side with dense grayish - white pubescence. .40 in. *discoidea* (♂), Fabr.

- Thorax with a denser line of gray pubescence each side, black, coarsely punctured, pubescence thin, grayish or (in Pacific Coast specimens) fulvous. .32-.36 in. *mæsta*, Lec.
- Thoracic pubescence uniform. Black, densely clothed throughout with cinereous pubescence, less coarsely punctured. .44-.48 in. *concolor*, Lec.

Some of the recorded food plants of the species of *Saperda* are as follows: *S. obliqua* has been found in the adult state on black alder; *S. calcarata* breeds in various poplars and in basswood; *S. candida* in apple, crab apple, mountain ash, junberry and hawthorn; *S. puncticollis* in poison ivy; *S. lateralis* in hickory, elm and witch-hazel; *S. tridentata* chiefly in elm, also in maple; *S. crenata* and *S. fayi* in thorn (*Crataegus*); *S. vestita* in basswood; *S. discoidea* in hickory and butternut; *S. mæsta* in poplars; and *S. concolor* in poplars and willows.

EUPOGONIUS, Lec.

Three species are known from Canada. They may be known thus:

- A. Elytra black, punctuation coarse quite to apex. Thorax black, with a broad line of yellow pubescence near each lateral margin. .28—.32 in. *subarmatus*, Lec.
- AA. Elytra piceous or castaneous, punctuation finer or even obliterated towards apex; Elytra castaneous, punctuation finer, almost obliterated at tip; pubescence grayish or yellowish, forming reticulations. .28—.32 in. *tomentosus*, Hald.
- Elytra piceous, punctuation stronger, pubescence luteous, forming small mottlings or patches. .24—.36 in. *vestitus*, Say.

Of these, *E. subarmatus* bores in elm, *E. tomentosus* in pine and hickory, *E. vestitus* in hickory.

HOPLOSIA, Muls.

Represented by *H. nubila*, Lec., which is described by the author as being .35 in. long, blackish piceous, polished, irregularly clothed with short, dense cinereous pubescence, thorax with acute lateral spine, elytra with large, closely placed punctures anteriorly, tip rounded. It lives on basswood.

POGONOCHERUS, J. atr.

Two small blackish species belong here. They are variegated with whitish or grayish pubescence, and the elytra are truncate, more or less dentate at tip. *P. penicillatus*, Lec., is .24 in. long, blackish; elytra with

sub-basal band of grayish pubescence, well marked lateral costæ, and with a row of five or six tufts of erect black setæ. *P. mixtus*, Hald., is .20-.28 in. long, much resembling the former species, but the lateral costæ of the elytra are indistinct and the tufts wanting. The extent of the pubescent bands is variable. The elytra are clothed with erect black bristles, in addition to the short pubescence. Bred from dead willow branches, and found also on pear trees, while I have taken it quite abundantly on poplar logs.

ECYRUS, Lec.

E. dasycerus, Say, has been bred from dead hickory limbs by Dr. Hamilton. It is from .24-.32 inch long, brownish or cinereous, thorax without well-marked tubercles, disk with two longitudinal approximate dark lines, usually rather indistinct. Elytra with black arcuate band near base, a number of black points (consisting of bundles of hairs) arranged in series, and a common indistinct white band behind the middle, which may sometimes be wanting. The antennæ are hairy beneath.

OBEREA, Mulsant.

Contains very elongate, cylindrical species, easily recognized by their facies. Some of them are quite variable in colour, and hence the number of names proposed is in considerable excess of the species now recognized. Mr. Leng has tabulated them according to structural characters, leaving only three specific names to cover all the recorded Canadian forms, thus :

Thorax with four callosities ; pygidium of female strongly protuberant. .45-.60 in. *Schaumii*, Led.

Thorax with two callosities ; pygidium of female feebly protuberant. .32-.70 in. *tripunctata*, Swed.

Thorax without callosities ; elytra densely pubescent. .60-.70 in. *ruficollis*, Fabr.

The colour varieties of *tripunctata* are thus separated by Mr. Leng ; *amabilis* is said to scarcely differ from *mandarina* :

Body beneath black ; legs nearly or quite black.

