PAN-PACIFIC ENTOMOLOGIST
71(4): 237–244, (1995)

LARVA AND PUPA OF *ARCHEDINUS RELICTUS* MORÓN & KRIKKEN (COLEOPTERA: MELOLONTHIDAE, TRICHIINAE, INCAINI)

MIGUEL-ANGEL MORÓN
Departamento de Biosistemática de Insectos, Instituto de Ecología, A.C. Apdo. Postal 63 Xalapa, Veracruz 91000 México

Abstract.—The third-stage larva and the pupa of *Archedinus relictus* Morón & Krikken are described and illustrated, based on 9 specimens collected in the cloud forest of "El Triunfo," Chiapas, Mexico. Morphological characteristics are compared with those of *Inca clathrata sommeri* Westwood, with emphasis in pupal abdominal spiracles. A key to the known third-stage larvae of American Trichiinae is also included.

Resúmen.—Se describen la larva de tercer estadio y la pupa de *Archedinus relictus* Morón & Krikken, con base en 9 ejemplares colectados en el bosque nebular de "El Triunfo", Chiapas, México. Se comparan las características morfológicas de esta especie con las de *Inca clathrata sommeri* Westwood, destacando la estructura de los estigmas respiratorios abdominales de las pupas. Se proporciona una clave para separar las larvas de tercer estadio conocidas hasta la fecha de los Trichiinae americanos.

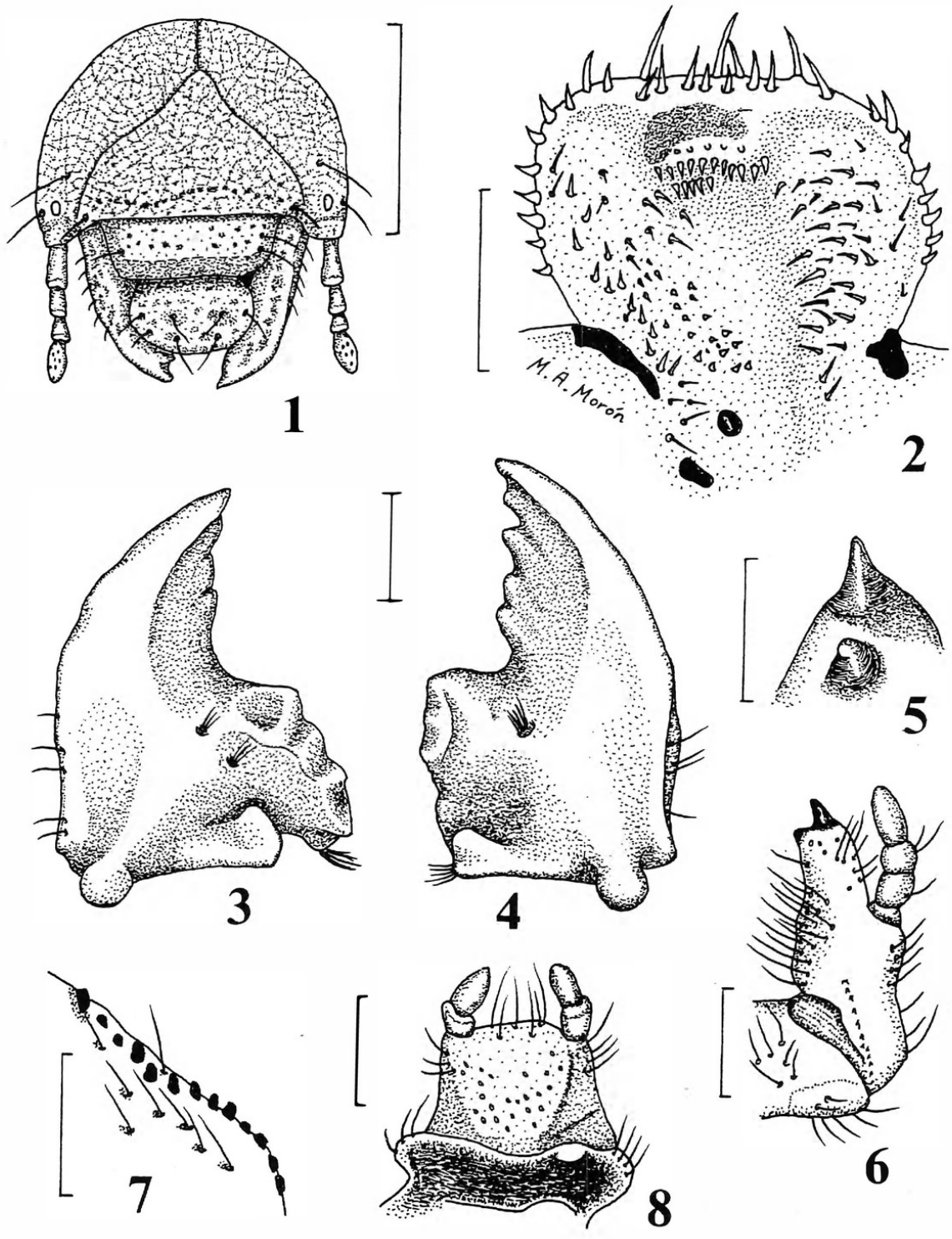
Key Words.—Insecta, Coleoptera, Trichiinae, *Archedinus,* immature stages, morphology, taxonomy, America

