

DESCRIPTIONS OF THE IMMATURE STAGES OF FIVE MEXICAN SPECIES
OF GYMNETINI (COLEOPTERA: SCARABAEIDAE: CETONIINAE)

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Abstract.—The third instar larva of *Amithao haematopus* (Burmeister) from Chiapas, México, is described as the first description of a larva in this genus. The third instar larvae and pupa of *Marmarina maculosa* (Olivier) from Veracruz, México are described. The third instar larvae and pupa of *Hoplopyga liturata* (Olivier) from Veracruz are described, including comments on first and second instar larvae. The third instar larva of *Gymnetis hebraica difficilis* Burmeister from Veracruz, is described. The larva of *Gymnetis flavomarginata sallei* Schaum is redescribed with specimens from Veracruz, including differences with second and first instar larvae and the description of the pupa. All of these species are included in a key to the larvae of New World Gymnetini, which now has 14 species in nine genera.

Resumen.—Se describe la larva de tercer estadio de *Amithao haematopus* (Burmeister) de Chiapas, México, que representa la primera descripción larvaria para el género. Se describen la larva de tercer estadio y la pupa de *Marmarina maculosa* (Olivier) de Veracruz, México. Se describen la larva y la pupa de *Hoplopyga liturata* (Olivier) con ejemplares de Veracruz, incluyendo comentarios sobre las larvas de primero y segundo estadio. Se describe la larva de tercer estadio de *Gymnetis hebraica difficilis* Burmeister de Veracruz. Se redescribe la larva de tercer estadio de *Gymnetis flavomarginata sallei* Schaum, con ejemplares de Veracruz, incluyendo las diferencias con las larvas de primero y segundo estadio, y la descripción de la pupa. Todas estas especies se incluyen en una clave para las larvas de los Gymnetini del Nuevo Mundo, que ahora contiene 14 especies de nueve géneros.

Key Words: *Amithao*, *Marmarina*, *Hoplopyga*, *Gymnetis*, larvae, pupae, taxonomy, key, México

Ritcher (1966) described the third instar larvae of four species of the genera *Cotinis* Burmeister, *Gymnetis* MacLeay and *Gymnetina* Casey from the United States. Monné (1969) described the larvae of two species of *Blaesia* Burmeister and *Marmarina* Kirby from Uruguay. Morón and Ratcliffe

(1984) described the larva of one species of *Argyripa* Thomson from México, and a key to the seven then-known species of New World Gymnetini. Vanin and Costa (1984) described the larva of one species of *Hoplopyga* Thomson from Brazil. Micó et al. (2001) provided descriptions of the larva of

one species of *Hologymnetis* Martínez from México and another species of *Hoplopyga* from Brazil, with a key to larvae of the 10 then-known species of Gymnetini from the Americas.

In this paper, we describe for the first time the third instar larvae of one species of the genus *Amithao*; the third instar larvae of three species of *Marmarina*, *Gymnetis* and *Hoplopyga*; the first and second instar larvae of two species of *Gymnetis* and *Hoplopyga*; and the pupae of three species of *Gymnetis*, *Marmarina* and *Hoplopyga*. Also, we redescribe the larva of third instar of *Gymnetis flavomarginata sallei* Schaum, and present a new key to the third instar larvae of 14 known species and nine genera of Gymnetini. Technical terms are those of Ritcher (1966), Morón (1993), and Micó et al. (2001). Studied specimens are deposited in the collection of immature stages of the Departamento de Entomología, Instituto de Ecología, Xalapa, México (IEXA).

Relative to the 3100 species of Cetoniinae listed from the world, only 55 larvae representing 30 genera of Cetoniini, Gymnetini, Goliathini and Cremastoceilini are described at present. Consequently, it is difficult to get a set of diagnostic characters that aid in distinguishing the larvae of the tribe Gymnetini from the larvae of other tribes. But as a preliminary introduction, based on Ritcher (1966), Micó et al. (2001), and our own experience, we propose the following combination of characters as diagnostic for larvae of Gymnetini: frons with 1–2 posterofrontal setae at each side; labrum symmetrical, anterior border trilobed; clithra present; plegmata absent; haptomerum with a transverse row of 7–19 heli; maxillary stridulatory area consisting of a row of 3–9 curved teeth with anteriorly projecting points; ocelli clearly defined, vague or absent; last antennal segment with 2–15 dorsal sensory spots; tarsungulus cylindrical, rounded apically, bearing 5–15 setae; raster usually with elliptical monostichous or polystichous palidia, each palidium with 12–38 pali.

KEY TO THE KNOWN THIRD STAGE LARVAE OF GYMNETINI FROM THE AMERICAS. (MODIFIED FROM MICÓ ET AL., 2001.)

1. Palidia present 2
 - Palidia absent ... *Gymnetina cretacea* (LeConte)
2. Raster with each palidium consisting of 2 or more irregular rows of pali. Last antennal segment with 3–7 dorsal sensory spots. 3
 - Raster with palidia monostichous. Last antennal segment with 2–15 dorsal sensory spots 5
3. Tarsungulus with 7 setae. Maxillary stridulatory area with 5 teeth. Last antennal segment with 3 ventral sensory spots
 - ... *Hologymnetis cinerea* (Gory and Percheron)
 - Tarsungulus with 10–12 setae. Maxillary stridulatory area with 7–9 teeth. Last segment of antenna with 5–13 ventral sensory spots 4
4. Raster with inner row of each palidium having 7–10 pali much stouter and larger than those in outer row
 - ... *Cotinis mutabilis* (Gory and Percheron)
 - Raster with inner row of each palidium having 9–10 pali slightly larger than those in outer row *Cotinis nitida* (Linné)
5. Dorsum of abdominal segment VII with 3 annulets. Last antennal segment with 10–15 dorsal sensory spots 6
 - Dorsum of abdominal segment VII with 2 annulets. Last antennal segment with 2–5 dorsal sensory spots 7
6. Ocelli present, well-defined (Fig. 1). Haptomerum with 14–16 heli in a transverse row (Fig. 2). Each palidium consisting of a row of 17–20 pali (Fig. 12)
 - ... *Amithao haematopus* (Burmeister)
 - Ocelli absent. Haptomerum with 10–15 heli in a transverse row. Each palidium consisting of a row of 23–26 pali
 - ... *Argyripa lansbergei* (Sallé)
7. All tarsungulus bearing 5–7 setae 8
 - All tarsungulus bearing 8–15 setae 10
8. With haptomerum cone-like process. Haptomerum with a row of 10–16 short heli, and 7–14 short, stout, spine-like setae (Fig. 16) 9
 - Without haptomerum cone-like process. Haptomerum with a row of 16 medium size heli, and 16–17 medium size, stout, spine-like setae *Blaesia atra* Burmeister
9. Last antennal segment with 5 dorsal sensory spots. Maxillary stridulatory area with row of 9 acute teeth. Each palidium consisting of an irregular row of 12–13 pali
 - ... *Marmarina tigrina* (Gory and Percheron)
 - Last antennal segment with 2–3 dorsal sen-

- sory spots (Fig. 23). Maxillary stridulatory area with row of 6 acute teeth (Fig. 20). Each palidium consisting of an irregular row of 19–20 pali (Fig. 25)
 *Marmarina maculosa* (Olivier)
10. Distance between the 2 lobes of respiratory plate of spiracles much less than the dorsoventral diameter of the bulla (Fig. 48). Last antennal segment with 2–3 dorsal sensory spots 11
 – Distance between the 2 lobes of respiratory plate of spiracles slightly less than the dorsoventral diameter of the bulla, or as long as such diameter (Fig. 35). Last antennal segment with 3–4 dorsal sensory spots 12
11. Metatarsungulus bearing 10–12 setae. Each palidium consisting of a row of 12–18 pali. Ocelli absent or vaguely defined. Spiracles with peritreme strongly sclerotized (Fig. 58)
 *Gymnetis flavomarginata sallei* Schaum
- Metatarsungulus bearing 8 setae. Each palidium consisting of a row of 20–21 pali. Ocelli absent. Spiracles with peritreme weakly sclerotized
 *Gymnetis hebraica difficilis* Burmeister
12. Right mandible with 2 scissorial teeth. Haptomer region with a transverse row of 8–11 heli
 *Hoplopyga singularis* (Gory and Percheron)
- Right mandible with 3 scissorial teeth (Fig. 30). Haptomer region with a transverse row of 12–19 heli 13
13. Metatarsungulus bearing 11–12 setae. Last antennal segment with 3 dorsal sensory spots. Each palidium consisting of a row of 14–18 pali
 *Hoplopyga brasiliensis* (Gory and Percheron)
- Metatarsungulus bearing 9–10 setae. Last antennal segment with 4 dorsal sensory spots. Each palidium consisting of a row of 14–15 pali
 *Hoplopyga liturata* (Olivier)

LARVAE OF AMITHAO THOMSON

This larval description of *Amithao haematopus* (Burmeister) is the first for the genus. Based on current knowledge of Gymnetini larvae, the larvae of *Amithao* are most similar morphologically to those of *Argyripa* species. The known larvae of *Amithao* have the ocelli well-defined, haptomer region with 14–16 heli in a transverse row, last antennal segment with 12 dorsal sensory spots, tarsungulus bearing 7–8 setae, and each palidium consisting of a row of 17–20 pali. Larvae of *Argyripa* have the ocelli absent, haptomer region