Thorax yellow, with two discal and an antescutellar spot black *tripunctata*, || Fabr.

Thorax yellow, with two discal spots alone black. *bimaculata*, Oliv.

Body beneath in great part yellow ; head yellow, thorax with two discal and an antescutellar spot black *mandarina*, Fabr.

Most of the species of *Oberea* are found about raspberry and blackberry, in the canes of which they bore. However, *O. Schaumii* and *O. mandarina* breed in twigs of cottonwood.

TETRAOPES, Serv.

Moderate sized, stout insects, with short antennæ and strongly tuberculate thorax. They are found on *Asclepias*, the common milkweed, in the stems and roots of which they are said to breed. The two Canadian species may be known thus :

Smaller (.32-.48 in.); body beneath, legs and antennæ, black.

Above red; scutellum, four spots on the thorax and elytral markings (a spot on the umbone, a large median heart-shaped blotch and broad common apical space), black. These markings are liable to some variation through extension or diminution *canteriator*, Drap.

Larger (.36-.56 in.); ground colours and thoracic ornamentation about as in the preceding species, the front angles and basal margin sometimes also dark. Elytra with umbonal, two ante-median (one subsutural, one discal) and one post-median spot on each, black *tetraophthalmus*, Forst.

The bibliography of the North American Cerambycidae is very extensive. Aside from detached descriptions of species and biological notes, the following papers, which are more or less synoptic or monographic in form, are recommended for consultation :

1847. Haldeman, S. S. Materials towards a history of the Coleoptera Longicornia of the United States. Trans. Am. Phil. Soc. Additions and corrections to same, Proc. Am. Phil. Soc., Vol. IV.

1850-1852. Leconte, J. L. An attempt to classify the Longicorn Coleoptera of America north of Mexico. Jour. Acad. Nat. Sci., Phila.

1873. Leconte, J. L. New species of North American Coleoptera, Part II., Smithsonian Institution. Contains tables of several genera.

1878. Horn, Geo. H. Notes on some genera of Cerambycidae of the United States. Tr. Am. Ento. Soc.

1880. Horn, Geo. H. Notes on some genera of Cerambycidae, with descriptions of new species. Tr. Am. Ento. Soc.

1885. Horn, Geo. H. Descriptions of some new Cerambycidae, with notes. Tr. Am. Ento. Soc.

1884-1890. Leng, C. W. Synopses of Cerambycidae. Begun in Bulletin Brooklyn Ento. Soc., Vol VII., continued in Entomologica Americana, Vols. I.-VI. Contains tables of all genera up to and including the Lepturoides. The remainder are treated in a paper, cited below, by the same author in collaboration with Dr. Hamilton.

1890. Casey, Thos. L. Coleopterological Notices, II. Ann. N. Y. Acad. of Science. Tables of *Ergates* and *Tragosoma*.

1891 Casey, Thos. L. Coleopterological Notices, III. Ann. N. Y. Acad. of Sci. Contains synopses of several of the smaller genera.

1893. Casey, Thos. L. Coleopterological Notices, V. Ann. N. Y. Acad. Sci. Tables of four genera.

1896. Leng, C. W., and Hamilton, John, The Lamiinæ of North America. Trans. Am. Ento. Soc.

THE MONTREAL BRANCH.

The 211th regular monthly meeting of the Montreal Branch of the Entomological Society of Ontario was held on 11th January, at 74 Mc-Tavish street; Mr. Henry H. Lyman, president, in the chair. Dr. James Fletcher, F. L. S., F. R. S. C., the Government Entomologist, had come down from Ottawa to attend the meeting, and gave a full and most interesting account of the San José scale, the insect pest which is so destructive to the fruit-growing industry, and the introduction of which into Canada from infected nurseries in the United States has caused such widespread alarm. Dr. Fletcher gave an account of its life history, described the features which distinguish it from other and comparatively harmless scale insects, and the most approved remedies for controlling and, if possible, exterminating it. A hearty vote of thanks to Dr. Fletcher was unanimously passed. The President read a letter from Mr. John G. Jack, now of the Arnold Arboretum of Harvard University, who still keeps up his membership in the Branch, announcing the donation of three valuable United States Government reports to the library of the Branch. A cordial vote of thanks to Mr. Jack was unanimously adopted. The President read a paper entitled "Further Notes on the Genus *Chionobas*," illustrated with specimens of nearly all the known species and varieties from this continent, as well as some from the Old World. After discussion and the examination of many interesting specimens, among them some brought back by the Hudson's Bay expedition from the far north, the meeting adjourned.