The tribe Incaini is formed by ten Neotropical species of *Inca* Le Peletier & Serville, *Golinca* J. Thomson, *Pantodinus* Burmeister and *Archedinus* Morón & Krikken (Krikken 1984, Morón & Krikken 1990). The two former genera have a wide Central and South American distribution, and the two later genera have a very restricted, relictual distribution in the humid mountains of Chiapas, México and Guatemala. At present, only the third stage larvae and pupae of *Inca clathrata sommeri* Westwood and *Inca bonplandi* (Gyll.) are described and illustrated (Morón 1983, Costa et al. 1988).

During a fortunate collecting trip conducted in 1983 by Roberto Terrón and Bert Kohlmann in the cloud montane forest located in "El Triunfo," State of Chiapas, a small lot of "cetoniid-like" larvae with remnants of one female was found under rotten logs. After rearing in a laboratory in Mexico City, we obtained only one female pupa of *Archedinus relictus* Morón & Krikken. In this paper, the larva and pupa of this species are described and compared with the immature stages of *Inca* species. Technical terms used are those of Ritcher (1966) and Morón (1983, 1987, 1993). The descriptions are based on 8 third stage-larvae and one cast skin of third-stage larva reared to pupa collected in association with remnants of adult female (see Material Examined).

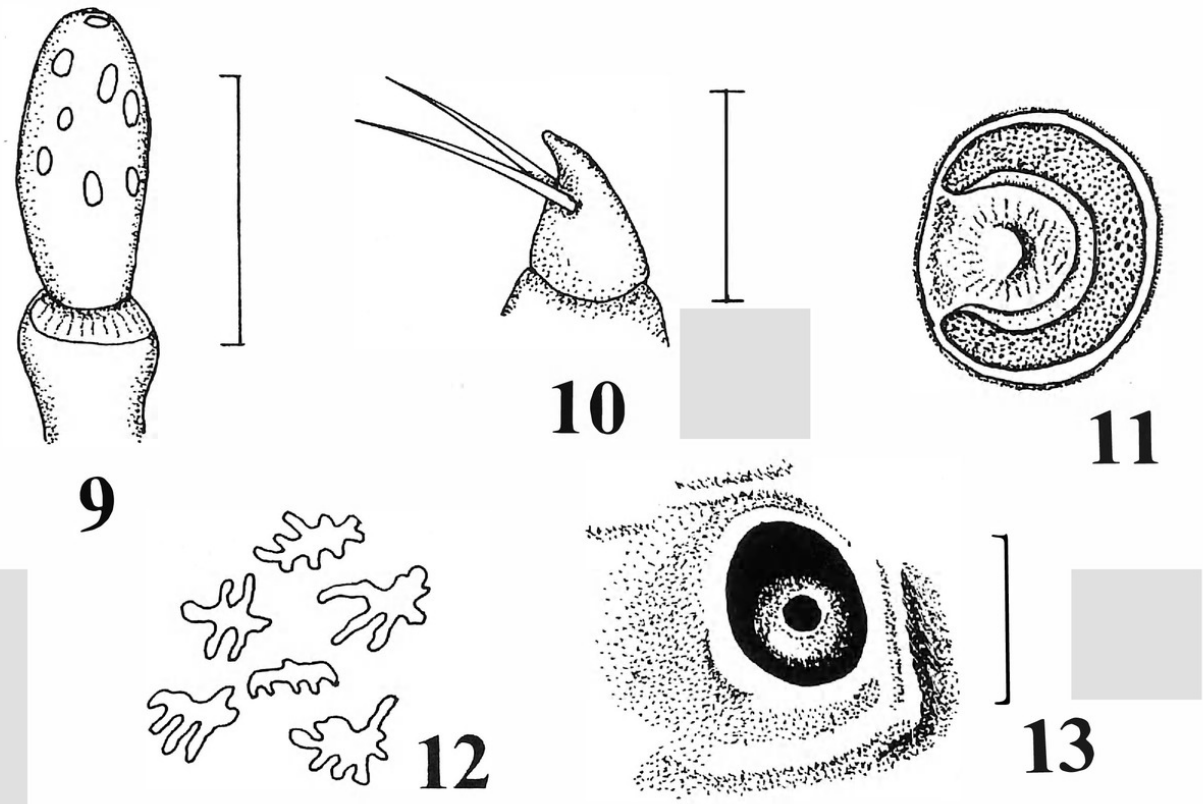
ARCHEDINUS RELICTUS MORÓN & KRIKKEN, 1990, (Figs. 1–13)

