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IMMATURES OF *TAPURUIA FELISBERTOI* LANE, 1973 (CERAMBYCIDAE, CERAMBYCINAE, HEXOPLONINI)

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EXPEDITO A.W. STEFFANELLO²

ABSTRACT

The larva and pupa of Tapurua felisbertoi Lane, 1973, collected in Hevea brasiliensis (Euphorbiaceae) in Mato Grosso, Brazil, are described and illustrated. Biological data and a comparison with the larvae of other Hexoplonini species are also presented.

KEYWORDS: Brazil; Coleoptera; Larva; Pupa; Rubber tree.

INTRODUCTION

The tribe Hexoplonini currently contains 20 genera and 143 species. All genera are recorded from South America, except one from Cuba (Martins, 2006). Immatures of two genera of this tribe are known: larva and pupa of *Gnomidolon varians* Gounelle, 1909, described by Meyer (1967) and of *Tetraibidion aurivillii* (Gounelle, 1908), described by Pentead-Dias (1978).

The genus *Tapurua* includes three species and until now, the immatures were unknown. *Tapurua felisbertoi* is recorded from Brazil (Amazonas, Pará and Goiás, and now includes Mato Grosso). The biology of this species was described and illustrated by Martins (2006), based on material collected in *Hevea brasiliensis* (Euphorbiaceae) in Goianésia, Goiás. Herein, larva and pupa of this species are described and illustrated based on material collected in the same host plant in Sinop, Mato Grosso.

MATERIAL AND METHODS

The material studied was received by Dr. Ubirajara R. Martins, of the Museu de Zoologia da Universidade de São Paulo (MZUSP) for identification. He received many pupal chambers, each with one specimen inside. The majority arrived at the laboratory as pupa or adult.

The material was collected in a rubber plantation at "Chacara Carli" in Sinop, MT, in September of 2009, during the infestation period of the trees.

The larva and the pupae were killed in hot water and are preserved in alcohol; the adults and the pupal chambers are preserved dry.

Photographs of the larvae, pupae, pupal chambers and trees were taken (by EAWS) in September 2009 and those of the trees also in March 2010.

The general nomenclature in the descriptions follows especially Duffy (1960) and Lawrence (1991).