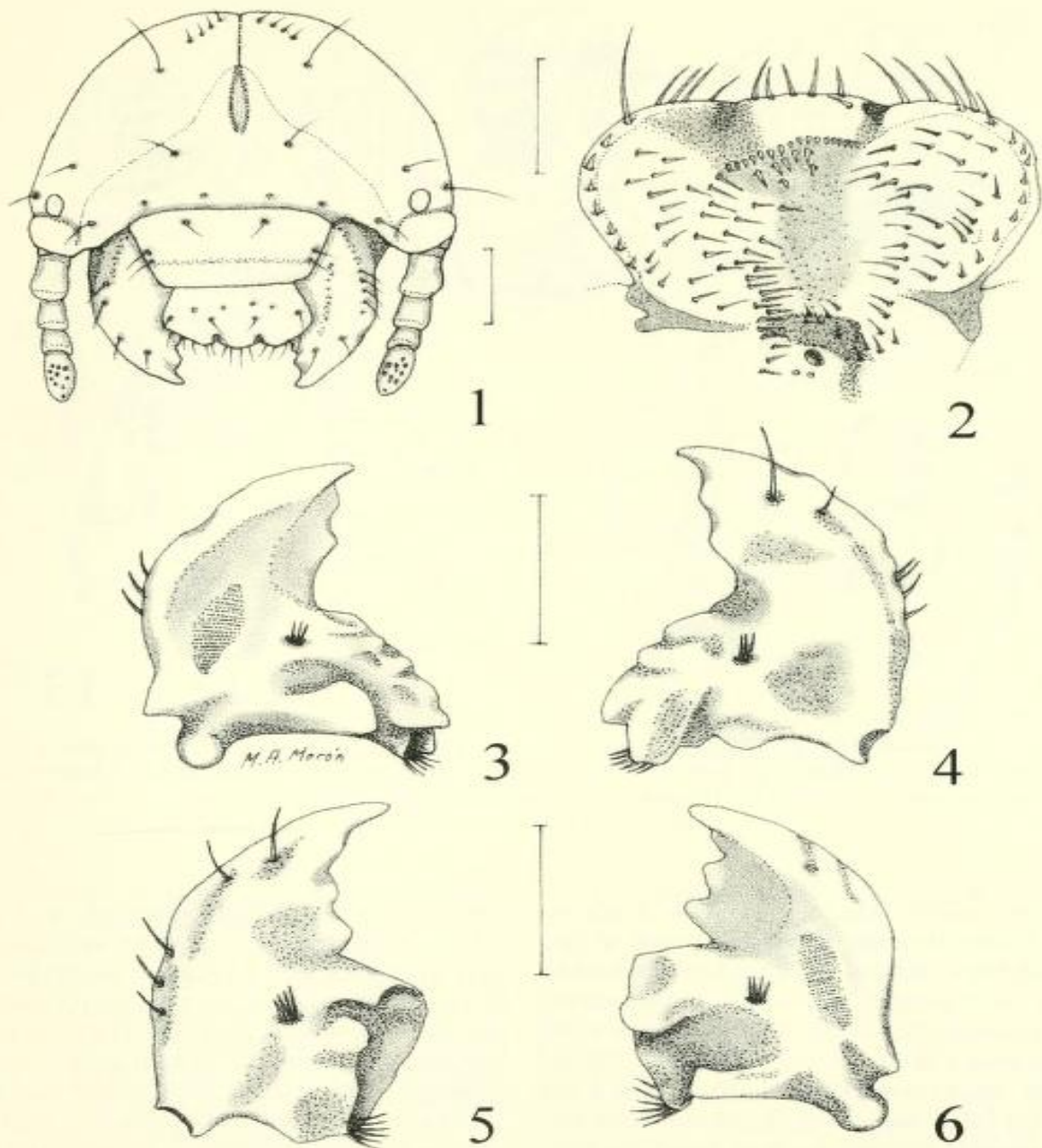
with 10–15 heli in a transverse row, last antennal segment with 10–15 sensory spots, tarsungulus bearing 8–9 setae, and each palidium consisting of a row of 23–26 pali. Larvae of both genera have the dorsum of abdominal segment VII with 3 anulets.

The genus *Amithao* consist of 15 species that are found from the southeastern Mexico to Brazil, including Jamaica and Hispaniola. The genus is being revised by Brett C. Ratcliffe. Adults of *Amithao* species have been collected with rotting fruit traps and are rarely attracted by lights (Morón et al. 1997). The known larvae feed in organic matter deposited in the axillary folds of leaves of epiphytes.

Amithao haematopus (Burmeister) (Figs. 1–14)

Third instar larva.—This description is based on four third instar larvae associated with dead adult females or their remnants collected from debris found in the axillary folds of leaves of epiphyte *Acmaea* sp. (Bromeliaceae). Locality data: México: State of Chiapas, Ocosingo municipality, Biosphere Reserve "Montes Azules," Boca del Chajul, 2-I-1983, 110 m elevation, C. Frago (1 larva) (IEXA); same data except 24-X-1984 (3 larvae) (IEXA).

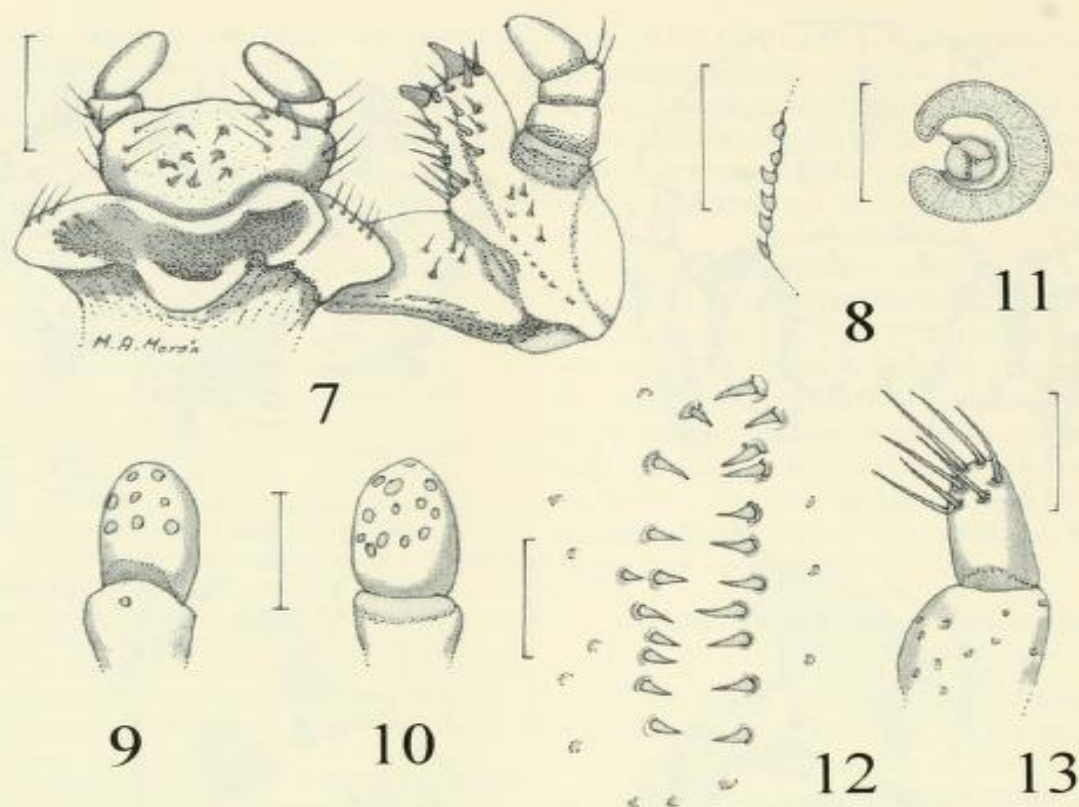
Head (Fig. 1): Maximum width of head capsule 4.6–4.8 mm. *Cranium* smooth, orange yellowish. Frons with a median, longitudinal depression extending anteriorly from the epicranial stem, a single posterior frontal seta, single anterior angle seta on each side, and 4 anterior frontal setigerous punctures. Dorsoepicranium with 4 small setae and 1 long seta in a line diverging from center-base of head. Tentorial pits not defined. *Clypeus*: Shape subtrapezoidal with 2 posterior clypeal setae and 2 exterior clypeal setae on each side. Pre-clypeus weakly sclerotized, without setae. Labrum trilobed, clithra present. *Epipharynx* (Fig. 2): *Corypha* with 5 stout setae. Haptomer region with cone-like process, without macroscopic sensilla, behind process a curved



Figs. 1-6. *Amithao haematopus*, third-instar larva. 1, Head, frontal view. 2, Epipharynx. 3, Right mandible, ventral view. 4, Right mandible, dorsal view. 5, Left mandible, dorsal view. 6, Left mandible, ventral view. Scale lines = 1 mm, except fig. 2 = 0.5 mm.

row of 14-16 small heli, 6-7 stout spine-like setae behind row. Acanthoparia with 7-9 short setae. Chaetoparia with 28-36 setae on each side. Dexiotorma wide and long, with moderately developed pternotorma. Laeotorma elongated, with small pternotor-

