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IMMATURE STAGES OF *ANACAMPTODES HERSE* (SCHAUS) (GEOMETRIDAE) ON SOYBEAN IN HONDURAS

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ABSTRACT. *Anacamptodes herse* is recorded from Honduras for the first time. The larvae were reared on soybean and are described with the pupa.

The genus *Anacamptodes* contains 24 species distributed throughout the New World from Canada to Costa Rica (Rindge, 1966; McGuffin, 1977). Three species of *Anacamptodes* are recorded as pests (Dixon, 1982; Furniss & Carolin, 1977; Zimmerman, 1958), but none is a problem in Honduras. Geometrids are important defoliators of soybeans in other parts of the world. Panizzi et al. (1980) listed four genera attacking soybeans in Brazil (*Iridopsis, Oxydia, Semiothisa,* and *Stenalcidia*). Park et al. (1978) considered six genera important in Japan (*Ascotis, Biston, Bizia, Scopula, Serraca,* and *Ectropis*).

Rindge (1966) reported *Anacamptodes herse* (Schaus) from Mexico and Costa Rica while stating the immature stages were unknown. This paper describes the mature larva and pupa of *A. herse* and establishes its occurrence in Honduras. Larvae were initially swept from and reared on soybean, *Glycine max* (L.) Merrill, outside the city of La Paz, department of La Paz, Honduras. These larvae were associated with a high population of *Anticarsia gemmatalis* Hbn. (Noctuidae) but were not causing economic damage.

METHODS AND MATERIALS

The larvae were described from three shed skin preparations with associated adults in addition to larvae preserved in alcohol. A male (genitalia slide #159, shed skin and mandible slide #166, S. Passoa coll.) and two females (genitalia slides #145, 285, shed skin and mandible slides 116, 221, S. Passoa coll.) were examined. Color photographs also aided in the descriptions.

Collection data are as follows: Honduras, Jutiapa (near Danli), 1-IX-1979, larva on soybean leaf, coll. E. M. de Vasquez, mandible slide #169, S. Passoa coll.; Honduras, La Paz (near Comayagua), 14-VIII-1980, larva on soybean, mandible slide #170, S. Passoa coll., male and female emerged 28-VIII-1980, coll. S. Passoa; Honduras, El Zamorano, Escuela Agricola Panamericana, 9-IX-1982, larva on soybean, female emerged 24-IX-1982, coll. S. Passoa.

The shed skins of the last instar larvae after pupation were first softened in 10% potassium hydroxide for 24 hours. Later they were washed in acid alcohol followed by increasing alcohol concentrations

until absolute alcohol was reached. At this point the head was removed. The epicrania, frontal area, mandibles, and hypopharyngeal complex were separated from each other. Slide mounted material was cleared in clove oil and mounted in balsam. Two of the three shed skins were stained in mercurochrome and slide mounted. The other was preserved in alcohol.

RESULTS

Larva: Coloration of living material: head reticulated with light brown spots on a cream ground, top of vertex tipped with brown, middle of frontal area often with a black spot, body faintly lined with long dark green-brown and white stripes on a light green ground, thoracic legs and all spiracles both tan-brown, A2 with a black dorsal projection usually tipping seta D2, often another black spotted tubercle on A2 behind and below the spiracle touching L1, D1 of A8 tuberculate and black (Figs. 1, 12).

Early instar larva: yellow-green with a tan head, dorsal tubercle of A2 present but reduced in size, lateral tubercles absent.

Chaetotaxy: Head with P2 directly above P1, A2 in front and below A3 and above A1, L1 above O2, O1 centrally located between stemmata, adfrontals with AF1 and AF2 widely separated, F1 above and behind C2, C1 close to C2, labrum with L1 and L2 longer than L3, M1, M2, and M3 as shown (Figs. 7, 8). Prothorax with XD1, XD2, D1, and D2 approximately equidistant from each other, SD1 and SD2 closely spaced, L1 above and in front of L2, SV group bisetose (Fig. 10). Mesothorax with D1, D2, SD1, and SD2 in a vertical line, D2 and SD2 widely separated, L3 longer than L1 or L2, one SV seta present (Fig. 11). Second abdominal segment with D1 and D2 level with each other, SD1 in front of the spiracle, L1 behind the spiracle, L2 above L3, SV2 absent, SV3 above and behind SV4, SV4 above SV1 (Fig. 12). Sixth abdominal segment with D1 above D2, SD1 in front of spiracle, L1 behind it, L2 directly above L3 (Fig. 13), five SV setae present on A6 proleg. Eighth abdominal segment with D setae as in A6, SD1 closer to the spiracle, L1 equidistant from L2 and SV3, one SV seta present (Fig. 14). Ninth abdominal segment with D1 in front and below D2, SD1 above L1, L1 above SV1 (Fig. 14). Tenth segment with SD1 and D1 widely spaced, L1 and D2 close together, all four setae on the anal shield, CD1 above CD2, both on the paraproct, LG3 above LG2 and LG1, CP1 above CP2 (Fig. 14). One ventral seta is present on each segment, SV2 absent on A1 (Fig. 20).

