

Stage IV.—Head dark gray with longitudinal black stripes, heavy black stripe crossing the apex of each lobe, continued by a light stripe to corner of the mouth; body dark gray, a geminate dorsal stripe and three lighter lateral lines.

Stage V.—Head gray, heavily striped with black, a little paler apically. Body gray, with subdorsal and spiracular lines of small black spots; two faint centrodorsal and three darker lateral lines.

Stage VI.—Head light gray, longitudinally lined with dark gray brown stripes, prominent darker brownish stripe on the apex of each lobe extending just over the front; a heavy black stripe extending outward from the jaws, after a short distance apparently merging into the lines of the face; body gray with centrodorsal, subdorsal and two lateral darker lines, the subdorsal being most prominent; dorsum with pale oval or diamond-shaped patches; the posterior portion of the fifth and the anterior of the sixth abdominal segments darker. Fringes pinkish white.

The larvae vary somewhat in shade of color but on the whole are quite constant. A single larva from ova laid by variety *paulina* produced var. *paulina*. The larva was quite similar to the larvae of the normal *lacrymosa*.

The food plant of both *C. ulalume* and *C. lacrymosa* is hickory.

Biological Notes on Elateridae and Melasidae (Col.)

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The following miscellaneous biological notes on insects of the families *Elateridae* and *Melasidae* have been assembled from field observations, rearings and collections by the author over a number of years, and from notes and specimens in the collection of the Bureau of Plant Industry by others, to whom due credit is given in the text.

Little is known of the habits of the adults of these two families, although they may be collected on foliage, flowers, trees and on the ground, sometimes beneath stones.

Larvae of some of the species are predaceous. This is particularly true of the species of *Adelocera*, *Chalcolepidius*, *Alaus* and *Hemirhipus*, which are decidedly beneficial. Certain species of other genera attack living plant tissue, roots, tubers, etc., and are destructive. Those attacking dead or decaying wood

tissue are of no special economic importance. Larvae of the predaceous forms, although confined to either deciduous trees or conifers in nature, will in captivity feed on any woodboring larvae, and will attain at maturity their natural characteristics and markings.

Many species transform in July and August, and remain in their pupal cells until April or May of the following year. During this time adults with the cast larval skins may be found together, thus furnishing a means of connecting the adults with the larvae. Adults also hibernate beneath bark, in crevices and in abandoned cells of various insects, and are sometimes attracted to light.

While the family *Elateridae* has not been considered as containing any particularly beneficial species, a more thorough study of the younger immature larval stages will no doubt reveal as many equally important predaceous species as those of the family *Cleridae*.

ELATERIDAE.

ADELOCERA IMPRESSICOLLIS Say. Harrisburg, Pennsylvania, VII-15; Rockville, Pennsylvania, XII-12. Rare. Hibernating in decayed cavity in living tree.

A. RORULENTA Lec. El Paso County, Colorado, VI-14, VII-12. A. B. Champlain.

A. BREVICORNIS Lec. State College, Pennsylvania, V-25; Charter Oak, Pennsylvania, V-21; J. N. Knull. Wales, Maine, VI-23; C. A. Frost. Rare.

A. OBTECTA Say. Pennsylvania, VI, VII. Franklin, New Hampshire, IX-18, larva and adult found in gallery of woodborer in apple twig. F. C. Craighead.

A. PROFUSA Cand. Cornwall, Connecticut, VII-15, K. F. Chamberlain; Cranebrook, British Columbia, VII-8, C. B. Garrett; Oregon, VIII-11, adults taken in Yellow Pine, W. D. Edmonston.

A. MARMORATA Fab. Rockville, III-3; Hummelstown, IV-29, Kirk and Knull; and Harrisburg, April, June, July; all in Pennsylvania. Larvae of this species found feeding on *Bostrychid* larvae (*Trichodesma gibbosa*) in Gum tree (*Nyssa sylvatica*).

A. DISCOIDEA Web. All localities in Pennsylvania. Common beneath bark of dead Pine.

A. AVITA Say. Hummelstown, III-29, VII-7, Kirk and Knull, and State College, V, both Pennsylvania. A number of adults reared from larvae collected beneath bark of dying and dead hickory trees. These trees were heavily infested with woodboring larvae which were the

hosts of *A. avita*. Have taken a number of adults on these trees at night during June and July.