Third-Stage Larva.—*Head.* Maximum width of head capsule 6.6–7.7 mm. Surface of cranium finely and densely rugose punctate, red-brown. Frons (Fig. 1) with only 1 seta on each anterior frontal angle and remaining cranial surface with only 2 para-ocellar setae on each side. Clypeus (Fig. 1) with 1 seta at right margin and 2 setae at left margin. Labrum (Fig. 1) ovate, slightly asymmetrical, with 2 central



Figures 1–8. *Archedinus relictus* third-stage larva. Figure 1. Frontal view of head. Figure 2. Epipharynx. Figure 3. Ventral view of right mandible. Figure 4. Ventral view of left mandible. Figure 5. Inner view of apex of right maxilla. Figure 6. Dorsal view of right maxilla. Figure 7. Detail of right maxillary stridulatory area. Figure 8. Dorsal view of hypopharynx. Scale lines are 1 mm, except Fig. 1 (5 mm) and Figs. 5 and 7 (0.5 mm).

setae, 1–2 lateral setae and 2 anterior setae. Ocelli present. Epipharynx (Fig. 2) with vague zygum and without clithra, 1 anterior row of 5 small tubercles, 1 irregular transverse row of 11 spine-like setae and 1 posterior row of 6 spine like setae on the haptomeral region; right chaetoparia with 24–28 spine-like setae and 18–21 very short conical setae; left chaetoparia with 32–38 spine-like setae and 4–5 very short conical setae; dexiotorma elongated and laeotorma shortened; sense cone well developed,



Figures 9–13. *Archedinus relictus*. Figures 9–12. third-stage larva. Figure 9. Dorsal view of last antennal article. Figure 10. Right hind tarsal claw, inner view. Figure 11. Third abdominal spiracle. Figure 12. Detail of "holes" in the respiratory plate. Figure 13. Fourth right abdominal spiracle of *A. relictus* pupa. Scale lines are 1 mm in figures 9 and 13, or 0.5 mm in Figs. 10–11.