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RESULTS

Tapuruia felisbertoi Lane, 1973

Larva

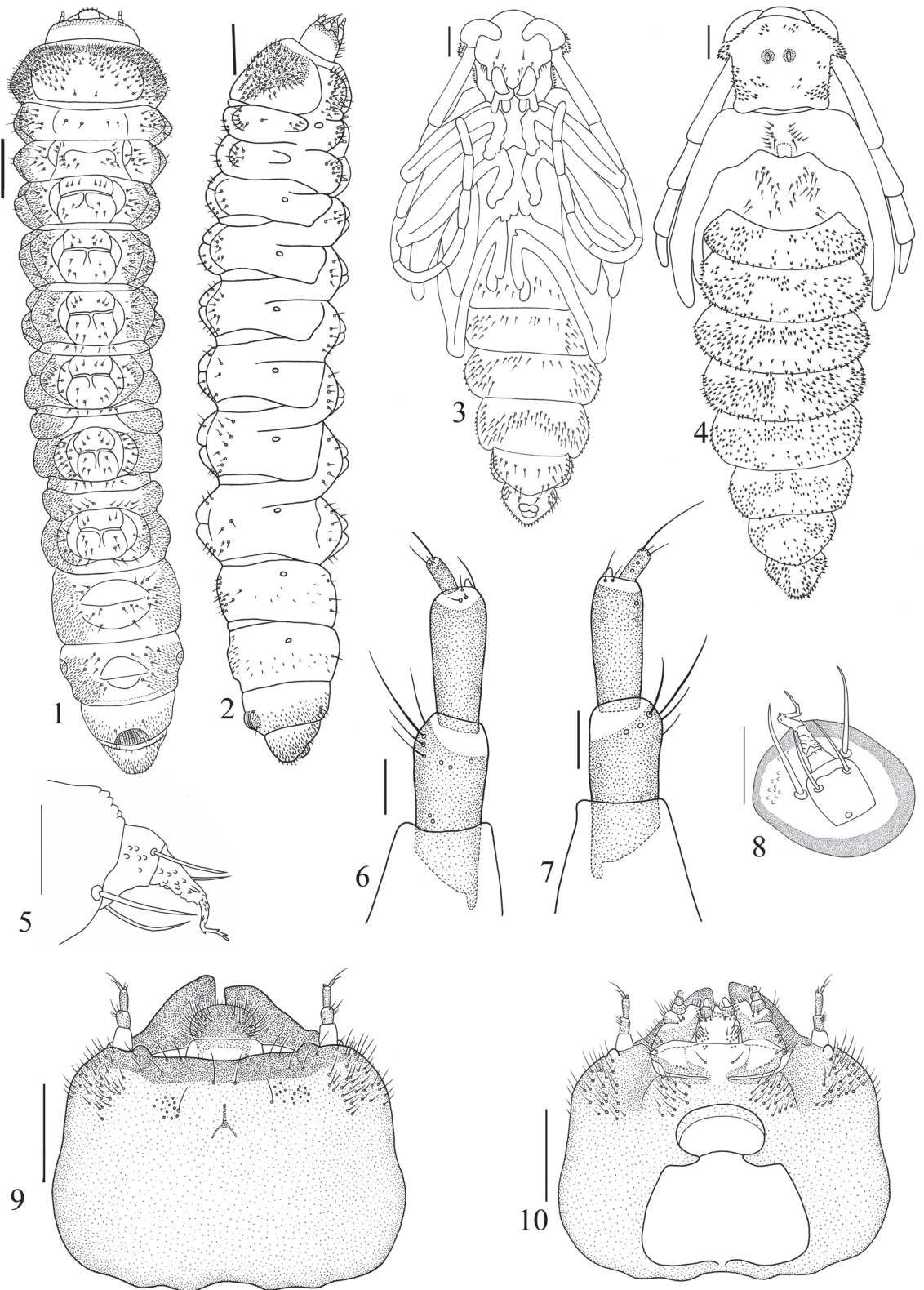
(Figs. 1, 2, 5-23, 28-31)

Length (mm): 25.5; width of prothorax: 5; width of head: 3.7.