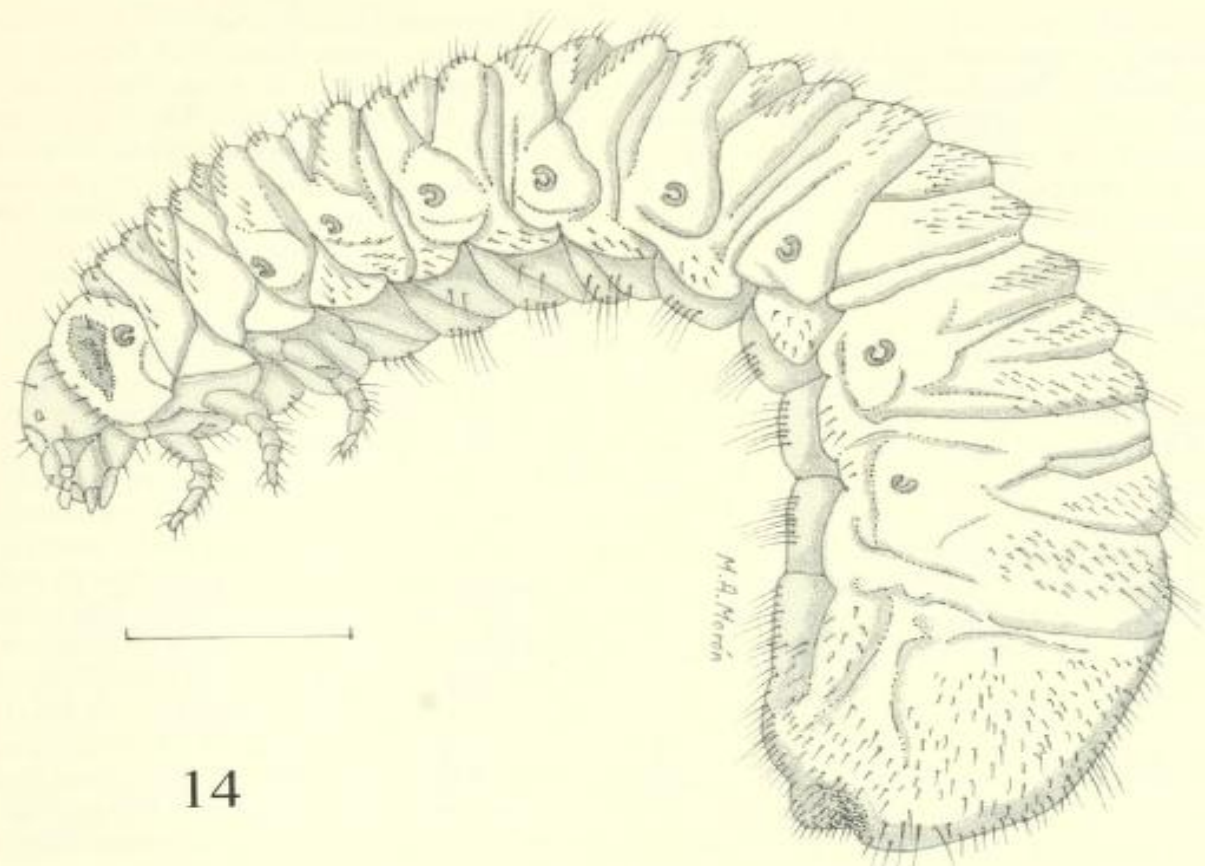
ma. Nesia with sensorial cone. Haptolachus with 2 sensilla below sensorial cone. *Mandibles*: Right mandible (Figs. 3-4) with 1 scissorial tooth anterior to scissorial notch and 2 scissorial teeth posterior to notch. Stridulatory area elongate-oval, length 2



Figs. 7-13. *Amithao haematopus*, third instar larva. 7, Hypopharynx and right maxilla, dorsal view. 8, Stridulatory area of maxilla. 9, Last antennal segment, ventral view. 10, Last antennal segment, dorsal view. 11, Abdominal spiracle. 12, Palidia. 13, Tarsungulus of posterior leg. Scale lines = 0.5 mm.

times its width. Molar area with 3 lobes. Calx wide. Brustia formed by 6-8 setae. Lateral edge with 3-5 setae. Left mandible (Figs. 5-6) with 1 scissorial tooth anterior to scissorial notch, 1 tooth posterior to notch, and 2 teeth on premolar area. Stridulatory area elongate, length 3 times its width. Molar area with 2 lobes. Acia absent. Brustia formed by 6-8 setae. Lateral edge with 3-4 setae. *Maxilla*: Galea and lacinia fused (Fig. 7), forming mala. Mala with large uncus at apex and 1 subterminal uncus vaguely bifid. Surface with 4 indistinct rows of setae. Stridulatory area (Fig. 8) with row of 5 curved, acute teeth and a distal, truncate process. *Labium* (Fig. 7): Dorsal surface with large, erect, truncate process. Hypopharyngeal sclerome with group of 7 setae on left side; both lateral

lobes with 3-5 setae arranged in 1 row. Glossa with 8 setae at middle, and 2 lateral rows formed by 3-4 setae on each side. *Antenna*: First segment as long as following 2 segments together. Surface (Figs. 9-10) of last segment with 12 dorsal and 8 ventral sensory spots. Ocelli clearly defined (Fig. 1). *Thorax*: Thoracic spiracles with C-shaped respiratory plate 0.58 mm high and 0.51 mm wide; plate with 23 holes across diameter at middle; holes irregularly oval. Dorsal surface of each segment with many short setae. *Abdomen* (Fig. 14): Spiracles of abdominal segments I-VII similar in size, those abdominal segment VIII slightly smaller. Distance between 2 lobes of respiratory plate slightly less than dorsoventral diameter of bulla (Fig. 11). Bulla irregularly oval, slightly convex. Dorsal areas of



14

Fig. 14. *Amithao haematopus*, third instar larva. Scale line = 5 mm.

each segment with many short setae. Prescutum of abdominal segments IV, VI and VII with irregular, transverse rows of long setae. Scutum of abdominal segments III–VII with transverse row of long setae. Scutellum of abdominal segments II–VI with irregular, transverse rows of long setae. Segments IX and X fused, covered with short setae and some sparse, long setae toward posterior borders. Spiracular area and pleural lobes of abdominal segments I–VIII with few, sparse, short setae. Raster with pair of palidia (Fig. 12) each consisting of an irregular row of 17–20 pali, rows joined anteriorly. Septula diffuse. Tegilla composed of scarce short, thick setae and some slender long setae. Lower anal lip with mixture of medium size setae and short setae. *Legs*: Tarsungulus (Fig. 13) cylindrical, apex rounded and bearing 7–8 setae.

LARVAE OF *MARMARINA* KIRBY

The larval description of *Marmarina maculosa* (Olivier) from Mexico is the second for the genus. *Marmarina tigrina* (Gory and Percheron), from Uruguay, was described by Monné (1969). Based on our current knowledge of Gymnetini larvae, the larvae of *Marmarina* are most similar morphologically to those of *Blaesia* species. Larvae of *Marmarina* have a haptomeral cone-like process; with a row of 10–16 short heli, and 7–14 short, stout, spine-like setae behind row; last antennal segment with 2–5 dorsal sensory spots, maxillary stridulatory area with row of 6–9 acute teeth, and each palidium consisting of an irregular row of 12–20 pali. Larvae of *Blaesia* have a slightly convex haptomeral process, with a row of 16 medium size heli, and 16–17 medium

size, stout, spine-like setae behind row, maxillary stridulatory area with row of 7 acute teeth, last antennal segment with 4 dorsal sensory spots, and each palidium consisting of an irregular row of 14–16 pali. Larvae of both genera have the dorsum of abdominal segment VII with 2 annulets.

The genus *Marmarina* (= *Maculinetis* Schurhoff) consists of three species, three subspecies and three varieties that are found from the southeastern Mexico to Argentina (Blackwelder 1944). The genus is being revised by Brett C. Ratcliffe. Adults of *Marmarina* species have been collected on mature tropical fruits, rarely with rotting fruit traps, and sifting soil litter (Morón et al. 1997). The known larvae feed in organic matter deposited under rotten logs or in debris of ant nests of *Acromyrmex* sp.

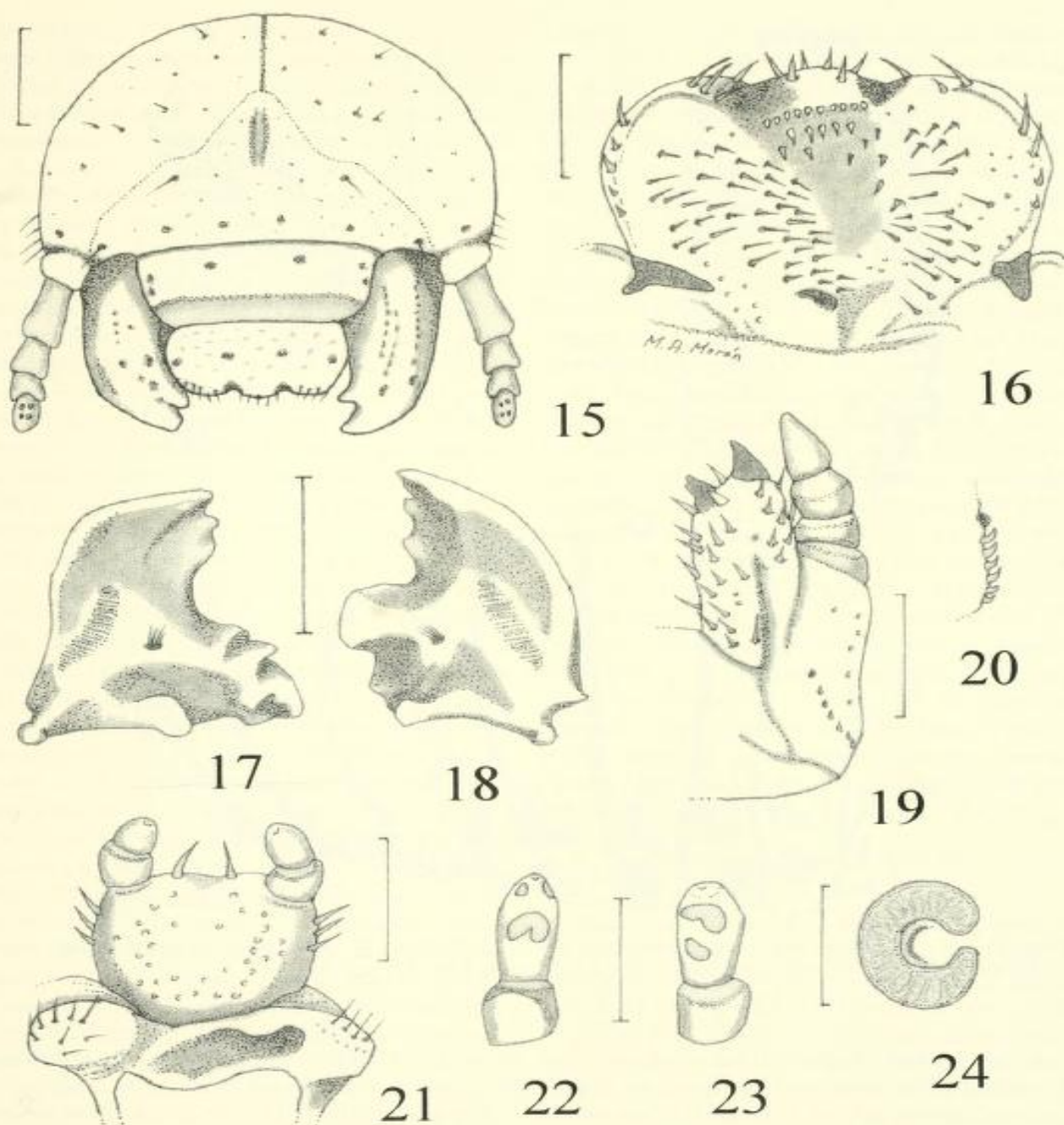
Marmarina maculosa (Olivier)
(Figs. 15–27)