sclerotized; acanthopariae with 8 short spine-like setae (Fig. 2). Scissorial area of right mandible with 4 teeth; premolar area without teeth; molar area with 3 flattened lobes; rounded ventral process; slightly prominent calx and brustia formed by 5 setae (Fig. 3). Scissorial area of left mandible with 3 teeth, well separated by 2 notches; premolar area with 2 teeth; molar area with 1 lobe; acia not developed; rounded ventral process, brustia formed by 5 setae (Fig. 4). Stridulatory area of each mandible absent. Galea with sharply pointed conical uncus; lacinia with 1 reduced, rounded uncus (Figs. 5–6); maxillary stridulatory area with 12 irregular shaped, not pointed teeth, and a distal rounded process (Figs. 6–7). Labium short, with scarce medium size setae; hypopharyngeal sclerome well developed, with asymmetrical, rounded, heavily sclerotized prominence (Fig. 8). Dorsal surface of last antennomere with 7–10 sensory spots (Fig. 9). *Thorax*. Prothoracic spiracles 0.80 mm long and 0.56 mm wide. Prothoracic sclerome wide, orange-yellow. Dorsa of thoracic segments covered with a great number of short and medium size setae (0.3–0.9 mm length), and transverse rows of very long slender setae (VLSS) (2.9–3.6 mm length) as follows: pronotum VLSS 1 (8); mesoprescutum VLSS 1 (4); mesoscutum VLSS 1 (10–14); mesoscutellum VLSS 1 (4); metaprescutum VLSS 1 (4); metascutum VLSS 1 (10–12); metascutellum VLSS 1 (4). Tarsal claws in all the legs similar in size and shape, with 2 internal preapical setae (Fig. 10). *Abdomen*. Spiracles I-VII similar in size, 0.72 mm long and 0.56 mm wide; spiracle VIII slightly small 0.60 mm long and 0.56 mm wide; respiratory plate yellow, C-shaped, with a maximum of 20-22 irregular ameboid "holes" along any diameter; bulla nearly flat with a small central rounded prominence; distance between the two lobes subequal to the dorsoventral diameter of the bulla (Figs. 11–12). Dorsa of abdominal segments covered with a dense cover of short and medium size setae (0.3–0.9 mm length), and transverse rows of very long slender setae (VLSS) (2.9–3.6 mm length) as follows: segment I VLSS 2 (3-14); II VLSS 3 (4-4-18); III VLSS 3 (10-4-14); IV VLSS 3 (10-4-16); V VLSS 3 (10-3-10); VI VLSS 3 (12-4-18); VII VLSS 3 (10-4-14); VIII VLSS 2 (4-16); IX VLSS 2 (2-10); X VLSS 2 (8-8). Venter of abdominal segments I–VIII also with transverse rows of VLSS (Fig. 13). Anal slit transverse, slightly curved. Upper anal lip with a great number of