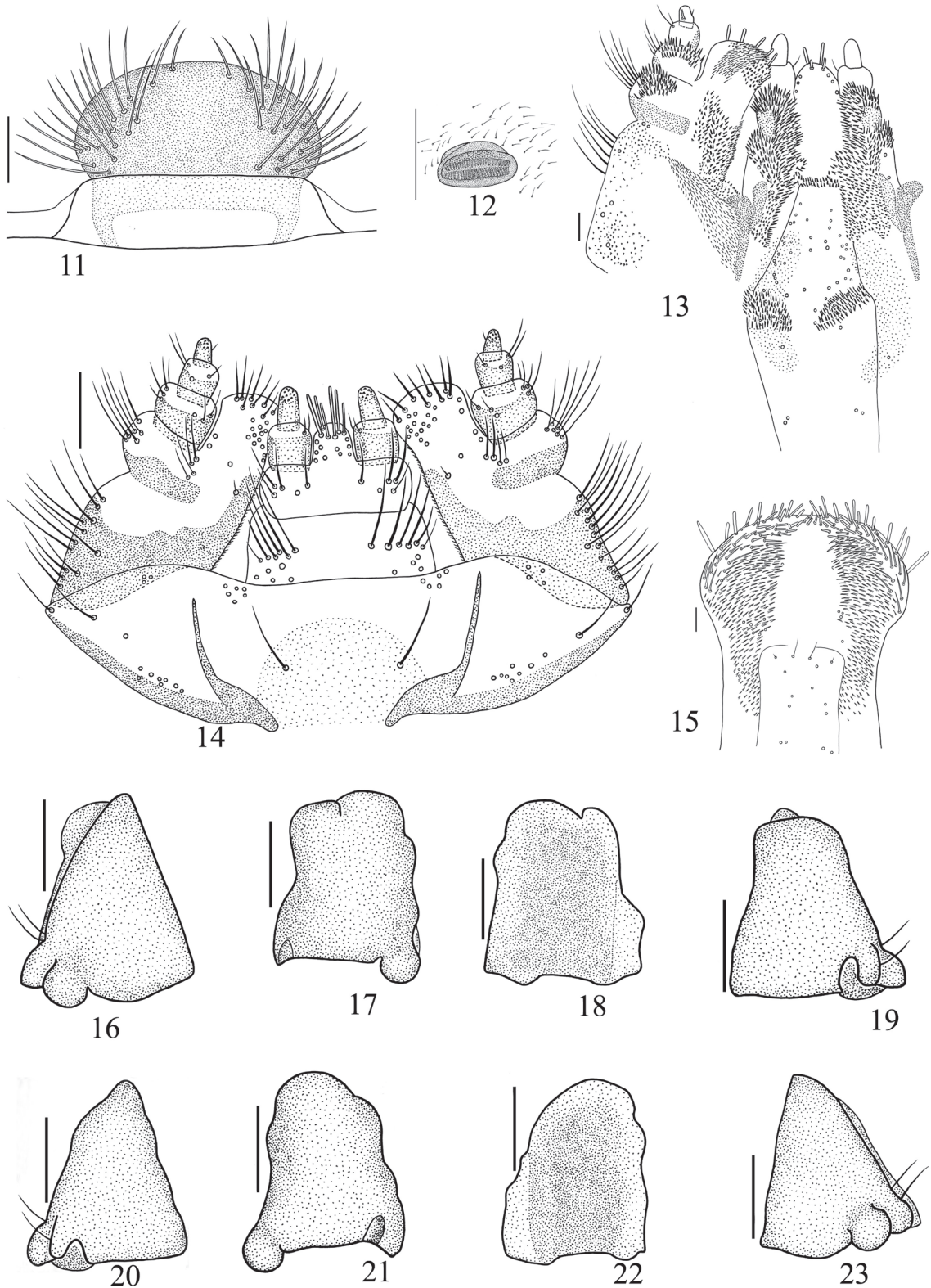
Body elongate, cylindrical, slightly flattened and slightly narrowed apicad (Figs. 1, 2). Surfaces apparently smooth; pubescence sparse, simple, fine and reddish-brown, from short to moderately long, more concentrated on pronotum and distributed especially dorsally and ventrally; laterally, pubescence very short, minute, not represented in Fig. 2. Body yellow (Figs. 28-31), after fixation, yellowish; pronotum (except anterior and lateral margins) and median region (ampullae) of mesonotum, metanotum and abdominal segments I-VI dorsally, whitish; prosternum and median region (ampullae) of mesosternum, metasternum and abdominal segments I-VI ventrally, whitish. Head yellowish with frontal margin from brownish to black; mandibles black; labrum, antennae (except antennifer), maxillae and labium (partially) and spiracular openings brownish; pronotum marginated lateral- and anteriorly by yellowish-brown band, anterior band interrupted at middle; segment IX with a median dorsal brownish patch, near apex.

Head (Figs. 1, 2, 9, 10) extensible, deeply retracted into prothorax; retracted portion glabrous; prognathous, moderately flattened; occipital foramen very large, divided into two portions: pars minor elliptical and pars major wider than long, trapezoidal. Head capsule, dorsally, entire. Median suture and endocarina absent; frontal suture indistinct. Frons margin almost straight with a rounded prominence each side; strongly sclerotized, with seven setae each side: two setae near frontoclepeal suture; three internally near antennal base, one near middle on darker area and one below darker area. Each epicranial half with many laterodorsal and lateroventral setae, below antenna. One stemma each side, ventrally on elevation below antenna (Fig. 10). Ventrally, limit between gula and hypostoma indistinct; hypostomal sutures short; hypostoma with many moderately long setae laterally. Antenna (Figs. 6, 7) long, as long as mandibles, with three antennomeres; antennifer elongate and membranous; first and second antennomeres elongate; first with four long setae lateroexternally and eight campaniform sensilla (three dorsal and five ventral); second narrower than first, bearing near apex, dorsally