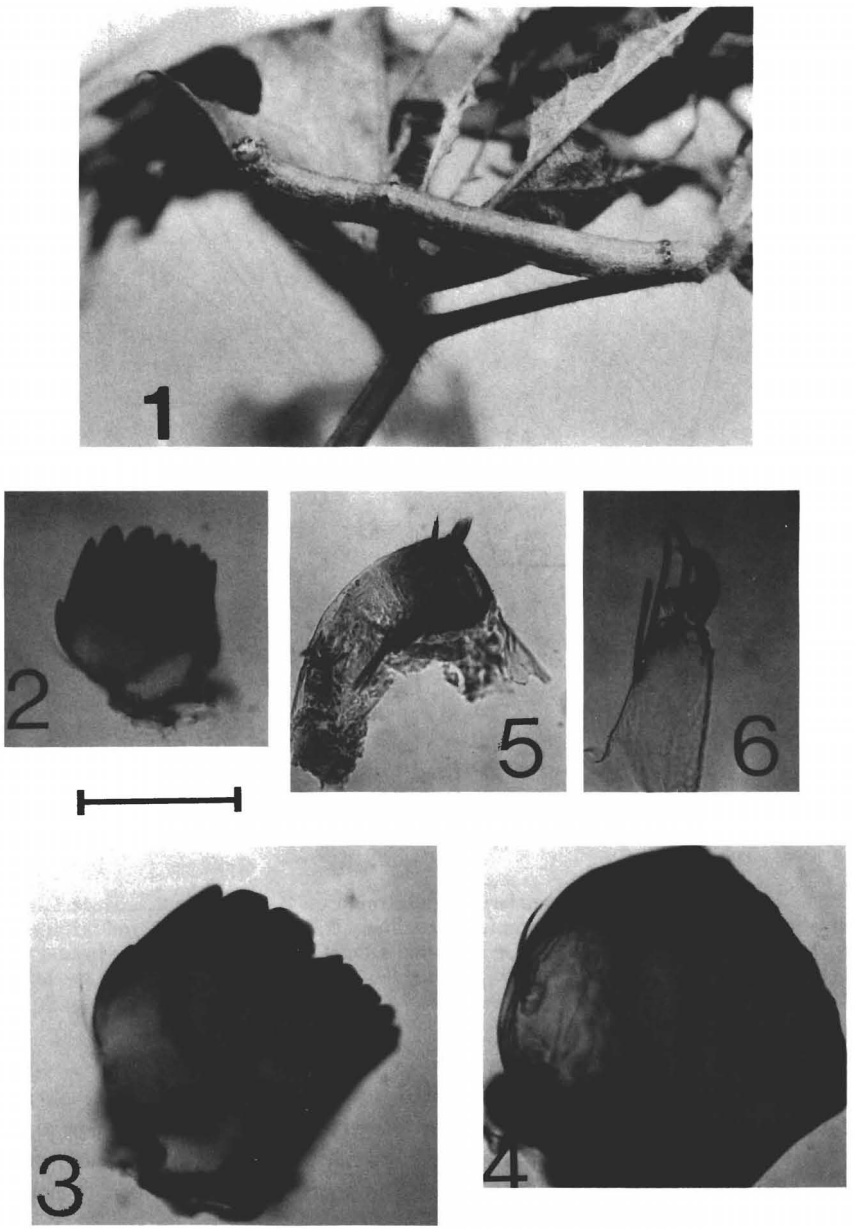
Mouthparts: mandible shape variable, usually with eight teeth (Figs. 2, 3), sometimes all worn smooth (Fig. 4), first four teeth larger than the others, lateral tooth and two mandibular setae present. Hypopharyngeal complex with labial palps about as long as spinneret, small stipular setae present, proximomedial region membranous sparsely covered with fine spines (Figs. 5, 9).