Third instar larva.—This description is based on one exuvium of a third instar larva reared to an adult female, collected under a rotten log from tropical rain forest. Locality data: México: State of Veracruz, Monte Pío municipality, Estación de Biología Tropical "Los Tuxtlas," 6-III-1986, 150 m elevation, M. L. Castillo (1 exuvium) (IEXA).

Head (Fig. 15): Maximum width of head capsule 3.8 mm. *Cranium* nearly smooth, with sparse shallow punctures, reddish brown. Frons with median, longitudinal depression extending anteriorly from epicranial stem, a single posterior frontal seta and single anterior angle seta on each side, and 4 anterior frontal setigerous punctures. Dorsopicranium with 4 small setae widely separated. Tentorial pits not defined. *Clypeus*: Shape subtrapezoidal, with 2 posterior clypeal setigerous punctures and 2 exterior clypeal setigerous punctures on each side. Preclypeus weakly sclerotized, without setae. Labrum trilobed, clithra present. *Epipharynx* (Fig. 16): Corypha with 6 stout, setae. Haptomer region with cone-like process, without macroscopic sensillae, be-

hind process a transverse row of 10 small heli, 7 stout spine-like setae behind row. Acanthoparia with 4–5 medium size or short setae. Chaetoparia with 36–47 setae on each side. Dextiotorma wide and long, with moderately developed pternotorma. Laeotorma short, with small pternotorma. Nesia with sensorial cone. Haptolachus without macroscopic sensilla below sensorial cone. *Mandibles*: Right mandible (Fig. 17) with 1 scissorial tooth anterior to scissorial notch and 2 scissorial teeth posterior to notch. Stridulatory area elongate, sinuose, length 4 times its width. Molar area with 3 lobes. Calx short. Brustia absent. Lateral edge without setae. Left mandible (Fig. 18) with 1 scissorial tooth anterior to scissorial notch, 1 tooth posterior to notch, and 1 tooth on premolar area. Stridulatory area elongate, length 4 times its width. Molar area with 2 lobes. Acia absent. Brustia absent. Lateral edge without setae. *Maxilla*: Galea and lacinia fused (Fig. 19), forming mala. Mala with large unicus at apex and 1 subterminal unicus vaguely bifid. Surface with 4–5 indistinct rows of setae. Stridulatory area (Fig. 20) with row of 6 curved, acute teeth and a distal, truncate process. *Labium* (Fig. 21): Dorsal surface with large, curved, truncate process. Hypopharyngeal sclerome without setae on left side; both lateral lobes with 4–8 setae. Glossa with 2 setigerous punctures at middle, 2 transverse rows of setigerous punctures near basal margin, and 2 lateral irregular rows formed by 4–7 setiferous punctures on each side. *Antenna*: First segment slightly longer than the following 2 segments together. Surface (Figs. 22–23) of last segment with 2–3 dorsal and 3–4 ventral sensory spots. Ocelli not defined (Fig. 15). *Thorax*: Thoracic spiracles with C-shaped respiratory plate 0.54 mm high and 0.50 mm wide; plate with 20 holes across diameter at middle; holes irregularly oval. Dorsal surface of each segment with many short setae and some slender, long setae.

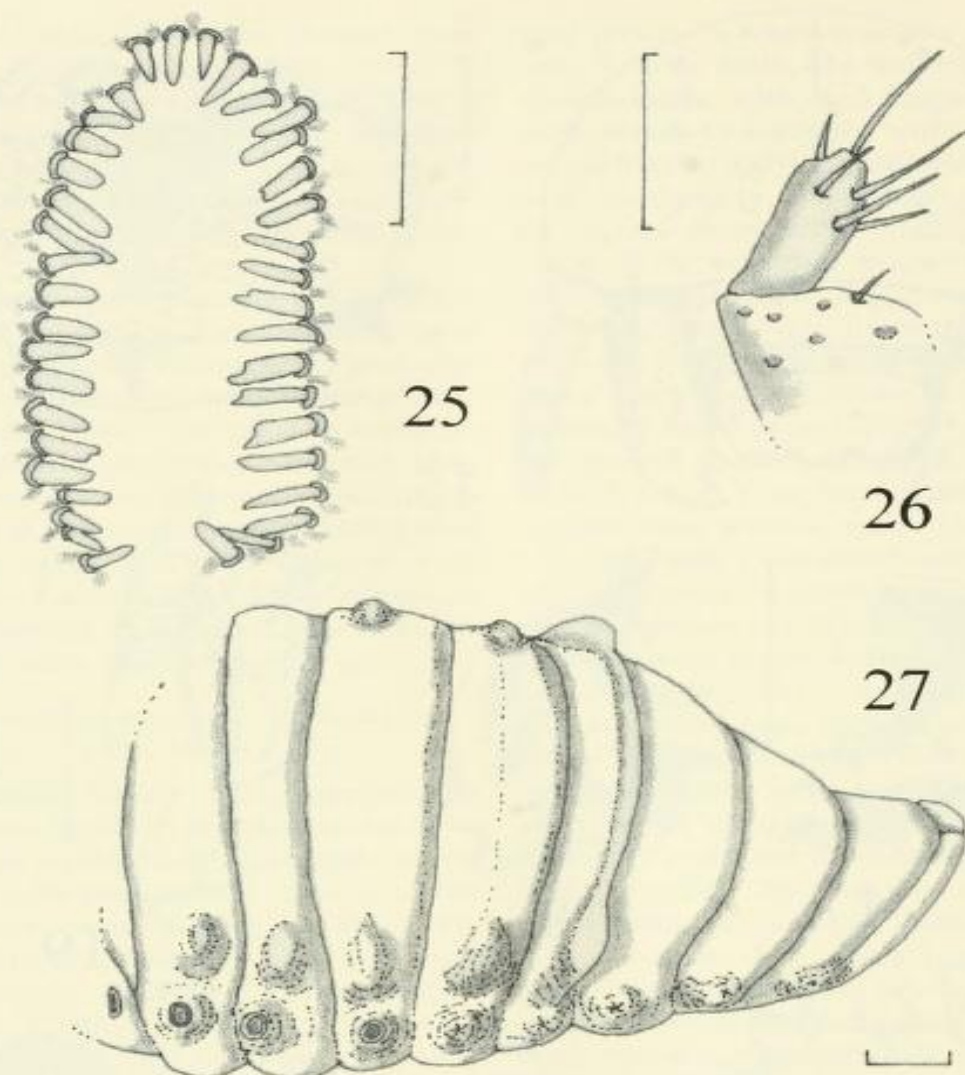
Abdomen: Spiracles of abdominal segments I–VIII similar in size. Distance be-



Figs. 15-24. *Marmarina maculosa*, third instar larva. 15, Head, frontal view. 16, Epipharynx. 17, Right mandible, ventral view. 18, Left mandible, ventral view. 19, Right maxilla, dorsal view. 20, Stridulatory area of maxilla. 21, Hypopharynx, dorsal view. 22, Last antennal segment, ventral view. 23, Last antennal segment, dorsal view. 24, Abdominal spiracle. Scale lines = 0.5 mm, except figs. 15, 17-18.

tween 2 lobes of respiratory plate much less than dorsoventral diameter of bulla (Fig. 24). Bulla regularly oval, slightly convex. Dorsal areas of each segment with many

short setae. Prescutum of abdominal segments I-VII with irregular, transverse rows of long setae. Scutum of abdominal segments II-VII with transverse row of long



Figs. 25-27. *Marmarina maculosa*, third instar larva. 25, Palidia, 26, Tarsungulus of posterior leg. Pupa. 27, Abdomen, dorsolateral view. Scale lines = 0.5 mm, except fig. 27 = 1 mm.

setae. Scutellum of abdominal segments I-VI with irregular, transverse rows of long setae. Segments IX and X fused, covered with short setae and some sparse, long setae toward posterior borders. Spiracular area and pleural lobes of abdominal segments I-VIII with many short setae. Raster with pair of palidia (Fig. 25), each consisting of a row of 19-20 pali, rows joined anteriorly. Septula elongate. Tegilla composed of many short, thick setae and some slender, long setae. Lower anal lip with many short

setae. *Legs:* Tarsungulus (Fig. 26) cylindrical, apex rounded and bearing 6-7 setae.

Pupa. Female.—This description is based on one exuvium of a pupa reared to an adult female, collected under a rotten log from tropical rain forest. Locality data: México: State of Veracruz, Monte Pfo municipality, Estación de Biología Tropical "Los Tuxtlas," 6-III-1986, 150 m elevation, M. L. Castillo (1 exuvium) (IEXA).