one campaniform sensilla and two moderately long setae and ventrally three shorter setae, and at apex, third antennomere located lateroexternally and one short membranous conical sensorial appendix laterointernally; third antennomere smaller, bearing two campaniform sensilla dorsally near middle and one long and two shorter setae at apex. Clypeus (Fig. 11) membranous, glabrous, transverse, band-like with fore angles rounded. Labrum (Fig. 11) wider than long, margins strongly rounded, bearing many long setae more concentrated laterally. Epipharynx (Fig. 15) with anterior half wide, narrowed at basal half; covered by spines, except median region; spines decreasing in size basad; anterior margin bearing a band of wide and/or long setae; with two long and two short setae near middle of basal half; many campaniform sensilla distributed among spines and below median setae. Mandibles asymmetrical (Figs. 16-23), wide and concave at mesal region; bearing two lateroexternal setae near base; penicillus absent; right mandible (Figs. 16-19) wider, bearing two wide rounded well defined lobes at apex, and one subapical small lobe lateroventral; left mandible (Figs. 20-23) with one wide rounded apical lobe and one small sub-apical lobe each side. Maxillae (Figs. 13, 14): cardo fused with submentum, with two moderately long setae lateroexternally and several campaniform sensilla near base; stipes ventrally partially membranous, with many long setae near lateroexternal margin; stipes dorsally with microscopules moderately sparse and some campaniform sensilla near lateral margin and spines a little longer in a transverse triangular area near middle; maxillary lobe with apex widely rounded; ventrally with eight long setae, many campaniform sensilla and one short seta at base near internal margin; dorsally with microscopules and one wide seta at internal margin near apex; palpifer partially membranous, sclerotized near base; bearing ventrally six long setae lateroexternal and four laterointernal and dorsally many lateroanterior spines. Maxillary palpi with three palpomeres: basal palpomere wider than long, bearing ventrally, four lateroexternal and two laterointernal setae and one campaniform sensillum; median palpomere longer than wide, bearing ventrally two long setae lateroexternal, one shorter laterointernal and one campaniform sensillum near middle; distal palpomere shorter, elongate, bearing one seta laterointernal near apex and many peg-like sensilla at apex; dorsally, basal palpomere bearing a band of spines on anterior third and distal palpomere with one wide seta near middle. Labium (Figs. 13, 14): submentum apparently fused to cardo, bearing two long setae near middle and several campaniform sensilla each side below mentum;



FIGURES 1-10: *Tapuruia felisbertoi* Lane, 1973. Larva: 1, dorsal; 2, lateral, 5, 8, leg (lateral, dorsal); 6, 7, right antenna (ventral, dorsal); 9, 10, head (dorsal, ventral). Pupa: 3, ventral; 4, dorsal. Bars = 1 mm, except Figs. 1, 2 = 2 mm.



FIGURES 11-23: *Tapuruiia felisbertoi* Lane, 1973. Larva: **11**, clypeus and labrum; **12**, thoracic spiracle; **13**, **14**, maxillae and labium (dorsal, ventral); **15**, epipharynx; **16-19**, right mandible (ventral, external, internal, dorsal); **20-23**, left mandible (dorsal, external, internal, ventral). Bars = 5 mm, except Figs. 2, 14 = 2 mm and Figs. 13, 15 = 1 mm.

mentum band-like, each side with a transverse row, near middle, with six long and four campaniform sensilla near base; prementum band-like bearing each side four long setae and one campaniform sensillum below palpus; ligula as long as basal palpomere, narrow with rounded apex, bearing ventrally six wide and long setae near apex and several campaniform sensilla, and dorsally, two wide and shorter setae at middle near apex and three campaniform sensilla each side near lateral margin. Labial palpi with two palpomeres: basal as long as wide, bearing ventrally two lateroventral setae; palpomere distal elongate bearing many peg-like sensilla at apex. Hypopharynx (Fig. 13) partially covered by microspicules, with three sclerites each side: two elongate and narrow near middle of lateral margin and one larger near base; many campaniform sensilla at middle near base.

