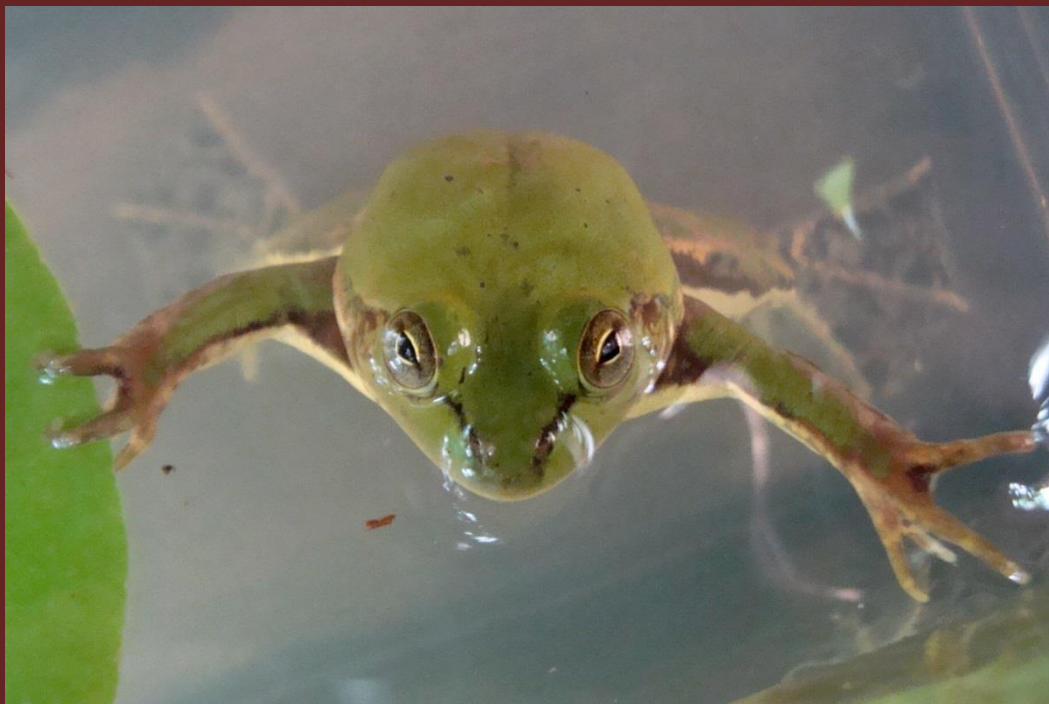


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*Pseudis paradoxa* (Linnaeus, 1758)

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# The immature stages of *Hylesia ebalus* (Cramer, 1775) (Lepidoptera: Saturniidae: Hemileucinae)

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**Abstract:** The biology and immature stages of *Hylesia ebalus* (Cramer, 1775) of paraguayan origin are described. In the wild larvae were found on *Psidium guajava* L. (Myrtaceae). In the laboratory the larvae were fed on *Cassia fistula* L. (Fabaceae). Generation (oviposition to imago) lasted 101-106 days. Egg, larval instars, cocoon, pupa and adults are illustrated.

**Resumen:** La biología y estados inmaduros de *Hylesia ebalus* (Cramer, 1775) de origen paraguayo se describen. En la naturaleza se encontraron las larvas sobre *Psidium guajava* L. (Myrtaceae). En el laboratorio se alimentaron con *Cassia fistula* L. (Fabaceae). Una generación (oviposición a imago) duró 101-106 días. Huevo, estadios larvales, capullo, pupa y adultos se ilustran.

**Zusammenfassung:** Die Biologie und praeimaginale Stadien von *Hylesia ebalus* (Cramer, 1775) paraguayischen Ursprungs werden beschrieben. In freier Wildbahn wurden die Raupen auf *Psidium guajava* L. (Myrtaceae) gefunden. Im Labor wurde mit *Cassia fistula* L. (Fabaceae) gefüttert. Dauer von Eiablage zu Imago 101-106 Tage. Fotografien von Ei, Larvenstadien, Kokon, Puppe und Imagos werden gegeben.