NEWS OF THE DEPARTMENT OF INSECTS, U. S. NATIONAL MUSEUM.

The collection of insects of the U. S. National Museum at Washington is rapidly increasing. A great donation, the details of which have just been completed, is the large Hubbard and Schwarz collection of Coleoptera. This is one of the first collections of Coleoptera in the United States. It comprises from 10,000 to 12,000 species brought together by Messrs. Hubbard and Schwarz during the last twenty-five years. It has especial value from its fine condition and accurate labeling, affording possibly the best source of information regarding geographical distribution. This collection adds about 3,000 species to the collection of Coleoptera of the Museum. It contains a moderate number of types, but a large number of co-types of the species described by Leconte and Horn. It also contains some exotics, notably a good collec-

tion of West Indian micro-Coleoptera, and is practically unique in its large series of coleopterous larvæ and pupæ in alcohol.

The death of Mr. M. L. Linell, in the spring of 1897, was a severe blow to the Department, but a rearrangement has been effected by which an excellent working force has been secured. The Department has been extremely fortunate in attaching to it Dr. Harrison G. Dyar. Since the departure of Dr. John B. Smith there has practically been no Lepidopterist in Washington, and Dr. Dyar's advent is especially welcome. He has entirely rearranged the collection of Lepidoptera, and has deposited in the Museum his own large collection of some 15,000 specimens. The force as at present constituted is: L. O. Howard, Honorary Curator; Wm. H. Ashmead, Assistant Curator and Custodian of Hymenoptera; Harrison G. Dyar, Custodian of Lepidoptera; E. A. Schwarz, Custodian of Coleoptera; D. W. Coquillett, Custodian of Diptera; and R. R. Currie, Aid.

For a department which has bought no large collections, the Department of Insects is rich in type material. The catalogue shows the existence of over 4,000 types in the different orders.

Recent accessions of special value are a collection of European bees, representing all of the genera known except one; the Hubbard material in all orders recently collected in Arizona; the African material collected in Liberia by Cook and Currie; the African and Siamese material collected by Dr. W. L. Abbott; a collection of Coccinellidæ and Psyllidæ made by Albert Koebele in Japan, Australia, China, and Mexico; a collection of parasitic Hymenoptera made by the same collector in the countries above indicated; a very large collection of Japanese insects in all orders presented by the Imperial University of Tokio through Professor Mitsukuri; the T. A. Williams collection of Aphididæ, comprising over 800 slides of forms collected in the Northwest. Smaller donations are constantly being received from collectors and specialists and the number of those received in the course of the year form very important additions to the collection.

The facilities for the preservation of specimens have been very considerably increased, several hundred of the permanent glass-covered drawers having been added.

It is with profound regret that we record the death of DR. GEORGE H. HORN, the eminent Coleopterist, which took place at Beesley's Point, N. J., on the 24th of November last. He was President of the American Entomological Society and Director of the Entomological Section of the Academy of National Sciences of Philadelphia, and one of the few honorary members of the Entomological Society of Ontario.

AN ANTS'-NEST COCCID FROM NEW MEXICO.

BY J. D. TINSLEY, MESILLA PARK, N. M.

Phenacoccus solenopsis, n. sp.

Adult ♀.—Length, 5 mm.; width, 3 mm.; many are smaller than this, but this seems to be the average size of the adult containing eggs. Colour yellowish-gray, although they appear light gray, from the mealy secretion which covers the body.

Shape, ellipsoidal, dorsal surface quite convex, ventral surface flat, extremities rather pointed. Segmentation quite distinct to naked eye. Extremely short lateral appendages, little projections just visible; caudal appendages a little longer.

Legs and antennæ pale brown.