Prothorax wider than head; pronotum wider than long, longer than meso- or metanotum, with a transverse narrow groove parallel basal margin; groove with apices anteriorwardly directed, reaching almost a half of pronotum length (U-shaped). Meso- and metathorax band-like, together almost as long as pronotum; mesonotum with one pair of longitudinal

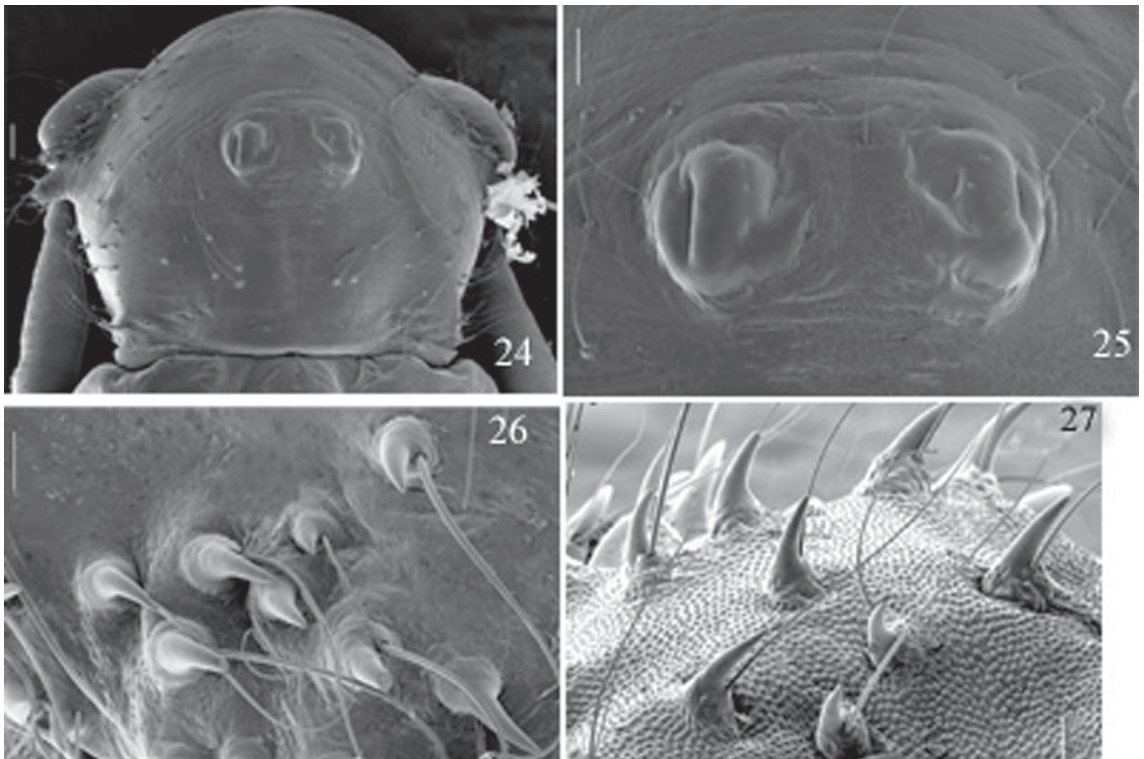
slightly curved narrow grooves; metanotum and meso- and metasternum, each with one median ampulla. Mesothorax with one pair of lateroanterior well developed elliptical spiracles (Fig. 12). Legs (Figs. 5, 8) very short and 3-segmented; coxa with sclerotized ring at base, and two long setae lateroventrally; median segment wide with two long dorsal setae and some small rugosities; distal segment longer than median, gradually narrowed apicad, bearing small rugosities.