**Key words:** Paraguay, Saturniidae, Hemileucinae, *Hylesia*, early stages.

## Introduction

From the large genus *Hylesia*, which contains in the Neotropics from Mexico to Argentina more than hundred species (Lemaire, 2002; Camargo, 2007), have yet been recorded from Paraguay six species: *Hylesia falcifera* (Hübner, [1825]), *H. remex* Dyar, 1913, *H. scortina* Draudt, 1929, *H. rufex* Draudt, 1929, *H. ebalus* (Cramer, 1775) and *H. paraguayensis* Lemaire, 2002. Further

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species of the genus are found with certainty on closer examination. The hitherto known distribution of *H. ebalus* extends from Colombia to Argentina (Lemaire, 2002). In Paraguay, the species has a widespread distribution over the oriental region, known from the departments of San Pedro, Kanindeyú, Alto Paraná, Caaguazú, Caazapá, Guairá, Paraguari and Cordillera.

### Material and methods

Larvae of the fifth instar of *H. ebalus* were found in the vicinity of Yaguarón, in the Department of Paraguari, on guava (*Psidium guajava* L.). After molting to the next instar they were fed with *Cassia fistula* L., which they accepted without hesitations. The resulting moths of these larvae were brought to copula and oviposition. The following generation obtained from the eggs could be successfully bred and observed from egg to imago. Classification and terminology of scoli follow Deml & Dettner (2002). Measurements of head capsules were taken with a binocular microscope with micrometric eyepiece. Voucher specimens of larvae and adult moths will be deposited in the *Museo Nacional de Historia Natural del Paraguay*.

### Immature stages

**Egg:** The eggs are laid close together in large groups of hundred or more and covered with the urticating hairs of the female's abdomen. They have an oval shape and are flattened laterally, measuring 1,5 x 1,0 x 0,8 mm. The micropyle at the pole of the long side is always opposite to the base of the egg mass (Fig. 2).



Figs. 1-2: *H. ebalus*; 1) egg mass on the underside of a leaf; 2) after 2 weeks the micropyle is visible as a dark spot

**First instar:** The first instar larvae hatched after 21 days since oviposition with a lengths of 2,5 mm. Head amber, body yellow, six rows of yellow urticating scoli on abdominal and thoracal segments, two dorsal, subdorsal and lateral respectively. The thoracic scoli are bifurcated at the top, the abdominal scoli have a simple tip. Each scolus tip armed with a long light brown seta as long as the

scolus. During the first three days larvae remained on the egg shells and ate a large part of the shells and covering hairs. Then they began to feed on the leaf of *P. guajava* beginning from the leaf's apex. Duration of the first instar: 6 days.



Figs: 3-4: *H. ebalus*; 3) first instar; 4) second instar

**Second instar:** Head and thoracic legs brown, body and prolegs of abdomen amber, six rows of yellow urticating scoli on abdominal and thoracal segments. The thoracic scoli now have a simple tip same as the abdominal scoli. Additionally to the longer setae at the tip all scoli are bearing several shorter lateral bristles. Lengths after moulting 5mm. Duration of the second instar: 5 days.

**Third instar:** Head and thoracic legs black, body and prolegs yellow, six rows of yellow urticating scoli on abdominal and thoracal segments. Thoracic scoli longer than abdominal scoli, top bi- or trifurcated, bearing numerous bristles (tree-shaped urticating setae). Dorsal scoli of the ninth abdominal segment longer than the other abdominal scoli, all bearing numerous bristles. Lengths of larva after moulting 7-8 mm. Duration of the third instar: 6 days.



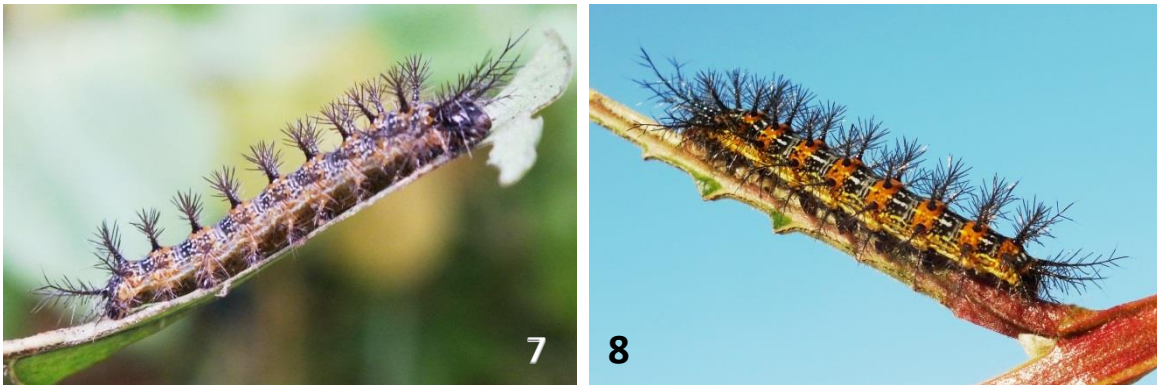
Figs: 5-6: *H. ebalus*; 5) third instar; 6) fourth instar