A. AURORATA Say. State College, Pennsylvania, I-9, from beneath the bark of dead Pitch Pine (*Pinus rigida*), J. N. Knull; Pittsburgh, Pennsylvania, June.

LACON ILLIMIS Horn. Common at Tucson, Arizona. J. H. Shive.

ALAEUS LUSCIOUSUS Hope. Arizona. Larva reared by feeding it with various woodboring larvae.

A. ZUNIANUS Casey. Adults, larvae and pupae cut from Cerambycid galleries in fallen sycamore tree. East Catalina Mountains, Arizona, June 20, M. Christman.

A. OCULATUS Lec. One of our most common species. Adults and larvae may be found in decaying logs and stumps infested by various woodborers upon which they are predaceous. Very small larvae of this species were observed feeding upon the larvae of *Agrilus bilineatus* in chestnut, also a more mature larva of *A. oculatus* found feeding on larvae of *Buprestis rufipes* in *Liriodendron* stump, and also on larvae of *Chalcophorella campestris* in dead beech (*Fagus americana*) trunk. Have found larvae, about one-half grown, emerging from exit holes of a Cerambycid and *Tremex* sp. in hickory trees, where they crawl about on the trunk and re-enter other burrows in search of woodboring larvae. This species occurs only upon deciduous trees according to our notes.

A. MYOPS Fab. Occurs only in pine. Adults and larvae taken around Harrisburg, Pa., in pine trees and stumps infested with woodboring larvae. At Falls Church, Virginia, have taken hundreds of adults and larvae in yellow pine stumps infested with *Asemum moestum*.

A. MELANOPS Lec. Adults and larvae found commonly in stumps infested with *Chalcophora angulicollis*. Larvae predaceous on various woodboring larvae in dead coniferous trees. Oregon, VIII-8, adults, pupae and larvae in galleries in dead Douglas fir, W. D. Edmonston; El Paso County, Colorado, II-20, A. B. Champlain.

CHALCOLEPIDIUS VIRIDIPILIS Say. Rockville, Pennsylvania, VIII-8, collected at sour sap on oak tree in the evening, Daecke and Kirk; Baltimore, Maryland, July 30, V. A. E. Daecke.

C. SMARAGDINUS Lec. Reared from larvae taken from woodborer gallery in dead wood. Tucson, Arizona, VII-14, J. W. Shive; VIII-6, G. Hofer; Sabino Canyon, Arizona, VII-5, W. D. Edmonston.

C. BEHRENSI Cand. Tucson, Arizona, VII-31, J. W. Shive.

ATHOUS CUCULLATUS Say. Larva collected in dead log where it was feeding on woodboring larva. Adult reared.

LUDIUS HIEROGLYPHICUS Say. Adults collected feeding on small insects on foliage, Knull and Champlain.

HEMICREPIDIUS MEMNONIUS Hbst. Rockville, Pennsylvania, VII-24, under stones.

H. BILOBATUS Say. Harrisburg, Pa., VIII-27, taken on hickory trees at night.

PARALLELOSTETHUS ATTENUATUS Say. Common in rotten logs, feeding on decaying moist wood tissue. Common in vicinity of Harrisburg, Pa., July and August.

Genus ELATER. Larvae of this genus feed on decaying wood tissue. Adults frequent flowers.

ELATER VITIOSUS Lec. Adults and larvae with *Elater sayi* Lec. in decayed hole in living *Celtis occidentalis*, November 12. It is likely that these two forms may be the same species. Kirk and Champlain.

MEGAPENTHES LIMBALIS Hbst. Male of this species taken in coitu with black female that answers the description of *M. granulatus*, Falls Church, Virginia, VII-16, F. C. Craighead.

Genus MELANOTUS. Adults of local species hibernate in numbers in old logs beneath bark and in old galleries of woodboring insects, many being found in a single gallery.

PITYOBIUS ANGUINUS Lec. Grand Lake, Presque Isle County, Michigan, VII-2, R. J. Sim; Endeavor, Pennsylvania, VII-30, adult taken on fresh cut white pine log by J. N. Knull.

Genus LIMONIUS. Adults taken around Harrisburg, Pa., fly early in the spring and are found commonly on flowers.