Abdominal segments I-VI transverse, bilobed laterally, each with one ampulla dorsal and one ventral; segments VII-VIII, transverse, each with one vestigial dorsal ampulla; segment IX transverse, narrower with median dorsal sclerotized patch near apex; segment X apical, conical, with anal opening ventrodistal, bilobed ventrally; segments I-VIII, each with one pair of lateral elliptical spiracles, shorter than thoracic.

Pupa

(Figs. 3, 4, 24-27, 29-31)

Length (mm): 18-21; width of prothorax: 2.5-3.0.



FIGURES 24-27: *Tapuruia felisbertoi* Lane, 1973. Pupa: **24**, pronotum; **25**, tubercles of pronotum; **26**, spines of pronotum; **27**, spines of abdomen. Bars = 40 µm except Fig. 24 = 200 µm and Fig. 25 = 100 µm.

Coloration yellow; yellowish after fixation. Setae simple, short and ferruginous. Pronotum and abdominal segments bearing many sclerotized spines each with one seta at base (Figs. 26, 27) (setae not represented in Fig. 4). Pronotum almost as long as wide, slightly narrowed basad; anterior margin rounded, slightly prominent at middle; lateral margin prominent anteriorly forming a well developed lobe each side at fore angle; spines on and near lateroanterior lobes, medioanteriorly and more concentrate laterally near base. Pronotum near middle with two sclerotized tubercles; sclerotization interrupted longitudinal medially giving an impression of glandular opening, but when imaged with MEV it is completely closed (Figs. 24, 25) with only a fold of integument.

Mesonotum short, with small darker mediobasal area; with setae of varied sizes near middle. Metanotum longer than mesonotum, with several setae,

some with tiny spines at base (spines not represented in Fig. 4). Abdomen narrowed apicad; abdominal segments, dorsally covered by setous spines; spines smaller on segments V, VI and anterior region of VII; segments I-VI with one elliptical spiracle each side, decreasing in size apicad; ventrally each segment with simple setae.

Pupal chamber (Figs. 30, 31)

Length (mm): 23-29; width: 15-19.

Oval shape; external appearance bark-like. Walls very thin: externally concave, formed by fine layer of bark covered internally by a brown cement-like mixture, probably including latex and frass; internal wall flat, whitish, formed by latex.



FIGURES 28-31: *Tapuruia felisbertoi* Lane, 1973. **28**, young larva under bark; **29**, larvae and pupa; **30**, larvae, pupae, pupal chambers and adult newly emerged; **31**, larva, pupa and pupal chambers.



FIGURES 32-35: *Tapurua felisbertoi* Lane, 1973: 32, external mark of presence of larva; 33, frass under bark; 34, pupal chambers after adult eclosion; 35, pupal chamber intact with dead insect inside.



FIGURES 36-39: *Tapuruiia felisbertoi* Lane, 1973: 36, 37, damage in different regions of tree; 38, 39, trunk after remotion of pupal chambers.

Material examined: Brazil, Mato Grosso: Sinop, Estrada Claudete (Chácara Carli, Setor de Chácaras Sul), 11°53'52"S, 55°32'23"W, 12-14.IX.2009, E.A.W. Stefanello col. 1 larva, 7 pupae, 32 pupal chambers and 12 adults. The material is deposited at MZUSP.

Biological Notes

The studied material was collected in the rubber trees of one farm where the plantation was attacked by *T. felisbertoi* during the period from September to December 2009. The eclosion of adults started in September, with a peak in November.

Larval development occurs under bark, between the phellogen and the cambium, without reaching the last layer of bark (most external). At the beginning of the life cycle it is difficult to note, externally on the trunk, the presence of the larvae. The young larvae remain protected by the bark, eating and digging under bark and by the small size are not perceived externally (Fig. 28). As the larvae grow, it is possible to observe the oval marks externally on the bark, formed by weak marginal depressions and elevations at middle (Fig. 32). In this stage, the mature larva closes the internal face of the oval area with frass and latex, making a pupal chamber (Figs. 30, 31). Each delimited and closed area has one protected mature larva. In these areas, the bark looks drier, with small scale-like cracks and it noticeable that the bark is damaged.