**Fourth instar:** Head and thoracic legs black, body yellow, dorsal densely covered with brown spots, leaving free a yellow stripe between the scoli rows. Six rows of yellow urticating scoli on



abdominal and thoracic segments. Thoracic scoli longer than abdominal scoli. Scoli of the first and second segment very long and directed forward. All bearing numerous bristles. Each scoli with a brown ring around the base. Lengths of larva after moulting 9-10 mm. Duration of the fourth instar: 9 days.

**Fifth instar:** Head black above, sides, front and mouthparts yellow. Thoracic legs black. Body yellow, dorsally black interspersed with small white spots. Six rows of yellow urticating scoli on abdominal and thoracic segments. Each segment with a transverse orange brown band, which surrounds the bases of the scoli. Dorsal and subdorsal scoli black, lateral scoli yellow. Scoli of the first and second thoracic segment longer than the other scoli and directed forward, scoli of anal segment longer than the other and directed backwards. All bearing numerous bristles. Lengths of larva after moulting 16-17 mm. Duration of the fifth instar: 10 days.



Figs: 7-8: *H. ebalus*; 7) fifth instar; 8) sixth instar

**Sixth instar:** Head, thoracic legs and scoli black. Body yellow, dorsally black interspersed with small white spots. Six rows of yellow urticating scoli on abdominal and thoracic segments. Each segment with a transverse orange band, which surrounds the bases of the dorsal and lateral scoli. Scoli of the first and second thoracic segment longer than the other scoli and directed forward, scoli of anal segment longer than the other and directed backwards. All bearing numerous bristles. Lengths of larva after moulting 26-30 mm. Duration of the fifth instar: 7 days.

**Seventh instar:** Head and thoracic legs brown, prolegs black. Body dorsally black with a broad red transverse band in the middle of each segment. Laterally with a bright yellow or white longitudinal band between subdorsal and lateral scoli rows. Ventral green, the black color of prolegs extending to the yellow lateral band. Scoli yellowish-white, arrangement and size as before. Lengths of larva after moulting 35-40 mm. Duration of the seventh instar: 7 days. On the eighth day, the first larvae begin with the spinning of the cocoon, which is completed after 2 days. Pupation takes place 6 days after the start of spinning.



Figs: 9-10: *H. ebalus*, Seventh instar

**Average width of head capsules:** L1: 0,56 mm; L2: 0,66 mm; L3: 1,02 mm; L4: 1,55 mm; L5: 2,10 mm; L6: 3,55 mm and L7: 5,10 mm (n = 5).

**Cocoon :** The cocoon is made from brown silk individually between leaves or other objects. The exterior has a shriveled aspect, while the inner side is smooth. Where the cocoon is not woven on to objects, the inner side has a hole pattern (fig. 12).



Figs. 11-12: *H. ebalus*; 11) cocoon; 12) cocoon opened, inner side

**Pupa:** Average length of male pupa 18 mm, of female pupa 23,5 mm.



Figs. 13-14: *H. ebalus*; 13) male pupa; 14) female pupa



**Imago:** The adult moths emerged after 30 to 35 days after pupal stage. Eclosion of the first females began 2 days after the eclosion of the first males in each case in the afternoon. The newly hatched females were mated immediately after dark and the copula lasted until dawn. Oviposition began the following night and was continued up to three additional nights. Males have an average wingspan of 44 mm, females 58 mm. The longevity of females of this species with 5-6 days was longer than that of males with 4-5 days.