MELASIDAE.

MELASIS PECTINICORNIS Melsh. Reared from dead birch (*Betula lenta*) and beech (*Fagus americana*), J. N. Knull and A. B. Champlain.

ISORHIPIS RUFICORNIS Say. Reared from dead chestnut, black birch, beech, linden and maple.

DELTOMETOPUS AMOENICORNIS Say. North East, Pennsylvania, VII-22, J. N. Knull; Tyrone, VII-26, J. G. Sanders; Jeanette, Klages; Harrisburg, VI-29, A. B. Champlain; and Landisburg, VI-30; all in Pennsylvania. Falls Church, Virginia, VI-24.

DROMAEOLUS CYLINDRICOLLIS Say. Hummelstown, reared from dead *Platanus occidentalis*, J. N. Knull; Ohio Pyle, VII-20, T. L. Guyton; Jeanette, VII, Klages; Clarks Valley, Dauphin County; all in Pennsylvania. Reared from dead standing Hemlock (*Tsuga canadensis*), A. B. Champlain.

D. STRIATUS Lec. Falls Church, Virginia, VII-31; Hummelstown, Pennsylvania, VII-17. Reared from dead chestnut stick.

FORNAX BADIUS Melsh. Harrisburg, Pa. Larva very plentiful in dead, decaying hickory. Adults on hickory trees at night, very active, crawling about and mating.

F. ORCHESIDES Newm. Harrisburg and Inglenook, Pennsylvania, larvae from decaying logs of willow and *Betula nigra* in swamps. The adults of this and other species in the genus are active only at night, and may be found mating, ovipositing and running over dead, decaying trees or logs at this time. During the daytime they crawl into cracks and crevices, where they remain concealed and inactive. The eggs of *F. orchesides* are placed in the cracks and crevices of decaying trees, stumps or logs, the wood of which is usually very soft and contains

considerable moisture. The larvae insinuate their way through the soft wood tissue, the gallery apparently closing up after their passage, and when ready for pupation they work their way to the sapwood, where cells are constructed. The cell is formed by the actions of the larva, and by an accumulation of soft particles rubbed loose. The pupal duration is about two weeks. The adults emerge during June, and vary greatly in size. The spring or clicking operation is developed in this species to some extent. They are able to spring slightly and click when held in the hand by the abdomen. Observation by Champlain, Knull and Kirk.

MICORRHAGUS HUMERALIS Say. New Cumberland, VI-28, Kirk and Champlain.

NEMATODES ATROPUS Say. Harrisburg, Pa., I-28, VII-9, and reared IV-14 from dead hickory stumps. Adults taken at night on dead hickory trees. Kirk and Champlain.

N. PENETRANS Lec. Harrisburg, Pa., VII-4, Kirk and Champlain.

SCHIZOPHILUS SUBRUFUS Rand. Very rare. Taken at night on hickory tree at Harrisburg, Kirk and Champlain (this specimen in collection of U. S. National Museum). East Falls Church, Virginia, III-6. Knull.

Change of Address.

Dr. Charles P. Alexander has removed from Urbana, Illinois, to Fernald Hall, Mass. Agricultural College, Amherst, Massachusetts.

Foundation of a Brazilian Entomological Society.

Professor Benedicto Raymundo has written to The American Entomological Society, announcing the foundation, on February 2, 1922, of the Sociedade Entomologica do Brasil, of which he is President. The Society is located at 15 Rua 1o de Março, Rio de Janeiro. We wish it prosperity and a long life.

Cuvier's Magnifying Glass.

At the meeting of the Entomological Society of France, January 11, 1922, Dr. E. Gobert presented to the Society the magnifying glass (loupe) belonging to Cuvier and gave its origin in the following terms: This glass belonged to Cuvier, died in 1832. Dying, he left it to Audouin, who died in 1841. Audouin confided it to Leon Dufour, celebrated entomologist of St. Sever (Landes). This latter dying, left it to E. Perris, his favorite pupil. E. Perris, in his turn, confided it to me as his pupil and friend. If the Society accepts it, I shall be glad to offer it as a souvenir and in the name of the three entomologists of The Landes.

This glass will be preserved as a precious relic in the archives of the Society. (Bull. Soc. Ent. France, 1922, no. 1, p. 6).



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