Form: Body elongate, robust, exarate. Yellowish white. With very fine velvety mi-

crotrichia on last abdominal segments. *Head*: Strongly reflexed downward. Antenna and mouth parts clearly separated. Ocular canthus and compound eyes well-differentiated. Clypeus concave. Labrum tumid. Surface of frons slightly convex. *Thorax*: Pronotal disk with irregular, shallow depressions toward sides; lateral margins not defined. Meso- and metanota differentiated. Meso- and metascutellum narrowed posteriorly, apex acute. Pterotega widened, with apex rounded, free, compressed around body; hind wing teca nearly as long as the elytron teca. Meso-metasternal process large and rounded, emerging between mesocoxae. Protibia with 3 short process on external border. Meso- and metatibia each with 2 rounded, short, apical spurs. All tarsomeres vaguely defined. *Abdomen* (Fig. 27): Tergites I–IV convex, without dionceiform organs; tergite V with vague transverse carina on posterior border; tergite VI with strong transverse carina on posterior border; tergites VII–VIII convex. Tergo-lateral tubercles II–VI prominent, surrounded by fine rugae. Spiracle I elongate, not prominent, partially protected by posterodorsal fleshy fold. Spiracles II–IV tuberculiform, with ringlike, sclerotized peritreme. Spiracles V–VII closed, slightly prominent, surrounded by fine rugae. Spiracle VIII closed, tuberculiform, surrounded by fine rugae. Sternites II–VII convex, with fine transverse lines. Last tergite with lateral rugae around small tubercle, and wide, fleshy lobes on the posterior border, without urogomphi. Genital ampulla wide, flattened, with fine mesial sulcus.

LARVAE OF *HOPLOPYGA* THOMSON

The larval description of *Hoplopyga liturata* (Olivier) from Mexico is the third in the genus. *Hoplopyga brasiliensis* (Gory and Percheron) from Brazil was described by Vanin and Costa (1984), and *Hoplopyga singularis* (Gory and Percheron) from Brazil was described by Micó et al. (2001). Larvae of *Hoplopyga* are most similar morphologically to those of *Gymnetis* species.

Larvae of *Hoplopyga* have the haptomeral area with a row of 8–19 heli, maxillary stridulatory area with a row of 3–5 acute teeth, last antennal segment with 3–4 dorsal sensory spots, tarsungulus bearing 9–15 setae, the distance between the 2 lobes of respiratory plate of spiracles slightly less than dorsoventral diameter of bulla, or as long as such diameter, and each palidium consisting of an irregular row of 14–25 pali. Larvae of *Gymnetis* have the haptomeral area with a row of 10–14 heli, maxillary stridulatory area with a row of 3–5 acute teeth, last antennal segment with 2–3 dorsal sensory spots, tarsungulus bearing 8–12 setae, the distance between the 2 lobes of respiratory plate much less than dorsoventral diameter of bulla, and each palidium consisting of an irregular row of 12–21 pali. Larvae of both genera have the dorsum of abdominal segment VII with 2 annulets.

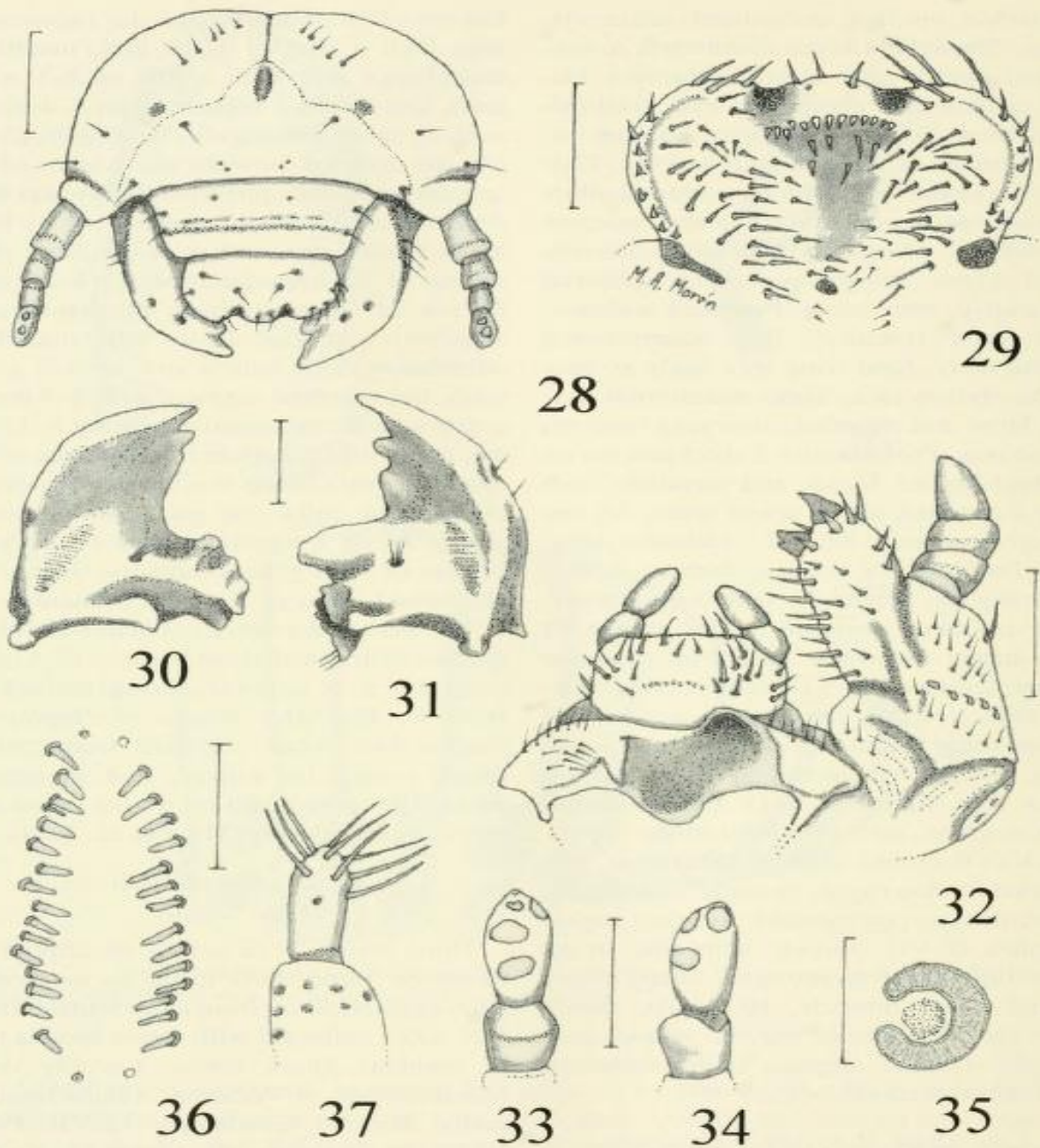
The genus *Hoplopyga* contains about 20 species distributed from Mexico to Argentina, and it is currently being revised by Brett C. Ratcliffe. Adults of *Hoplopyga* species have been collected from rotting fruits, resting on foliage, and in termite nests. The larvae feed on rotting wood and other organic debris (Micó et al. 2001).

Hoplopyga liturata (Olivier)

Figs. 28–38

Third instar larva.—This description is based on three third instar larvae reared from eggs obtained from adult female, fixed 6-X-2000, collected with rotten banana trap in montane cloud forest. Locality data: México: State of Veracruz, Xalapa municipality, Rancho Guadalupe, 12-VIII-1999, 1,350 m elevation, R. Arce (3 larvae) (IEXA).

Head (Fig. 28): Maximum width of head capsule 3.5 mm. *Cranium* nearly smooth, without defined punctures, orange yellowish. Frons with median, longitudinal shallow depression extending anteriorly from epicraneal stem, a single posterior frontal seta and single anterior angle seta on each side, and 4 anterior frontal setigerous punc-



Figs. 28-37. *Hoplopyga liturata*, third instar larva. 28, Head, frontal view. 29, Epipharynx. 30, Right mandible, ventral view. 31, Left mandible, ventral view. 32, Hypopharynx and right maxilla, dorsal view. 33, Last antennal segment, dorsal view. 34, Last antennal segment, ventral view. 35, Abdominal spiracle. 36, Palidia. 37, Tarsungulus of posterior leg. Scale lines = 0.5 mm, except fig. 28 = 1 mm.

tures. Dorsoepicranium with 4 small setae and 1 long seta in a line diverging from center-base of head. Tentorial pits vaguely defined. *Clypeus*: Shape subtrapezoidal

with 2 posterior clypeal setigerous punctures and 2 exterior clypeal setigerous punctures on each side. Preclypeus weakly sclerotized, without setae. Labrum trilobed,

clithra present. *Epipharynx* (Fig. 29): *Corypha* with 3 stout setae. Haptomeral region with cone-like process, without macroscopic sensillae, behind process a transverse row of 12 small heli, 6 stout spine-like setae behind row. *Acanthoparia* with 8 medium size or short setae. *Chaetoparia* with 18–28 setae on each side. *Dexiotorma* wide and long, with short pternotorma. *Laetotorma* short, rounded, with small pternotorma. *Nesia* with sensorial cone. *Haptolachus* without macroscopic sensilla below sensorial cone. *Mandibles*: Right mandible (Fig. 30) with 1 scissorial tooth anterior to scissorial notch and 1 scissorial tooth well-developed and 1 vague tooth posterior to notch. Stridulatory area elongate, length 3 times its width. Molar area with 3 lobes. Calx short. *Brustia* absent. Lateral edge without setae. Left mandible (Fig. 31) with 1 scissorial tooth anterior to scissorial notch, 1 tooth posterior to notch, and 1 tooth on premolar area. Stridulatory area elongate, length 3 times its width. Molar area with 2 lobes. *Acia* absent. *Brustia* formed by 4 setae. Lateral edge with 2 setae. *Maxilla*: *Galea* and *lacinia* fused (Fig. 32), forming mala. Mala with large uncus at apex and 1 subterminal uncus vaguely bifid. Surface with 3–4 indistinct rows of setae. Stridulatory area with row of 4 curved, acute teeth and a distal, truncate process. *Labium* (Fig. 32): Dorsal surface with large, curved, truncate process. Hypopharyngeal sclerome without setae on left side; both lateral lobes with 8–13 setae. *Glossa* with transverse row of small sensilla at middle, 6 setae near anterior margin, and 2 lateral irregular rows formed by 3–4 setae on each side. *Antenna*: First segment as long as following 2 segments together. Surface (Figs. 33–34) of last segment with 4 dorsal and 3 ventral sensory spots. *Ocelli* not defined (Fig. 28). *Thorax*: Thoracic spiracles with C-shaped respiratory plate 0.52 mm high and 0.48 mm wide; plate with 18 holes across diameter at middle; holes irregularly oval. Dorsal surface of each segment with many short setae and some slender, long setae.