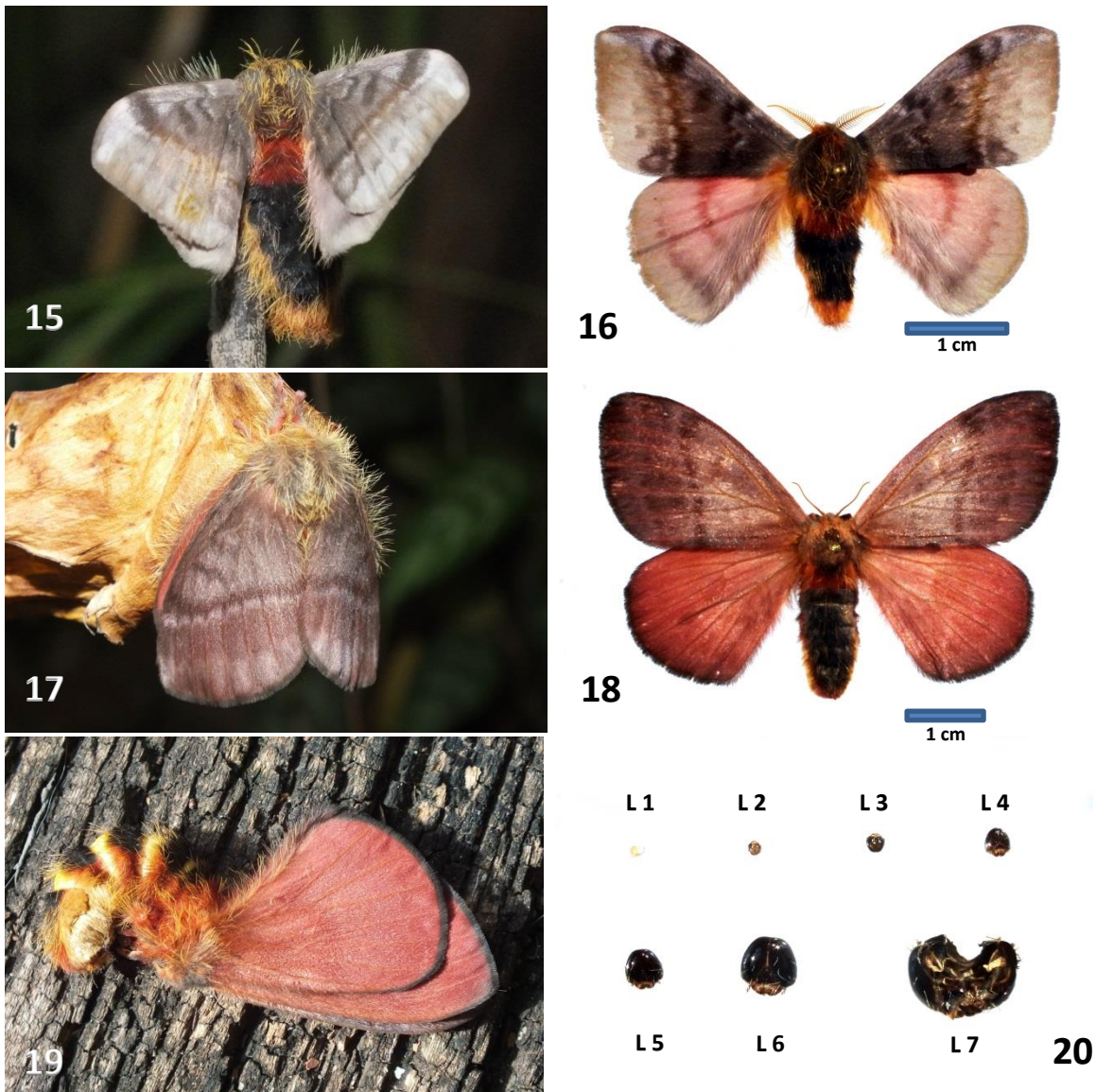


Fig: 15-20: *H. ebalus*; 15) male newly hatched; 16) same male prepared after copula; 17) female newly hatched; 18) same female prepared after oviposition (scale 1 cm) 19) male in thanatosis, 20) head capsules first to seventh instar

### Discussion

Larvae live extremely gregarious during the first five instars, feed, rest and molt at the same time. When disturbed they drop to the ground and fast running in all directions they try to hide under a cover. From the sixth instar, the community dissolves into individual groups. The members of each group feed, rest and molt together, the beginning of the molting of each group extends over three days. From the seventh instar also the groups are dissolved and the larvae dispersed around. The difference in size between the first and last molted larvae is now strikingly. Pupation takes place individually in a cocoon of brown silk. Adult moths, when disturbed drop to the ground, fold the wings up together, curve the abdomen ventrally and persist in a several minute long thanatosis (fig.19). When feeding the larvae and when handling the cocoons the painful urticating of the uncovered parts of the skin cannot be avoided. The fine setae of the scoli break off very easily and float in the air. When hitting on the human skin they generate a painful burning sensation.

### Acknowledgements

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**FRONT COVER PHOTO:** *Pseudis paradoxa* (Linnaeus, 1758) (Hylidae), Paraguay, Dep. Presidente Hayes, Estancia Costa Esmeralda, 21. I. 2011