The pupal chambers remain slightly adhered to the trunk, probably by the latex of the tree and protected by the layer of dead bark where the larvae fed on. They easily fell down when touched or by weather action.

After the eclosion, the adults get out by a circular hole opened at external wall of the pupal chamber, which remains adhered to trunk (Fig. 34). Some pupal chambers stay intact, indicating the death of the beetle before completing its life cycle (Fig. 35). When the pupal chambers are removed, their impressions remain on the trunk (Figs. 38-39). The accumulation of frass was observed under bark in the area excavated by larvae and also near the pupal chambers (Fig. 33). This was also observed outside of the trunk, on the ground at base of trees. Since no holes were found where frass could be expelled, we hypothesize that the larvae periodically expel frass from larval tunnels and subsequently close the openings.

It is difficult to note differences at the leaves of the trees attacked by *T. felisbertoi*. Field observations suggest that the trees more severely attacked, shown the leaves slightly yellowish, remarkable from

distance, similar those with nitrogen deficiency. But these observations need confirmation.

The larvae are found in different areas throughout the tree (Figs. 36, 37). The damage is result of several factors, starting by fact that several larvae are developed in the same area of the bark forming, by coalescence, a larger and continuous damage, certainly interfering in the normal sap circulation, considering that the lactifer vases are reached. In these areas the bark becomes thinner, but the larvae not reach the cambium, permitting the trees to repair the thickness of bark, and have been regenerated after two or three years. This condition demands large energy expenses by plant and after severe or successive attacks, the bark is heavily damaged and it is impossible to open bloodshed panels in these areas for collection of latex. Since the cambium is not reached, the damage is not irreversible but a decrease of productivity is suffered as well as economical loss.

DISCUSSION

The larvae and pupae of *T. felisbertoi* are bright yellow and the pupae present a very particular characteristic: two sclerotized tubercles at median region of pronotum. Comparing the larva of *T. felisbertoi* with of *Gnomidolon varians* and *Tetraibidion aurivillii* it was verified that the three species possess the following characters: legs 3-segmented, ampullae dorsally and ventrally on segments I-VI, one pair of stemmata and labrum rounded and setous. In addition, the maxillary lobes are also similar in shape, but have eight setae in *Tapuruia* and *Gnomidolon* and 10 setae in *Tetraibidion*, the palpomere maxillary distal presents median dorsal and laterodorsal external setae (lateroexternal seta absent in *Tetraibidion*) and labium similar but ligula not represented in *Gnomidolon* and *Tetraibidion*.

Tapuruia presents ventrally, palpifer and maxillary palpi more densely setous and dorsally, maxillary palpi more spinose than the others. Besides, in *Tapuruia* and *Tetraibidion* the head is similar and the segment IX presents dorsal small sclerotized area, both not observed in *Gnomidolon*. In both, *Gnomidolon* and *Tetraibidion* the pronotum possesses a posterior striate band and sensorial appendix at apex of second antennomere as long or slightly shorter than third antennomere.

The pupa of *Tapuruia* is very different from the other species. In this study the pronotum of *Tapuruia* is almost as long as wide with one projection at each fore angle; the pronotum is elongate without

projection in the other species. Besides, the pronotum of *Tapuruia* presents two sclerotized tubercles, not observed in the others. The dorsal region of prothorax and abdomen is densely microspined in *Tapuruia*; microspines smaller and sparser in *Tetraibidion* and with "brownish papilae" in *Gnomidolon*.

The eggs were not observed.

RESUMO

A larva e a pupa de Tapuruia felisbertoi Lane, 1973, coletadas em Hevea brasiliensis (Euphorbiaceae) em Mato Grosso, Brasil, são descritas e ilustradas. Dados biológicos e uma comparação com as larvas de outras espécies de Hexoplonini também são apresentados.

KEYWORDS: Brasil; Coleoptera; Larva; Pupa; Seringueira.

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