Abdomen: Spiracles of abdominal segments I–VIII similar in size. Distance between 2 lobes of respiratory plate slightly less than dorsoventral diameter of bulla (Fig. 35). Bulla regularly oval, slightly convex. Dorsal areas of each segment with many short setae. Prescutum of abdominal segments I–VII with irregular, transverse rows of long setae. Scutum of abdominal segments II–VII with transverse row of long setae. Scutellum of abdominal segments I–VI with irregular, transverse rows of long setae. Segments IX and X fused, covered with short setae and some sparse, long setae toward posterior borders. Spiracular area and pleural lobes of abdominal segments I–VIII with many short setae. Raster with pair of palidia (Fig. 36), each consisting of an irregular row of 14–15 pali, rows converging anteriorly. *Septula* irregular, elongate. *Tegilla* composed of some short, thick setae and some slender, long setae. Lower anal lip with many short setae. *Legs*: *Tarsungulus* (Fig. 37) cylindrical, apex rounded and bearing 9–10 setae.

Second instar larva.—This description is based on two second instar larvae reared from eggs obtained from an adult female, fixed 6-VII-2000, with data as cited above (2 larvae) (IEXA). Similar to third instar except as follows: maximum width of head capsule: 2.06 mm. Dorsoventral diameter of spiracles 0.32 mm. Each palidium with 12–13 pali.

First instar larva.—This description is based on two first instar larvae reared from eggs obtained from an adult female, fixed 6-VI-2000, with data as cited above (2 larvae) (IEXA). Similar to second instar except as follows: maximum width of head capsule: 1.06 mm. Respiratory plates of spiracles kidney shaped; dorsoventral diameter of spiracles: 0–16 mm. With one small, tubercle-like, eclosion spine, bearing preapical thin seta, on each side of metanotum. Palidia not defined.

Pupa, female.—This description is based on one pupa reared from eggs obtained from an adult female, fixed, 5-XII-2000,

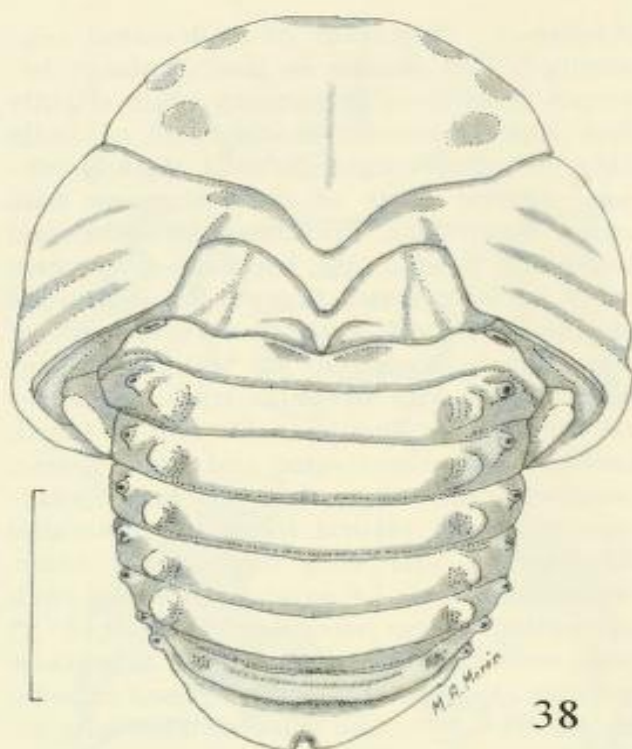


Fig. 38. *Hoplopyga liturata*, pupa, dorsal view. Scale line = 5 mm.

with data as cited above (1 pupa) (IEXA). **Form:** Body elongate, robust, exarate (Fig. 38). Yellowish white. Without velvety microtrichia on abdominal segments. **Head:** Strongly reflexed downward. Antennae and mouth parts clearly separated. Ocular canthus and compound eyes well-differentiated. Clypeus concave. Labrum tumid. Surface of frons slightly convex. **Thorax:** Pronotal disk with irregular shallow depressions toward sides; lateral margins not defined. Meso- and metanota differentiated. Meso- and metascutellum narrowed posteriorly, apex rounded. Pteroteca widened, with apex rounded, free, compressed around body; hind wing teca nearly as long as the elytron teca. Meso-metasternal process large and rounded, emerging between mesocoxae. Protibia with 3 short process on external border. Meso- and metatibia each with 2 rounded, short, apical spurs. All tarsomeres vaguely defined. **Abdomen:** Tergites I–VIII convex, without dioneiform or-

gans or transverse carina on posterior borders. Tergo-lateral tubercles II–VI prominent, surrounded by fine rugae. Spiracle I elongate, not prominent, partially protected by posterodorsal fleshy fold. Spiracles II–IV tuberculiform, with ring-like, sclerotized peritreme. Spiracles V–VII closed, tuberculiform, prominent, surrounded by fine rugae. Sternites II–VII convex, with fine transverse lines. Last tergite with lateral rugae around small tubercle, and narrow, fleshy lobes on posterior border, without urogomphi. Genital ampulla wide, flattened, with fine mesial sulcus.

LARVAE OF *Gymnetis* MacLeay

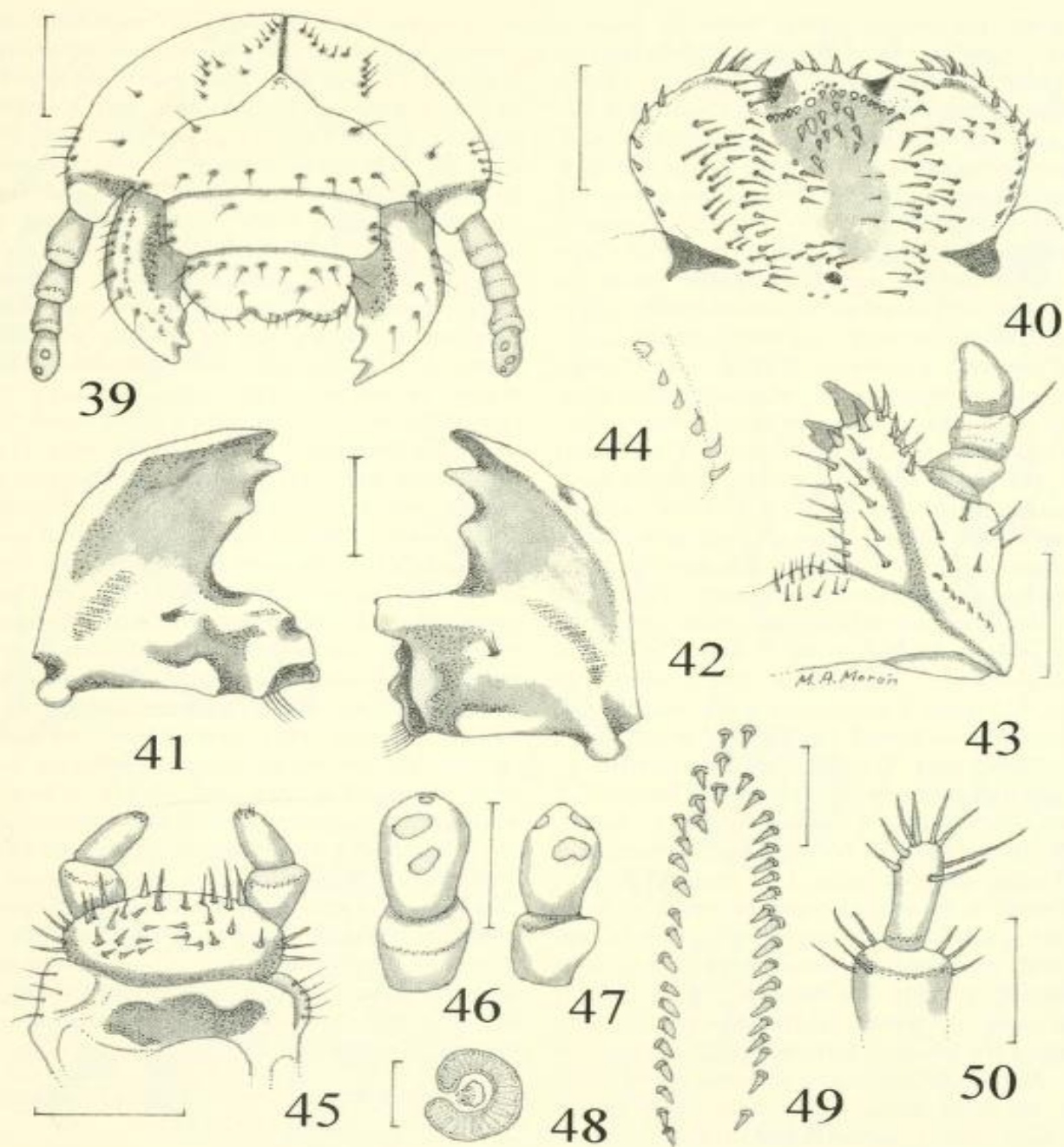
The larval description of *Gymnetis hebraica difficilis* Burmeister from Mexico is the second larva described in the genus. *Gymnetis flavomarginata sallei* Schaum from Texas was described by Ritcher (1966). As we indicated previously, larvae of *Gymnetis* are closely similar morphologically to those of *Hoplopyga* species.

