

## LARVA AND PUPA OF *AMARYGMUS MORIO* FROM HAWAII (COLEOPTERA: TENEBRIONIDAE)

T. J. SPILMAN<sup>1,2</sup>

Larvae of a tenebrionid were found in a decayed mango tree trunk at Hilo, Hawaii, by E. B. Fryer, 22, V, 53. Some were reared to pupae and adult; then all three stages were sent to the U. S. National Museum. I have identified the adults as *Amarygmus morio* (F.). The immature stages are described below for the first time.

This species was reported twice from the Hawaiian Islands as *Amarygmus* near *morio*. Maehler (1952:367) reported that specimens were found at Kuhio Wharf, Hilo, 1, XI, 51 in aerial prop-roots of pandanus and added that this might be the same as that taken at Pearl Harbor on Oahu two years earlier. Swezey (1953:11) reported specimens found near the fruit fly insectary at Hilo, 22, VI, 52. Undoubtedly *Amarygmus morio* was introduced accidentally into Hawaii. The species had been reported previously from Australia, Tasmania, New Guinea, Ceram, Aru, New Britain, and New Ireland.

### THE LARVA

*Body* elongate, cylindrical, wireworm-like; length, 20–24 mm; surface shiny, strongly chitinated and pigmented, mostly yellow-brown; with a few long, slender setae on most body areas.

*Head* is globular, bent downward (Fig. 1). Coarse, sparse punctures dorsally and laterally; small setae laterally on border just behind clypeus; long, sparse setae on lateral areas. *Frontal sulcus* with basal part of moderate length, then strongly bifurcating, each branch angled anteriorly, then again bifurcating with one branch to lateral area of clypeofrontal suture and one branch to lateral border of head capsule just posterior to antenna. *Eye spots* paired on each side; dorsal spot larger than ventral and farther from base of antenna. *Clypeus* smooth, impunctate, with 4 long setae. *Labrum* smooth, impunctate, length subequal to length of clypeus; with pair of widely separated, long setae on disc, anterior border with 2 shorter setae medially and 3 long setae laterally. *Labrum* with ventral surface (Fig. 4) having anterior border with 4 long, coarse setae laterally and 2 coarse setae medially, with papilla just lateral to base of each medial seta; central area with 3 rows of papillae, 2 in first row, 2 in second row, and 4 smaller papillae in posterior row then in order posteriorly, with 2 widely spaced rows of dense, coarse, medioposteriorly directed setae, between which are

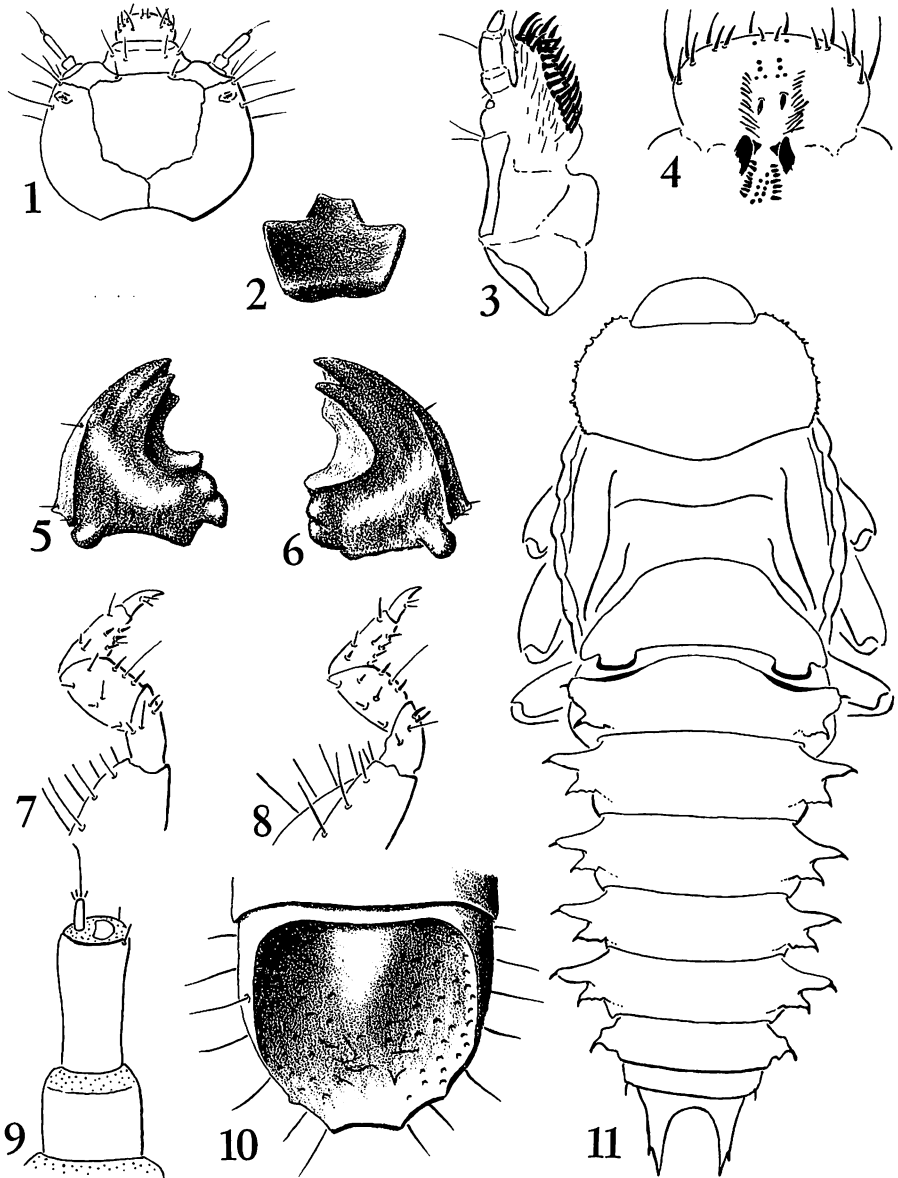
<sup>1</sup>Entomology Research Division, Agricultural Research Service, U.S. Department of Agriculture.