General: last instar larva about 22 mm long, setae arising from small black chalazae, skin granulated with short truncate cones (Fig. 18), tarsal claw rounded with three clubbed setae at its base (Fig. 6), A6 with crochets incompletely formed into two groups in early instar larvae (Fig. 19). Mature larvae with biordinal mesoseries in unbroken band.

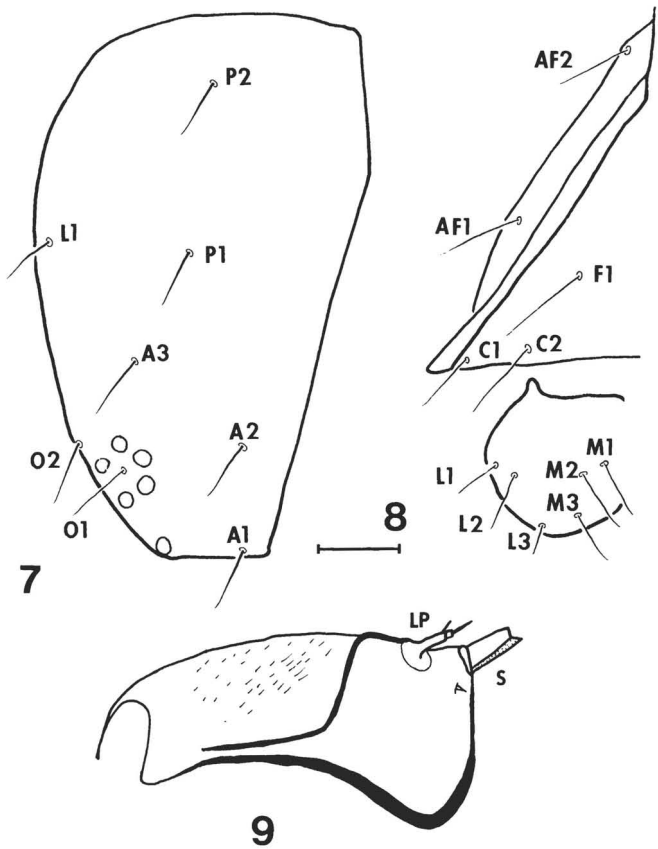
Pupa: With large eyes, semicircular labrum, oblong labial palps, and maxillae extending with antennae to caudal margin of wings, prothoracic femur exposed, prothoracic leg extending about ¾ length of maxillae, mesothoracic leg ending near antennae (Fig. 15). Prothoracic callosity oval and spinose (Fig. 16). Cremaster with two diverging spines forming "V" between them, usually broken (Fig. 17), but each spine actually bifurcate at tip. Abdominal segments punctate. Length varies, 12 mm (male) to 16 mm (female), colored reddish brown.

DISCUSSION

The position of the protuberances on A2 is an important character separating *Anacamptodes* from its close relatives (Heitzman, 1982),



FIGS. 1–6. *Anacamptodes herse* larva: **1,** dorsolateral view of mature larva showing defoliation of soybean leaf in the background; **2,** mandible with all teeth sharp; **3,** mandible with teeth partially worn; **4,** mandible with teeth worn smooth; **5,** hypopharyngeal complex; **6,** tarsal claw and its setae. (Scale line = 5.5 mm, 0.4 mm, 0.3 mm, 0.3 mm, 0.4 mm, 0.5 mm, respectively)



FIGS. 7–9. *Anacamptodes herse* larval head structures: **7,** epicrania; **8,** adfrontal area and labrum; **9,** hypopharyngeal complex; scale line = 0.25 mm, 0.25 mm, and 0.15 mm, respectively. (A = anterior setae; AF = adfrontal setae; C = clypeal setae; F = frontal setae; L = lateral setae; LP = labial palps; M = medial setae; O = ocular setae; P = posterior setae; S = spinneret)

but their size and shape is variable and may be missing in early instars. Younger larvae of *A. herse* have the D2 protuberance reduced in size and the L2 protuberance absent. Similar results were reported by Comstock and Dammers (1946) studying *Anacamptodes fragilaria* (Gross-