Dorsum has no bands, marks or ridges. Antennæ (fig. 6) of 9 segments; segment 2 longest, one-third longer than 9, which is next; segment 3 next longest and about three-quarters the length of 2; segment 1 usually next, although it is sometimes longer than 3, and sometimes sub-equal with 5; segment 4 is shorter than 5; 5 is usually shorter than 3, but is always appreciably longer than 4, 6, 7, or 8; 6 and 7 usually sub-equal; 8 often sub-equal with 6 and 7, but usually shorter.

Formula 293 (15) 4 (67) 8. Segments of antennæ with moderately stout hairs, segments 1, 4, 6, 7 and 8 having one ring and the others two or more rings of hairs. See figure of antenna.

Legs.—Femur fairly stout, being nearly half as wide as long (width 116μ , length 282μ), surface bears numerous bristles; tibia fairly stout (width 42μ , length 282μ), equal in length to the femur, bears numerous fairly stout spines; tarsus conical, not quite one-half the length of the tibia (length 105μ), several spines and a pair of long, slender digitules; claw rather small (length 34μ), a pair of fairly stout, knobbed digitules.

Anal lobes and ring normal.

Ovisac.—The one ovisac which I have found was on the stem of *Kallstromia brachystylis*, Vail., and was about 7 mm. long, 4 mm. wide, and rather loose in texture.

Eggs and newly-hatched larvæ pale yellow; male as yet unknown.

Habitat.—In nests of *Solenopsis geminata*, Fab., about the roots of

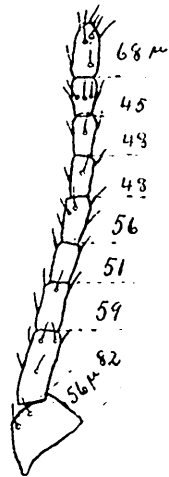


FIG. 6.

Bærhavia spicata, Choisy, and of *Kallstromia brachystylis*, Vail. These plants grow on the sandy mesa, in the atriplex belt, and on digging around their roots one is apt to find a nest of this ant; and on the roots, either just at the surface or up to the depth of an inch below, the Coccids are found. I have also found a few of them on the stems of *K. brachystylis*, which are prostrate. Found October 15th, 1897, on grounds of the N. M. College of Agriculture and Mechanic Arts.

Remarks.—This Coccid would at first thought be taken for *Phenacoccus helianthi*, Ckll., which occurs in the same locality and is found quite abundantly in early spring on a *Phacelia*, sp., but they differ in the following respects: *P. helianthi* has the caudal and lateral filaments quite prominent, and there are well-marked dorsal ridges; all these are absent in this species. In *helianthi*, segments 2 and 3 of the antennæ are usually longer than in this, 2 being about 90 μ , and 3, 80 μ , which is considerably longer than the third in this species; 9 is about the same length in both species. The formula of *helianthi* is 239 45 16 (78). This species is also broader and thicker in proportion to its length.

The ovisac of *helianthi* is also much more compact in texture than in this one. From *P. Americanae*, King and Ckll., it differs in having the legs and antennæ much larger, and in having ninth joint shorter than either 2 or 3.

This is the first Coccid found associated with ants in New Mexico.

BOOK NOTICE.

STORIES OF INSECT LIFE.—By Clarence Moores Weed. Ginn & Company, Publishers, Boston, U. S. A., and London; pp. 54, with many illustrations. Price, 25 cents.

The title indicates the nature of the book, and no one will mistake the figure of the well-known "Mourning Cloak" butterfly on the front cover, even though no attempt was made in the way of colour. This is for the young people, and just the thing for boys and girls who are romping and playing over the fields and meadows, securing that most important element in an education, health. The insects treated of are the most common, and this is a great advantage, because it is usually the things that are the nearest to us that we know the least about. Get the children to observe the common things carefully, and they will be all the better prepared to look after the uncommon, later on in life. I only wish that some philanthropist would buy up the whole edition of this work and present them to the school children of the country. Surely it would help to make better men and women of many boys and girls, and open up to them a world of wonders that are to be seen by any, no matter how lowly, provided they only know how and where to look. F. M. W.

Mailed February 4th, 1898.