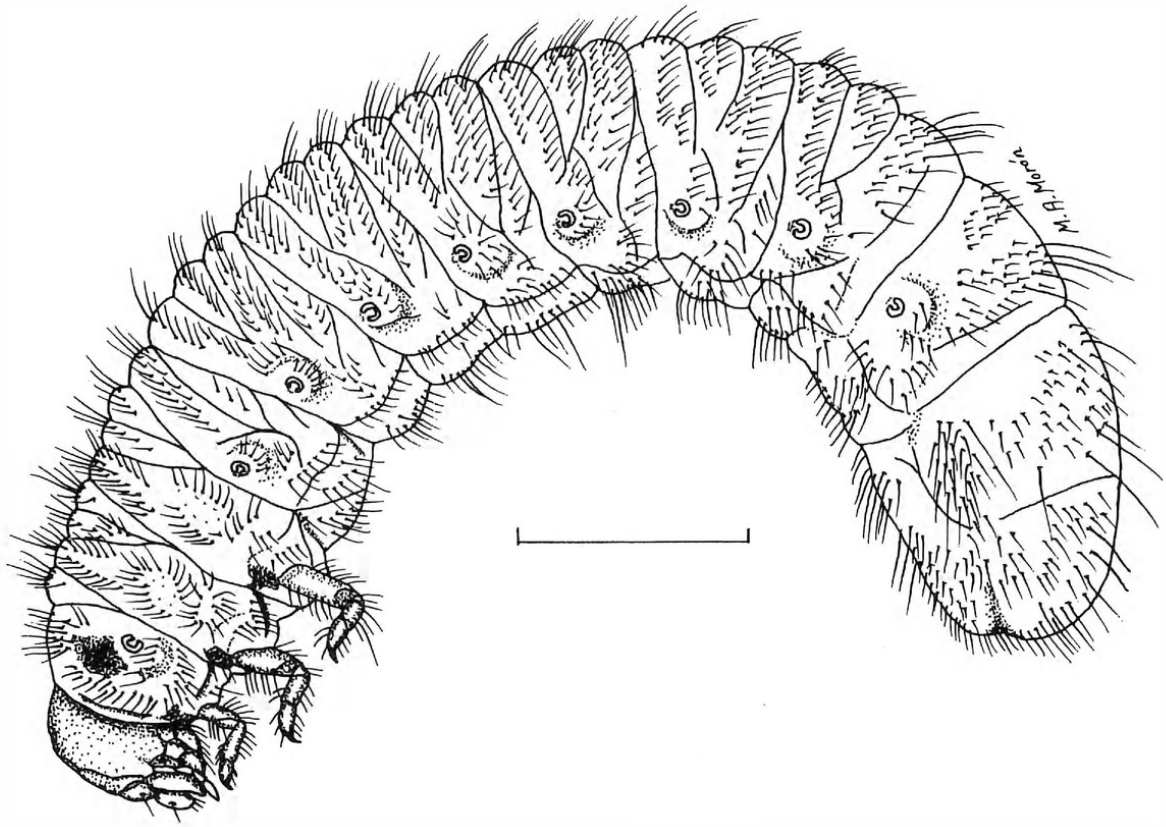


Figure 14. Lateral view of *Archedinus relictus* third-stage larva. Scale line is 10 mm.

long, stout setae; lower anal lip with 24-30 VLSS and a great number of short stout setae; septula and palidia absent. *Approximate dorsal body length:* 70–83 mm.

PUPA.—(Figs. 14–15).—*Female.* Body elongate, robust, exarate. Yellow-red. Covered by very fine, velvety golden microtrichia. *Head.* Strongly reflexed downward; antennae and mouth parts clearly separated; occular canthus and compound eyes well differentiated; clypeus tumid; labrum excavate; surface of frons very irregular. *Thorax.* Pronotal disk with a rounded tubercle near middle of anterior margin and irregular shallow depressions extended toward sides; lateral margins well defined. Meso- and metanota differentiated. Pterotecae narrow, free, not much compressed around body; hind wings slightly longer than elytra. Rounded prosternal process emerging between procoxae; metasternum with 2 divergent carinae. Protibiae with 3 short processes on external borders, ventral sulci and preapical spur well defined; meso- and metatibiae each with 2 rounded apical spurs; all tarsomeres vaguely defined. *Abdomen.* Terguites I–II with a well developed pair of dioneiform organs; terguites II–VI with 4 pairs of poorly developed dioneiform organs, decreasing progressively in definition and size from terguite III to VI. Pleural lobes II–VI prominent. Spiracle I tuberculiform, protected by anteroventral and posterodorsal fleshy folds. Spiracles II–IV tuberculiform, protected inside deep ovate, partially opened chambers, located in the prominence of each pleural lobes (Figs. 14–15); the inner walls of such spiracular chambers lack velvety golden microtrichia. Spirales V–VI closed and sunken surrounded by rugae. Spiracles VII–VIII closed, very small, surrounded by fine rugae. Sternites II-VII with fine transverse striae. Last terguite only with a pair of small rounded tubercles, without urogomphi. Genital ampulla wide, flattened, slightly bilobated by fine mesial sulcus. *Body length:* 38 mm. *Maximum body width:* 14 mm.