The genus *Gymnetis* (including *Paragymnetis* MacLeay and *Gymnetosoma* Martínez) contains about 26 species, distributed from southern United States to Argentina. The genus is being revised by Brett C. Ratcliffe. Adults of *Gymnetis* species have been collected frequently attracted to rotting fruit traps (Morón 1995; Morón et al. 1997). The larvae feed on organic debris. Complete life cycle of *Gymnetis flavomarginata sallei* was studied by Arce and Morón (1999).

Gymnetis hebraica difficilis Burmeister (Figs. 39–50)

Third instar larva.—This description is based on one third instar larvae reared from eggs obtained from an adult female, fixed 3-V-1995, collected with rotten banana trap in montane cloud forest. Locality data: México: State of Veracruz, Coatepec municipality, Briones, 2-IX-1994, 1,300 m elevation, M. A. Morón (1 larva) (IEXA).

Head (Fig. 39): Maximum width of head capsule 3.6 mm. **Cranium** nearly smooth,



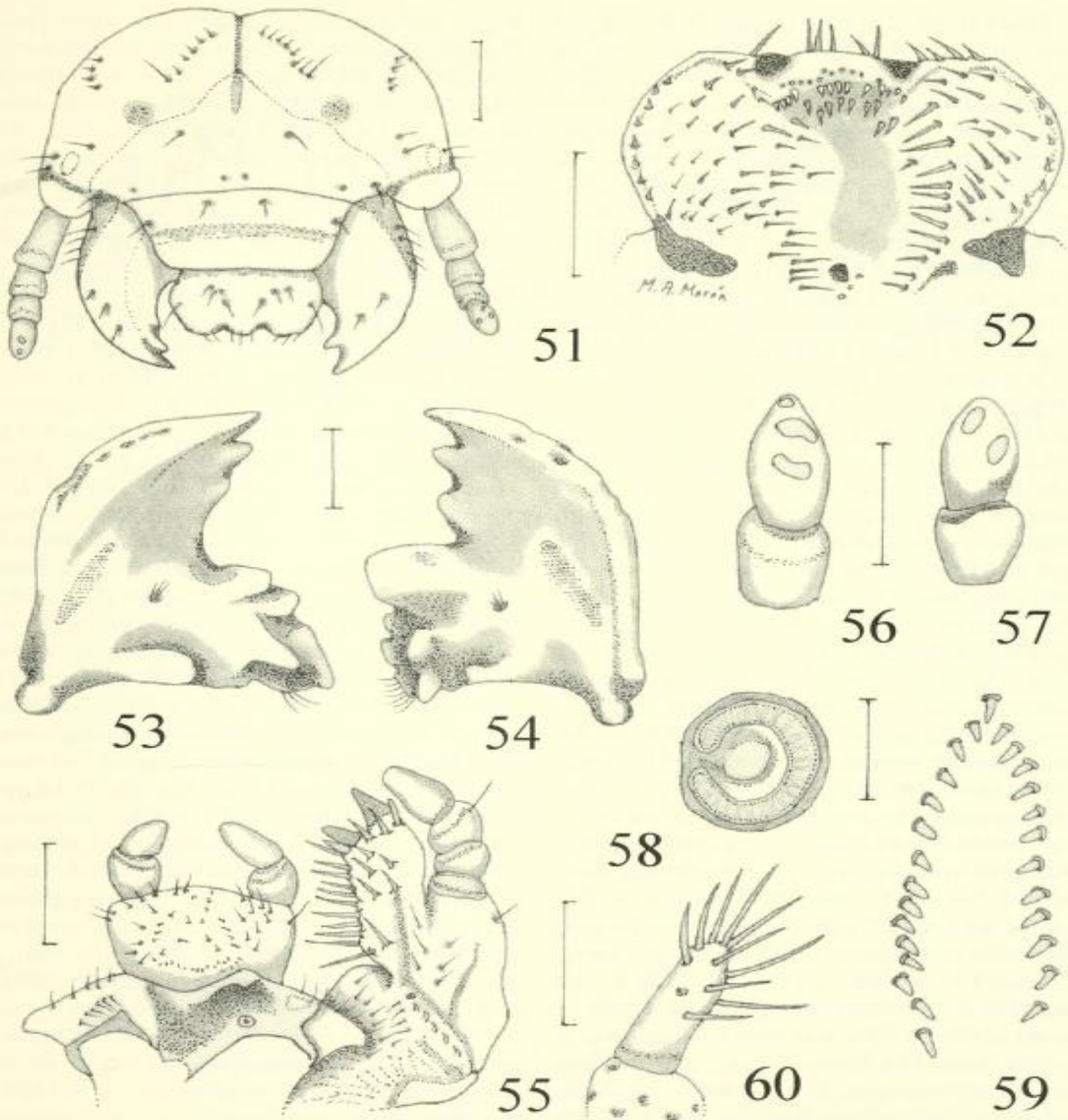
Figs. 39–50. *Gymnetis hebraica difficilis*, third instar larva. 39, Head, frontal view. 40, Epipharynx. 41, Right mandible, ventral view. 42, Left mandible, ventral view. 43, Right maxilla, dorsal view. 44, Stridulatory area of maxilla. 45, Hypopharynx, dorsal view. 46, Last antennal segment, dorsal view. 47, Last antennal segment, ventral view. 48, Abdominal spiracle. 49, Palidia. 50, Tarsungulus of posterior leg. Scale lines = 0.5 mm, except fig. 39 = 1 mm and fig. 48 = 0.25 mm.

without punctures, dark reddish brown. Frons with median, shallow depression at anterior end of epicraneal stem, a single posterior frontal seta and single anterior angle seta on each side, and 7 anterior frontal setae. Dorsoepicranium with 2 lines of 5–6 short setae diverging from center-base of head. Tentorial pits not defined. *Clypeus*: Shape subrectangular with 2 posterior clypeal setae and 2 exterior clypeal setae on each side. Preclypeus narrow, weakly sclerotized, without setae. Labrum trilobed, clithra present. *Epipharynx* (Fig. 40): *Corypha* with 4 stout, setae. Haptomeral region with cone-like process, with 5 sensilla, behind process a transverse row of 14 small heli, 11 stout spine-like setae behind row. *Acanthoparia* with 6–8 short setae. *Chaetoparia* with 28–34 setae on each side. *Dextortorma* wide and long, with narrow pternotorma. *Laeotorma* short, acute, with wide rounded pternotorma. *Nesia* with sensorial cone. *Haptolachus* with 3 sensilla below sensorial cone. *Mandibles*: Right mandible (Fig. 41) with 1 scissorial tooth anterior to scissorial notch and 1 scissorial tooth well-developed and 1 vague tooth posterior to notch. Stridulatory area elongate, length 3.5 times its width. Molar area with 3 lobes. Calx short. *Brustia* formed by 5 setae. Lateral edge without setae. Left mandible (Fig. 42) with 1 scissorial tooth anterior to scissorial notch, 1 tooth posterior to notch, and 1 tooth on premolar area. Stridulatory area elongate, length 7 times its width. Molar area with 2 lobes. *Acia* absent. *Brustia* formed by 7 setae. Lateral edge without setae. *Maxilla*. *Galea* and *lacinia* fused (Fig. 43), forming mala. Mala with large uncus at apex and 1 subterminal uncus vaguely bifid. Surface with 3 indistinct rows of setae. Stridulatory area (Fig. 44) with row of 5 curved, acute teeth and a distal, truncate process. *Labium* (Fig. 45): Dorsal surface with large, curved, truncate process. Hypopharyngeal sclerome without setae on left side; both lateral lobes with 4–5 setae. *Glossa* with 7 short setae at middle, 4 setae near anterior margin, and 2 lateral irregular

rows formed by 3–4 setae on each side. *Antenna*: First segment shorter than following 2 segments together. Surface (Figs. 46–47) of last segment with 2 dorsal and 3 ventral sensory spots. Ocelli not defined (Fig. 39). *Thorax*: Thoracic spiracles with C-shaped respiratory plate 0.43 mm high and 0.40 mm wide; plate with 23 holes across diameter at middle; holes irregularly oval. Dorsal surface of each segment with many short setae and some slender, long setae. *Abdomen*: Spiracles of abdominal segments I–VIII slightly increasing in size towards posterior segments. Distance between 2 lobes of respiratory plate much less than dorsoventral diameter of bulla (Fig. 48). Bulla irregularly oval, slightly convex. Dorsal areas of each segment with many short setae. Prescutum of abdominal segments I–VII with irregular, transverse rows of slender setae. Scutum of abdominal segments II–VII with transverse row of sparse, long setae. Scutellum of abdominal segments I–VI with irregular, transverse rows of sparse long setae. Segments IX and X fused, covered with short setae and some sparse, slender setae toward posterior borders. Spiracular area and pleural lobes of abdominal segments I–VIII with many short setae. Raster with pair of palidia (Fig. 49), each consisting of an irregular row of 20–21 pali, rows joined anteriorly. Septula elongate. Tegilla composed of many short, thick setae and some long setae. Lower anal lip with many short setae. *Legs*: *Tarsungulus* (Fig. 50) cylindrical, apex rounded and bearing 8 setae.

Gymnetis flavomarginata sallei Schaum
(Figs. 51–61)

Third instar larva.—This redescription is based on 40 third instar larvae reared from eggs obtained from breeding females, progeny of a female collected in montane cloud forest. Locality data: México: State of Veracruz, Xalapa municipality, Rancho Guadalupe, 10-IV-1995, 1,450 m elevation, R. Arce; fixed 8-X-1997 (20 larvae); fixed 10-IX-2000 (20 larvae) (IEXA).