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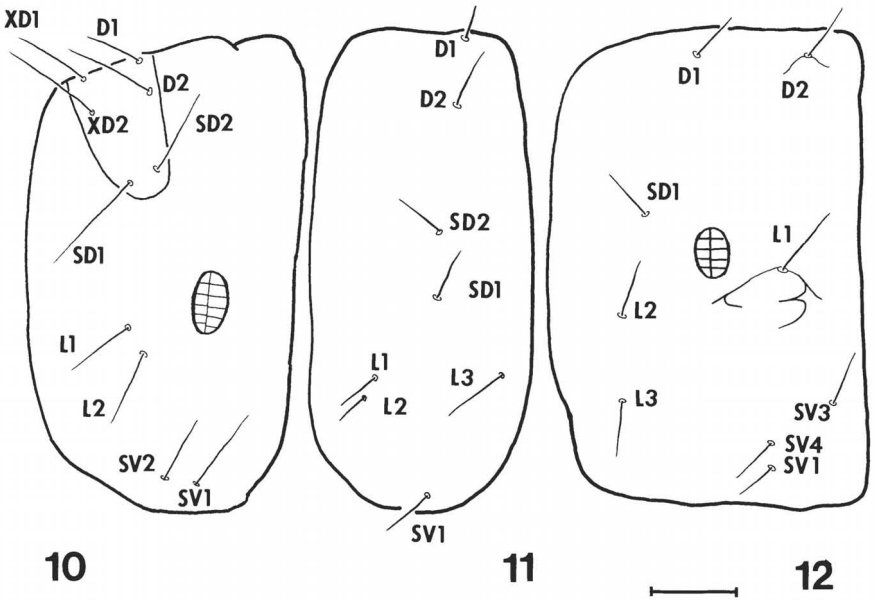
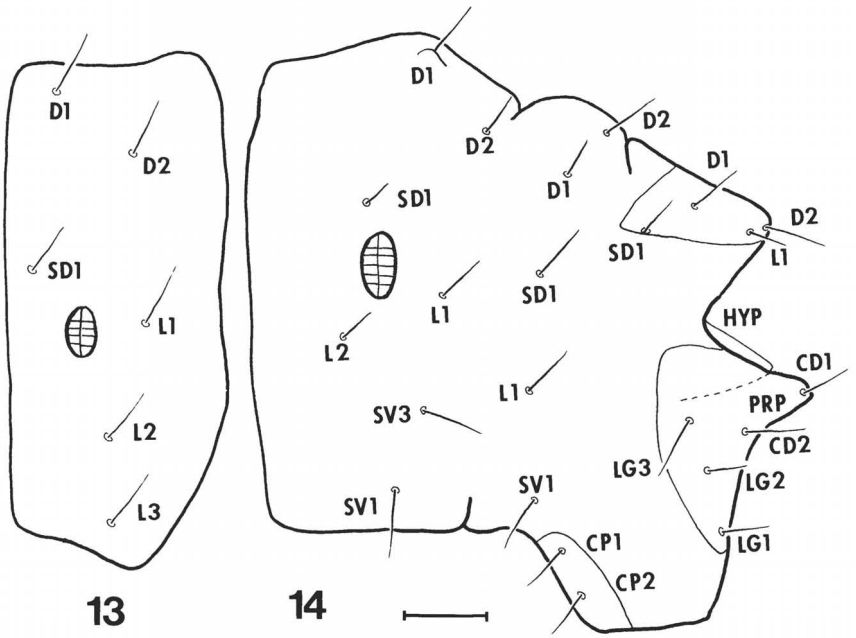
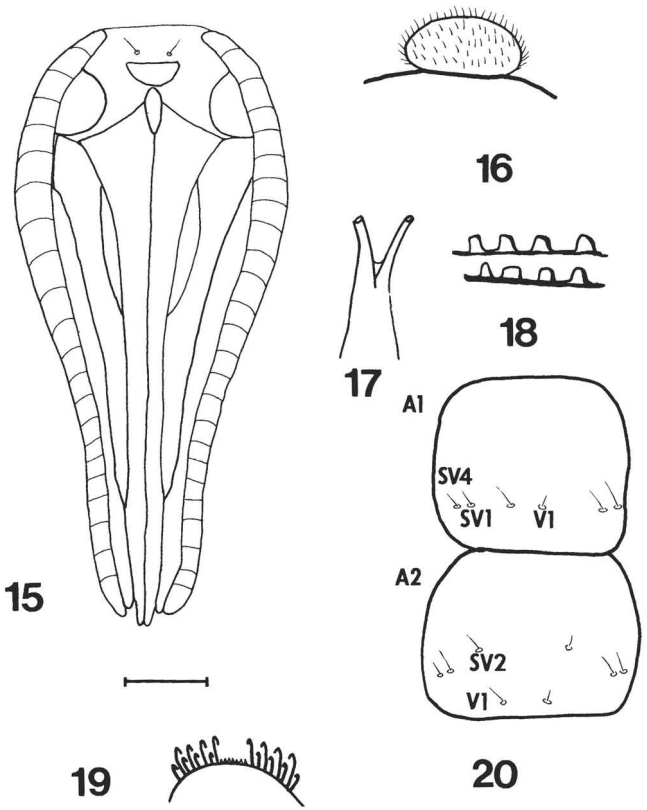
FIGS. 13, 14. *Anacamptodes herse* chaetotaxy continued: **13,** Anterior portion of A6; **14,** Segments 8, 9, and 10. Scale line = 0.3 mm. (CD = dorsal coxal setae; CP = posterior coxal setae; D = dorsal setae; HYP = hypoproct; L = lateral setae; LG = lateral setae of the proleg; PRP = paraprocts; SD = subdorsal setae; SP = spiracle; SV = subventral setae)