Diagnosis.—The great number of very long slender slightly red setae that cover nearly all the body, the very reduced cranial chaetotaxy, the structure of spiracles, and the absence of stridulatory areas in the mandibles distinguish the third-stage larva of *Archedinus relictus* from any other Trichiinae larvae. The larvae of *Inca clathrata sommeri* and *Inca bonplandi* are also very large (80–120 mm) and bears

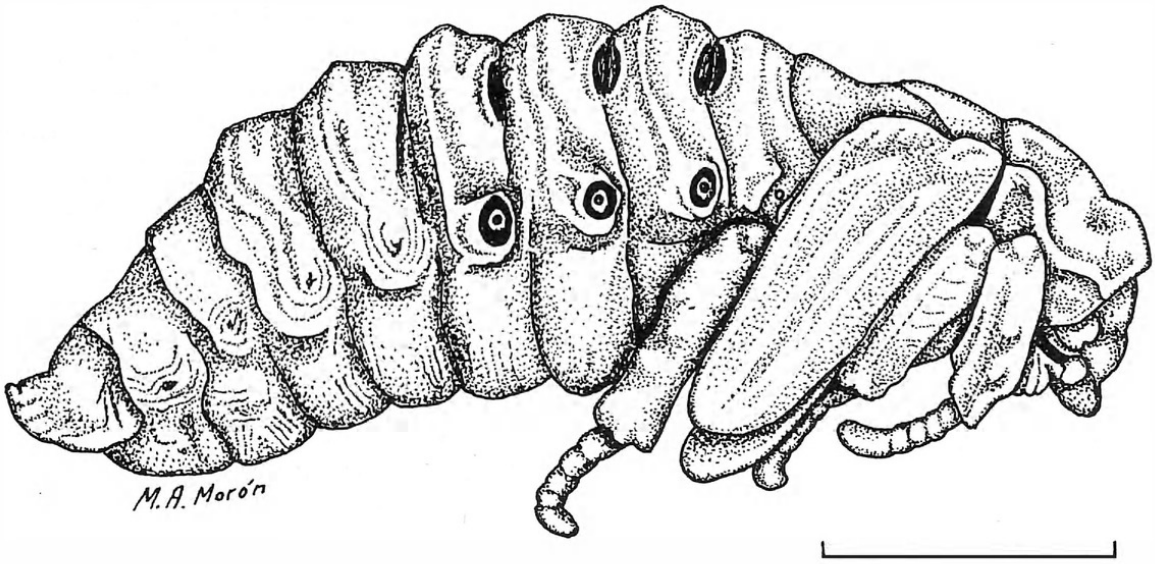


Figure 15. Lateral view of *Archedinus relictus* female pupa. Scale line is 10 mm.

dense vestiture, but present dorso-epicranial setae, the lobes of respiratory plates are more approximated, the "holes" of respiratory plate are not ameboid in shape; the mandibles present fine ovate stridulatory areas; and each tarsunguli bears a pair of basal setae, instead the pair of preapical setae observed in *A. relictus.* The third-stage larval cast skin of *A. relictus* present the ecdisial opening shortened, running from epicranial suture to third abdominal terguite, like *I. clathrata.* Differences and similarities with other Trichiinae larvae are evident in the attached key, which includes data from Howden (1968), Ratcliffe (1977), Costa et al (1988) and Delgado & Morón (1991).

On the other hand, the structure of pupal abdominal spiracles II–IV of *A. relictus* (Fig. 13) is completely different from other known spiracles in the pupae of Trichiinae, Cetoniinae, Rutelinae, Dynastinae and Melolonthinae. The position of a tubercle-like spiracle with small rounded atrium at the bottom of a polished deep cavity represents a very different design within the rotten log inhabiting scarab species. Usually, the spiracles II–IV of the xylophilous pupae are narrow slit apertures with conspicuous peritremae, partially hidden between the intersegmental folds (vg. Dynastinae, Rutelinae) or are rounded apertures with thickened peritremae placed on rounded tubercles (e.g., Trichiinae, Cetoniinae).