Figs. 51–60. *Gymnetis flavomarginata sallei*, third instar larva. 51, Head, frontal view. 52, Epipharynx. 53, Right mandible, ventral view. 54, Left mandible, ventral view. 55, Hypopharynx and right maxilla, dorsal view. 56, Last antennal segment, dorsal view. 57, Last antennal segment, ventral view. 58, Abdominal spiracle. 59, Palidia. 60, Tarsungulus of posterior leg. Scale lines = 0.5 mm, except fig. 51 = 1 mm.

Head (Fig. 51): Maximum width of head capsule 4.3–4.8 mm. *Cranium* nearly smooth, without punctures, dark orange. Frons with a median, longitudinal, shallow depression extending anteriorly from epicranial stem, a single posterior frontal seta and single anterior angle seta on each side, and 4 anterior frontal setiferous punctures. Dorsoepicranium with 1 line of 5–6 short setae and 1 long seta diverging from center-base of head, and 1 lateral line of 4–5 short setae on each side. Tentorial pits shallowly impressed. *Clypeus*: Shape subtrapezoidal, with 2 posterior clypeal setae and 1 exterior clypeal seta on each side. Preclipeus wide, weakly sclerotized, without setae. Labrum trilobed, clithra present. *Epipharynx* (Fig. 52): Corypha with 4–5 stout, setae. Haptomerall region with cone-like process, with 8–10 sensillae, behind process a transverse row of 10–12 small heli, 10–12 stout spine-like setae behind row. Acanthoparia with 8–9 short setae. Chaetoparia with 26–38 setae on each side. Dexiotorma wide and long, with short pternotorma. Laeotorma short, subtriangular, with wide, rounded pternotorma. Nesia with sensorial cone. Haptolachus with 3 sensilla below sensorial cone. *Mandibles*: Right mandible (Fig. 53) with 1 scissorial tooth anterior to scissorial notch and 1 scissorial tooth well-developed and 1 vague tooth posterior to notch. Stridulatory area elongate, length 4.5 times its width. Molar area with 3 lobes. Calx wide. Brustia formed by 3–4 setae. Lateral edge with 5–7 setae. Left mandible (Fig. 54) with 1 scissorial tooth anterior to scissorial notch, 1 tooth posterior to notch, and 1 tooth on pre-molar area. Stridulatory area elongate, length 4.5 times its width. Molar area with 2 lobes. Acia absent. Brustia formed by 6–7 setae. Lateral edge with 4–5 setae. *Maxilla*: Galea and lacinia fused (Fig. 55), forming mala. Mala with large uncus at apex and 1 subterminal uncus vaguely bifid. Surface with 3 indistinct rows of setae. Stridulatory area with row of 5 curved, acute teeth and a distal, small, truncate process. *Labium* (Fig. 55): Dorsal surface with

large, curved, truncate process. Hypopharyngeal sclerome without setae on left side; both lateral lobes with 6–10 setae. Glossa with 7–8 short setae at middle, a transverse row of 12–14 sensilla near basal border, 3–4 setae near anterior margin, and 2 lateral irregular rows formed by 5–7 setae on each side. *Antenna*: First segment slightly shorter than following 2 segments together. Surface (Figs. 56–57) of last segment with 2–3 dorsal and 2 ventral sensory spots. Ocelli vaguely defined (Fig. 51). *Thorax*: Thoracic spiracles with C-shaped respiratory plate 0.53–0.58 mm high and 0.48–0.51 mm wide; plate with 25 holes across diameter at middle; holes irregularly oval. Dorsal surface of each segment with many short setae and sparse, slender, long setae. *Abdomen*: Spiracles of abdominal segments I–VIII similar in size. Distance between 2 lobes of respiratory plate much less than dorsoventral diameter of bulla (Fig. 58). Bulla regularly oval, slightly convex. Dorsal areas of each segment with many short setae. Prescutum of abdominal segments I–VII with irregular, transverse rows of slender setae. Scutum of abdominal segments II–VII with transverse rows of mixed medium size and long setae. Scutellum of abdominal segments I–VI with irregular, transverse rows of medium size setae. Segments IX and X fused, covered with short setae and long setae toward posterior borders. Spiracular area and pleural lobes of abdominal segments I–VIII with many short setae. Raster with pair of palidia (Fig. 59), each consisting of an irregular row of 12–16 pali, rows joined anteriorly. Septula elongate. Tegilla composed of many short, thick setae and some long setae. Lower anal lip with many short setae. *Legs*: Tarsungulus (Fig. 60) cylindrical, apex rounded and bearing 10–12 setae.

Second instar larva.—This description is based on three second instar larvae reared from eggs obtained from an adult female, fixed 12-VII-1997, with data as cited above (3 larvae) (IEXA). Similar to third instar except as follows: maximum width of head



61

Fig. 61. *Gymnetis flavomarginata sallei*, pupa., lateral view. Scale line = 5 mm.

capsule: 2.50–2.85 mm. Dorsoventral diameter of spiracles 0.25–0.28 mm. Each palidium with 10–12 pali.

First instar larva.—This description is based on 11 first instar larvae reared from eggs obtained from an adult female, fixed 9-V-1997, with data as cited above (11 larvae) (IEXA). Similar to second instar except as follows: maximum width of head capsule: 1.4–1.5 mm. Respiratory plates of spiracles kidney shaped; dorso ventral diameter of spiracles: 0.09–0.11 mm. With 1 acute, small eclosion spine, placed on ovate weakly sclerotized plate, on each side of metanotum. Palidia not defined.

Pupa, female.—This description is based on three pupae reared from eggs obtained from an adult female, fixed, 20-II-1998, with data as cited above (3 pupa) (IEXA).

Form: Body elongate, robust, exarate (Fig. 61). Yellowish white. Without velvety microtrichia on abdominal segments. **Head:** Strongly reflexed downward; antennae and mouth parts clearly separated. Ocular canthus, antennae, and compound eyes well-differentiated. Clypeus concave. Labrum tumid. Surface of frons irregularly convex. **Thorax:** Pronotal disk with irregular, shallow depressions toward sides; lateral margins not defined. Meso- and metanota dif-

ferentiated. Meso- and metascutellum narrowed posteriorly, apex rounded. Pteroteca widened, free, with apex rounded or slightly acute, compressed around body; hind wing teca slightly longer than elytron teca. Meso-metasternal process large, with rounded apex emerging between pro- and mesocoxae. Protibia with 4 short process on external border; meso- and metatibiae each with 2 rounded, short, apical spurs; all tarsomeres vaguely defined. **Abdomen:** Tergites I–VIII convex, without dioneiform organs or transverse carina on posterior borders. Tergo-lateral tubercles II–V prominent, surrounded by fine rugae. Spiracle I elongate, not prominent, partially protected by posterodorsal fleshy fold. Spiracles II–IV tuberculiform, with ring-like, sclerotized peritreme. Spiracles V–VII closed, tuberculiform, prominent, surrounded by fine rugae. Sternites II–VII convex, with fine transverse lines. Last tergite with lateral rugae around small tubercle, and rounded, fleshy lobes on the posterior border, without urogomphi. Genital ampulla wide, slightly convex, with fine mesial sulcus.

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LITERATURE CITED

- Arce, R. and M. A. Morón. 1999. El ciclo de vida de *Paragymnetis flavomarginata sallei* Schaum, 1849 (Coleoptera: Melolonthidae: Cetoniinae), con observaciones sobre su biología. *Folia Entomológica Mexicana* 105: 37-54.
- Blackwelder, R. E. 1944. Checklist of the Coleopterous insects of Mexico, Central America, the West Indies and South America, Part 2. United States National Museum Bulletin 185: 261-264.
- Micó, E., W. E. Hall, and B. C. Ratcliffe. 2001. Descriptions of the larvae of *Hoplopyga singularis* (Gory and Percheron) and *Hologymnetis cinerea* (Gory and Percheron) with a revised key to the larvae of New World Gymnetini (Coleoptera: Scarabaeidae: Cetoniinae). *Coleopterists Bulletin* 55(2): 205-217.
- Monné, M. A. 1969. Descripción del último estadio larval de "*Macraspis dichroa cribrata*" Waterh., "*Blaesia atra*" Burm. y "*Marmarina tigrina*" (Gory and Perch.) (Coleoptera: Scarabaeidae). *Revista Brasileira da Biologia* 29: 367-376.
- Morón, M. A. 1993. Observaciones comparativas sobre la morfología pupal de los Coleoptera Melolonthidae neotropicales. *Giornale italiano di Entomologia* 6: 249-255.
- . 1995. Fenología y hábitos de los Cetoniinae (Coleoptera: Melolonthidae) en la región de Xalapa-Coatepec, Veracruz, México. *Giornale italiano di Entomologia* 7: 317-332.
- Morón, M. A. and B. C. Ratcliffe. 1984. Description of the larva and pupa of *Argyripa lansbergei* (Sallé) with new distributional records for the genus and a key to the New World Gymnetini larvae (Coleoptera: Scarabaeidae: Cetoniinae). *Proceedings of the Entomological Society of Washington* 86: 760-768.
- Morón, M. A., B. C. Ratcliffe, and C. Deloya. 1997. Atlas de los escarabajos de México. Coleoptera, Lamellicornia, Vol. 1. Familia Melolonthidae. CONABIO y Sociedad Mexicana de Entomología, A.C. México. 280 pp.
- Ritcher, P. O. 1966. White Grubs and Their Allies. A Study of North American Scarabaeoid Larvae. Oregon State University Press, Corvallis. 219 pp.
- Vanin, S. A. and C. Costa. 1984. Larvae of Neotropical Coleoptera IX. Scarabaeidae, Cetoniinae, Gymnetini. *Revista Brasileira da Entomologia* 28: 329-335.