FIGS. 10–12. *Anacamptodes herse* chaetotaxy: **10,** prothorax; **11,** mesothorax; **12,** 2nd abdominal segment; scale line = 0.3 mm. (A = abdominal segment; D = dorsal setae; L = lateral setae; SD = subdorsal setae; SP = spiracle; SV = subventral; XD = prothoracic dorsal setae)





FIGS. 15–20. Details of *Anacamptodes herse* larva and pupa: **15,** pupa, ventral view; **16,** prothoracic callosity; **17,** pupal cremaster; **18,** skin of larva at 400×; **19,** crochets of A6; **20,** ventral view of A1 and A2; scale line = 1.4 mm, 0.4 mm, 0.7 mm, 0.025 mm, 0.4 mm, and 0.5 mm, respectively. (SV = subventral setae; V = ventral setae)

beck). Only the last instars have the protuberances present, earlier instars lack them. Two separate rearings of the related *A. defectaria* (Gn.) from Gainesville, Florida, show a variation in the size and shape of D1 on A2. Some have a large upright conical protuberance, while others show a more flattened ridge-like structure. Given the above variation in the genus, it would be difficult to generalize and present the typical form of *A. herse* without a large series of larvae. McGuffin (1967) described *Anacamptodes angulata* Rindge from Mexico on *Artemisia* sp. as having "a dorsal ridge on A2 between setae D2, seta D1 on A8 prominently tuberculate," which is similar to the situation in *A. herse*. Color pattern can also be variable. Furniss and Barr (1967), cited by McGuffin (1977), reported four color forms of *A. clavinaria profanata* (Barnes and McD.) in the field. This variability in structure and color makes specific identification difficult. McGuffin (1977) relied

on distribution and hosts to separate the Canadian species of *Anacamptodes* instead of larval morphology.

The chaetotaxy is also very variable. The following setae can be more anterior than illustrated: A1 (head); SV2, SV1 (T1); D1, SV4, SV1 (A1); and L3 (A6). These setae can be more posterior than illustrated: P setae (head); D2 (A1); SD1 (A6) and SV1 (A8). The spiracle of A6 may lie directly above L2, more posterior than shown. M2 and L3 (T2) can be more dorsad, L1 (A6, A8) more ventrad, than the normal position. Finally, the AF, SD (T1), and L (T1) setae can be closer to each other than illustrated.

Little information is available for other tropical species of *Anacamptodes*, but an important similarity is shared by the Canadian species of *Anacamptodes* and *A. herse* concerning the relative length of the D setae on A3 compared to the spiracle size on that segment. In both cases the D setae are as long, or longer, than the spiracle.

It is worth noting that an as yet unidentified *Anacamptodes* was reared on soybean at Zamorano, Honduras. Unfortunately, no information is available on its early stages. Therefore, collectors wishing a positive specific determination must depend on rearing an adult male. The male genitalia of *A. herse* are distinctive (Rindge, 1966).

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