Material Examined.—MEXICO. *STATE OF CHIAPAS.* Angel Albino Corzo Municipality, Reserva "El Triunfo", 28 Feb 1984, 1850 m, R. Terrón, under rotten log of *Guarea* sp. (Meliaceae), 8 third-stage larvae, 1 cast skin of third-stage larva reared to pupa.

Key to Third-Stage Larvae of Some American Trichiinae
Modified from Ritcher, 1966 and Morón, 1983)

1. Clithra present. Abdominal segments IX–X dorsally fused. Maximum width of head capsule 5–7 mm. (Southern to Southeastern Canada and Northeastern to Central U.S.A.) ..... *Osmoderma* Serv. . . . 2

1′. Clithra absent. Abdominal segments IX–X clearly separated 3

2(1). Abdominal spiracles VII–VIII larger than spiracles I–VI. Dorsa of abdominal segments VII–VIII each with 2 annulets, each bearing a transverse patch of fairly short setae and a posterior, sparsely set row of longer setae . . *O. eremicola* Knoch and *O. subplanata* (Casey)

2′. Abdominal spiracles I–VIII similar in size. Dorsa of abdominal segments VII–VIII each with 2 widely separated, sparsely set rows of long setae but with only a few short setae anterior to each row . . . . . *O. scabra* (Beauv.)

3(1′). Premolar area of left mandible without teeth. Last antennal segment with 1–3 dorsal sensory spots. Maximum width of head capsule 2.6–3.8 mm 6

3′. Premolar area of left mandible with 2 teeth. Last antennal segment with 7–13 dorsal sensory spots. Maximum width of head capsule 6.6–9.5 mm 4

4(3′). Stridulatory area of each mandible absent. Dorsoepicarnial setae absent. Maxillary stridulatory area with 12 irregular, not pointed teeth. Spiracle respiratory plates with ameboid shaped "holes." Tarsal claws with 2 internal preapical setae. Dorsa and venter of abdominal segments with a great number of very long (2.9–3.6 mm length) slender setae. (Southern part of State of Chiapas, Mexico) . . . . . *Archedinus relictus* Morón & Krikken

4′. Stridulatory area of each mandible present, well developed. Dorsoepicranial setae present. Maxillary stridulatory area with 8 sharply pointed teeth. Spiracle respiratory plates with polygonal shaped "holes." Tarsal claws with 2 internal basal setae. Dorsa and venter of abdominal segments with a great number of long (0.8–2.7 mm) slender setae . . . . . *Inca* LePeletier & Serville . . . 5

5(4′). Head capsule with 4–5 dorsoepicranial setae and 4 posterior frontal setae on each side. Labrum with 10–12 discal setae. (Eastern and Southeastern Mexico to Panama) . . *I. clathrata sommeri* Westwood

5′. Head capsule with 3 dorsoepicranial setae on each side and without posterior frontal setae. Labrum with 4 discal setae. (Southern Brazil and Northern Argentina) . . . . . *I. bonplandi* Gyllenhal

6(3). Last antennal segment with 3 dorsal sensory spots. Haptomerum without spine-like setae or tooth-like process. Maxillary stridulatory area with 3 sharp, anteriorly directed teeth. Head capsule with 1 dorsoepicranial seta, 1 posterior frontal seta and 3 anterior frontal setae on each side. (Southern part of State of Guerrero, Mexico) . . . . . *Iridisoma acahuizotlensis* Delgado & Morón

6′. Last antennal segment with 1 dorsal sensory spot. Haptomerum with a circlet of stout, spine-like setae interrupted by a tooth-like process 7

7(6′). Scissorial area of left mandible with 2 teeth. Lacinia with a single terminal uncus. (Southeastern U.S.A.) . . . . . *Trigonopeltastes delta* (Forster)

7′. Scissorial area of left mandible with 3 teeth. Lacinia with 2 basally fused unci 8