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2 very coarse setae, then with a pair of raised, angulate, broad tormae, then with 2 longitudinal rows of very short, coarse, truncate setae lateral to 2 longitudinal rows of 8 small papillae. *Mandible* (Figs. 5, 6) with lateral surface rounded apically and with triangular excavation on basal two-thirds, with 1 seta on each corner of excavation; apex trifid, dorsal tooth more distinct on right mandible than on left; dorsal cutting edge without tooth; molar area large, protruding, with 3 heavy ridges. *Maxilla* (Fig. 3) with mala having 2 longitudinal rows of coarse, dense setae on medial area and having dense, long, slender setae on dorsal surface; palpus with apex of 2nd segment on level of apex of mala. *Labium* with ligula pronounced, digitiform; hypopharyngeal sclerome (Fig. 2) heavily sclerotized, projecting, with lateral borders divergent anteriorly, with medial cusp broad and irregularly truncate, with surface transversely concave except for transverse carina near posterior border. *Antenna* (Fig. 9) with 1st segment without setae and two-thirds length of 2nd; 2nd with very small setae on apical border, apex with large reniform, distinctly delimited, white area; 3rd very small, styloform, with one long apical seta and few very small setae on apical border.

*Body.* *Terga* with small irregular wrinkles. (In the following, 1st, 2nd, etc., refer to abdominal segments.) Prothoracic and 1st through 7th with coarse, shallow punctures, these punctures on anterior borders of anterior segments and gradually becoming more numerous and covering a larger area on posterior segments. Prothoracic with anterior border having 6 long, slender setae, with posterior border having 4 long, slender setae placed laterally; mesothoracic, metathoracic, and 1st through 7th with 6 long, slender setae on posterior border and 1 long, slender seta on anterolateral corner. Mesothoracic, metathoracic, and 1st through 8th with indistinct longitudinal lateral line becoming slightly more obvious on posterior segments and with dark, weakly curved, clavate fascia just dorsal to lateral line. Spiracles elliptical, obliquely placed with ventral end directed slightly posteriorly. The 9th (Fig. 10) with deep concavity dorsally, its border transverse anteriorly and arcuate laterally and posteriorly, with 4 small, blunt teeth posteriorly; concavity with weak convexity medio-anteriorly, with dense, coarse punctures except medially; ventrally convex with long, sparse, slender setae and with dense, coarse punctures antero-laterally. *Sterna* impunctate, weakly pigmented; 1st through 8th with anterior and posterior transverse rows of long, slender setae, lateral seta in each posterior row longer than others; 1st with 4 setae in both rows; 2nd through 7th with 2 in anterior row, each laterally placed, and 4 in posterior row, each pair laterally placed; 8th with 2 in anterior row, each laterally placed and 5 in posterior row, all equally spaced; 9th forming flap-like operculum, with a few short, slender setae; posterior opening with 2 distinct papillae, each posteriorly sclerotized and with small setae.

*Legs.* Sparsely setose; not modified for digging; prothoracic only



Figs. 1-11. *Amarygnus morio*; 1-10, larva; 11, pupa. 1, head capsule, dorsal view. 2, hypopharyngeal sclerome, dorsal view. 3, left mandible, dorsal view. 4, labrum, ventral view. 5, left mandible, dorsal view. 6, right mandible, dorsal view. 7, antenna. 8, left prothoracic leg, posterior view. 9, left mesothoracic leg, posterior view. 10, 9th abdominal tergum, dorsal view. 11, whole pupa, dorsal view.

slightly stouter than others and its setae slightly coarser (Figs. 7, 8). Coxae with long, slender setae on anterior and posterior dorsal borders. Trochanters with 2 short setae on ventral surface. Profemur with 2 short, coarse setae and 1 long, slender seta on ventral surface. Protibiotarsus with 3 short, coarse setae on ventral surface, and 1 short, coarse seta on posterior surface. Mesofemur and metafemur with 2 short, coarse setae and 1 long, slender seta on ventral surface, and 2 short, coarse setae on posterior surface. Mesotibiotarsus and metatibiotarsus with 4 short, coarse setae on ventral surface, and 2 short, coarse, setae on posterior surface. Claws with 2 short ventral setae.

