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THE IMMATURE STAGES OF *TROPIDOSTEPTES CARDINALIS* UHLER (CAPSIDAE, HEMIPTERA).¹

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On June 10, 1908, Prof. C. R. Crosby first noticed that the leaves of an ash tree near the Cornell Insectary were being slightly injured by a Capsid which by that date had become adult. In the early spring of 1910 he prepared descriptions of the stages from nymphs reared on twigs forced out in the insectary, but no adults were obtained. In the spring of 1913 Professor Crosby called the writer's attention to the problem and the study of the immature stages of the insect was again taken up. The nymphs were redescribed and adults were obtained which were identified as *Tropidosteptes cardinalis* Uhler.

Detailed observations have not been made on the length of time required for the nymphs to complete their growth on the trees but on May 23, 1914, two first-stage nymphs were still present and, on June 4, the first fifth-stage nymph was observed. The insect spends the winter in the egg stage. The eggs are probably inserted during late summer into the smaller twigs but have not been definitely located. The following descriptions of the nymphal stages are based on notes made during the spring of 1914 and of 1915. The drawings were made by the writer with the exception of that of the fourth nymphal stage which was made by Miss Anna C. Stryke. The injury to the foliage consists of a yellow spotting or stippling which in more severe cases causes the leaves to crumple in places.

Stage I (Fig. 1): Length, .85 mm.; greatest width of abdomen, .45 mm. Ground color reddish; head strongly suffused with dusky; thorax with a large

¹ Contribution from the Department of Entomology of Cornell University.

dusky spot on each segment, not reaching the lateral margin and interrupted by a median red line running the length of the thorax. This latter crosses, for a short distance, a procurved line of red on the vertex which extends almost to the cephalic border of the eyes. Abdomen red, sometimes mottled with red of a darker shade; opening of dorsal gland indicated by a small dusky spot. Eyes dark reddish; antennæ pale, suffused slightly with dusky, paler at the tip of the segments, whole of last segment reddish and slightly swollen. Legs pale, suffused slightly with dusky, tarsi slightly darker. Beak same as legs, extreme tip somewhat darker.

Stage II (Fig. 2): Length, 1.3 mm.; greatest width of abdomen, .7 mm. Ground color of head and thorax shining dark red, but strongly suffused with blackish, except the lateral margins, narrowly, of the thorax and a narrow median line which is as in preceding stage. Abdomen shining dark red, opening of dorsal gland indicated by a dusky spot. Eyes dark reddish; antennæ, beak and legs about the same as in preceding stage.

Stage III (Fig. 3): Length, 1.85 mm.; greatest width of abdomen, .975 mm. Head and thorax now wholly suffused with blackish except for a narrow reddish median line which terminates on the vertex in a procurved line extending towards either eye. Abdomen shining dark red, opening of dorsal gland indicated by a blackish spot. Eyes dark reddish, antennæ pale yellowish, slightly grayish distally, terminal segment wholly reddish. Legs pale yellowish washed with grayish, much as in preceding stages; tarsi slightly dusky. Wing-pads just becoming apparent on meso- and meta-thorax.

Stage IV (Fig. 4): Length, 2.2 mm.; greatest width, across wing-pads, 1.42 mm., giving body a very broad appearance. Head and thorax as in preceding stage. First three abdominal segments and a transverse spot on fourth segment on either side of the gland blackish. Rest of abdomen red. Eyes dark reddish. Antennæ as in preceding stage. Legs pale yellowish, terminal segment of tarsi suffused with dusky; hind femora with two rather faint dusky rings near the tip. Under side of insect dark red; basal segment and extreme tip of beak blackish, remainder slightly tinged with pinkish. Wing-pads extend back to third abdominal segment.

Stage V (Fig. 5): Length, 2.8 mm.; greatest width, across wing-pads, 1.8 mm. Head and thorax, including wing-pads, now shining black, except for the narrow, red, median line which meets a procurved line of the same color on the head, as in the preceding stages. Abdomen shining black, hind border of each segment broadly red. Eyes very dark reddish. First three segments of the antennæ, yellowish, suffused with dusky, especially at center of first segment and at tip and base of segments two and three; fourth segment red. Legs yellowish, the second segment of the tarsi, tip of tibiæ, a band on tibiæ, and two more or less distinct bands on femora, dusky. Wing-pads extend back almost to sixth abdominal segment.

Adult (Fig. 6)—*Female*: Length, about 5.5 mm.; greatest width, about 2.5 mm. Dark red with a broad black stripe extending from hind border of pronotum, but not including scutellum, to tip of wings. A small whitish spot on membrane where it meets tip of cuneus. Dorsum bare, finely punctate. Head shining, not punctate. Front of head with a black median stripe starting about even with antennal tubercles and running a short distance onto first segment of beak. Eyes black. Antennæ shining black, clothed with fine, short, golden hairs. Legs, except coxæ and trochanters, shining black; fore and middle femora with a brownish

yellow band near tip; base of tarsi slightly lighter; coxæ and trochanters yellowish or pinkish. Thorax beneath pinkish; venter reddish. First segment of beak brownish yellow, remainder blackish.

Male, about 5 mm. in length; similar to female.

PROTHETELY IN THE ELATERID GENUS *MELANOTUS*.

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Two papers on the abnormal phenomenon termed prothetely appeared last year in *PSYCHE*. In one of these papers¹ six bibliographical references were given on the subject and in the other paper² a seventh was added to this list. Dr. Adam Böving brought another interesting paper on the same subject, published in 1914,³ to my attention, and in looking over the literature two more papers were located.^{4,5}

The present paper deals with a very striking case observed at the United States Entomological Laboratory in Hagerstown. The subject was *Melanotus communis* Gyll.

On May 18, 1915, Mr. J. J. Davis sent the writer fifty-eight living larvæ of *Melanotus communis* Gyll., collected near Cincinnati, Ohio, with the note that they were found damaging corn on river bottom land. These larvæ were shipped in salve boxes filled with moist Sphagnum moss, and when received were isolated in similar boxes partly filled with moist earth and fed seed corn. The boxes were all placed in galvanized iron trays and the contents examined, cast skins removed, soil moistened when necessary, and new food supplied, weekly.⁶

Strickland⁷ suggested as an explanation of the phenomenon of prothetely that it "is usually caused by keeping the larvæ at an abnormally high temperature." The temperature to which this particular larva was subjected could not have varied to any appre-

¹ Williams, F. X., 1914, *PSYCHE*, Vol. XXI, p. 126.

² Barber, H. S., 1914, *PSYCHE*, Vol. XXI, p. 190.

³ Kemner, A., 1914, *Ent. Tidsk.* (Swedish), Vol. XXV, pt. 1-2, pp. 87-95.

⁴ Tragardh, I., 1912, *Fauna och Flora*, pp. 245-255.

⁵ Peyerimhoff, P. de, 1911, *Bull. Soc. Ent. France*, p. 327.

⁶ The writer was ably assisted in this work by Messrs. H. L. Parker and W. E. Pennington of the Station staff.

⁷ Strickland, E. H., 1911, *Biol. Bull.*, Vol. 21, pp. 313-327.

LEONARD—*Tropidosteptes cardinalis*.