8(7′). Frons with an anterior semicircular depression. Labrum without a

median, transverse, emarginate protuberance. (Southeastern Canada and Northeastern U.S.A.) ..... *Gnorimella maculosa* (Knoch)

8′. Frons without anterior depression, convex. Labrum with a median, transverse, emarginate protuberance ..... *Trichiotinus* Casey . . . 9

9(8′). Spiracles of abdominal segment VIII much smaller than those of abdominal segments I–VII. Raster with more than 50 very small, stout setae among and anterior to which are only a very few long acicular setae. (Eastern Texas to Virgina, U.S.A.) ..... *T. lunulatus* (Fabr.)

9′. Spiracles of abdominal segments I–VIII similar in size. Raster with 40 or fewer, very small, stout setae among which, or anterior to which, are many long, acicular setae 10

10(9′). Raster with less than 10 very short setae, all of them spine-like and borne close to lower anal lip posterior to the acicular setae. (Southern Canada, Central and Northeastern, U.S.A.) ..... *T. affinis* (Gory & Percheron)

10′. Raster with 15 or more very short setae, but all of them not always spine-like. Short setae scattered among the long, acicular setae 11

11(10′). Maxillary stridulatory area with 2–4 sharp teeth. (Southern Canada and Northern U.S.A.) ..... *T. assimilis* (Kirby)

11′. Maxillary stridulatory area with 4–6 sharp teeth 12

12(11′). Each lateral, pedal area on the sterna of abdominal segments III–VI usually with 3–5 setae. (Southeastern Canada and Eastern U.S.A.) ..... *T. piger* (Fabr.)

12′. Each lateral, pedal area on the sterna of abdominal segments III–VI with 2 long setae. (Eastern U.S.A.) ..... *T. bibens* (Fabr.)

Acknowledgment

Special thanks are extended to Roberto Terrón (UAM-X, México City) for providing the larvae of *A. relictus.*

Literature Cited

Costa, C, S. A. Vanin & S. A. Casari-Chen. 1988. Larvas de Coleoptera do Brasil. Museo de Zoología, Universidade de Sao Paulo.

Delgado, C. L. & M. A. Morón. 1991. A new genus and species of Trichiini from Mexico (Coleoptera: Melolonthidae). Pan-Pacif. Entomol. 67: 181–188.

Howden. H. F. 1968. A review of the Trichiinae of North and Central America (Coleoptera: Scarabaeidae). Mem. Entomol. Soc. Canada, 54.

Krikken, J. 1984. A new key to the suprageneric taxa in the beetle family Cetoniidae, with annotated lists of the known genera. Zool. Verhand, 210.

Morón, M. A. 1983. Los estados inmaduros de *Inca clathrata sommeri* Westwood (Coleoptera: Melolonthidae, Trichiinae) con observaciones sobre el crecimiento alométrico del imago. Folia Entomol. Mex., 56: 31–51.

Morón, M. A. 1987. Los estados inmaduros de *Dynastes hyllus* Chevrolat (Coleoptera: Melolonthidae, Dynastinae) con observaciones sobre su biología y el crecimiento alométrico del imago. Folia Entomol. Mex., 72: 33–74.

Morón, M. A. 1993. Observaciones comparativas sobre la morfología pupal de los Coleoptera Melolonthidae neotropicales. G. it. Entomol., 6: 249–255.

Morón, M. A. & J. Krikken. 1990. A new Mesoamerican genus of Trichiinae (Coleoptera: Scarabaeoidea). Folia Entomol. Mex., 78: 71–84.

Ratcliffe, B. C. 1977. Descriptions of the larva and pupa of *Osmoderma subplanata* (Casey) and *Cremastocheilus wheeleri* LeConte (Coleoptera: Scarabaeidae). J. Kansas Entomol. Soc., 50: 363–370.

Ritcher, P. O. 1966. White Grubs and their allies. A study of North American Scarabaeoid Larvae. Oregon State University Press, Corvallis, Oregon.