This larva is similar to two other described tenebrionid larvae: *Plesiophthalmus nigrocyaneus* Motschulsky from Japan, described by Fukuda, Kurosa, and Hayashi (1959:485, figs.), and *Meracantha contracta* (Palisot) from the United States, described by Wickham (1896:119, pl. 4, fig. 2) and Hyslop (1915:44, pl. 4, figs. a-j). The three larvae are most easily separated by counting the coarse setae on the legs. In the following tabulation the numbers of coarse setae on the ventral and posterior surfaces are separated by hyphens for the profemur, protibiotarsus, mesofemur and metafemur, and mesotibiotarsus and metatibiotarsus, in that order, for each species: *Amarygmus morio*, 2—0, 3—1, 2—2, 4—2; *Plesiophthalmus nigrocyaneus*, 2—2, 3—5, 3—2, 3—7; *Meracantha contracta*, 2—2, 2—3, 2—2, 2—4. In addition, the larvae of the last two species differ from the larva of the first in the following ways: Setae, punctures, and pigmentation stronger and coarser overall; labrum with ventral surface having papillae near anterior border closer to long lateral setae than to medial setae, having central area with 4 papillae in anterior row, 2 in medial row, and 4 smaller papillae in posterior row, and having large, arcuate, coarse transverse torma just anterior to usual pair of arcuate tormae; concavity of 9th tergum with surface evenly concave, with anterior border arcuate and with posterior border having blunt teeth absent or minute.

It is obvious from these comparisons that the larvae of *Meracantha contracta* and *Plesiophthalmus nigrocyaneus* have much more in common than does either with *Amarygmus morio*; this seems paradoxical because the first is placed in the tribe Meracanthini and the second and third in the tribe Amarygmini. However, those tribes were established more than 100 years ago when evidence from larvae was not included in the classification and when adult morphological characteristics were used that today would probably be given only generic rank.

#### THE PUPA

Without obvious setae; posterior segments with a few minute setae (Fig. 11).

*Pronotum*. Similar in shape to adult pronotum. Lateral border with approximately 25 very short tubercles; these, more numerous posteriorly.

*Abdomen.* Terga broad, most with lateral processes which project laterally on posterior segments and more dorsally on anterior segments. The 1st with posterior border near lateral corner having broad, truncate, heavily sclerotized lobe forming anterior border of gin trap. 2nd with anterior border near lateral corner having weakly incurved, sharp, heavily sclerotized edge forming posterior border of gin trap. Lateral process of 2nd with 2 projections, the anterior broad with apical spinous seta and converging posteriorly to posterior projection, the converging border not smooth; posterior projection, with apical spinous seta and with rough posterior border. Lateral processes of 3rd through 6th like that of 2nd except anterior projection is large tubercle. Lateral process of 7th broad, with long spinous seta. 8th without lateral process, with short ventrally directed spine. 9th with pair of long, acute, diverging urogomphi, each with small spine laterally.

As in larvae, the pupa of *Meracantha contracta*, described by Hyslop (1915:46, Fig. 1), is similar to the pupa of *Amarygmus morio*. However, the former has the following abdominal characteristics not present in the latter: All lateral processes blunter; 7th tergum evenly arcuate laterally and without processes. The pupa of *Plesiophthalmus nigrocyanus* has not been described and specimens are not available to me.

#### LITERATURE CITED

- FUKUDA, A., K. KUROSA, AND N. HAYASHI. 1959. COLEOPTERA, pp. 392-545, illus. In T. Esaki, T. Kawada, N. Yuasa, N. Ishii, and T. Motoki, editors, Illustrated insect larvae of Japan. (In Japanese.) Hokuryukan Co., Ltd. Tokyo.,
- HYSLOP, J. A. 1915. Observations on the life history of *Meracantha contracta* (Beauv.). PSYCHE 22 (2): 44-48, 2 figs., pl. 4.
- MAEHLER, K. L. 1952. A new tenebrionid beetle. PROC. HAW. ENT. SOC. 1951 (1952) 14 (3): 367.
- SWEZEY, O. H. 1953. *Amarygmus* near *morio* (F.). IBID. 1952 (1953) 15 (1): 11.
- WICKHAM, H. F. 1896. Description of the larvae of some heteromerous and rhyngophorus beetles. JOUR. NEW YORK ENT. SOC. 4 (3): 118-124, pl. 4, figs. 1-6.