ISSN 2313-0504 3(5)2016

PARAGUAY BIODIVERSIDAD

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***Psilocybe cubensis* Earle (Singer)** foto: U. Drechsel

Asunción, Noviembre 2016

Paraguay Biodiversidad	3(5)	26-32	Asunción, Noviembre 2016

The immature stages of *Hypercompe indecisa* (Walker, 1855) (Lepidoptera: Erebidae: Arctiini)

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Abstract: The immature stages of *Hypercompe indecisa* (Walker, 1855) are described. In the wild a female was found in the Paraguayan department of Presidente Hayes, which laid some ova. In the laboratory the larvae were fed with leaves of *Lactuca sativa* L., *Senecio grisebachii* Baker, 1884 (both Asteraceae) and artificial diet. One generation (oviposition to imago) lasted 42 days. Ova, larval instars, cocoon, pupa and adults are illustrated.

Resumen: Se describen los estadios inmaduros de *Hypercompe indecisa* (Walker, 1855). En la naturaleza una hembra fue encontrada en Paraguay en el departamento de Presidente Hayes, que puso algunos huevos. En el laboratorio se alimentaron las larvas con hojas de *Lactuca sativa* L., *Senecio grisebachii* Baker, 1884 (ambas Asteraceae) y dieta artificial. Una generación (oviposición a imago) duró 42 días. Huevos, estadios larvales, capullo, pupa y adultos se ilustran.

Zusammenfassung: Die Entwicklungsstadien von *Hypercompe indecisa* (Walker, 1855) werden beschrieben. In freier Wildbahn wurde ein Weibchen im paraguayischen Departament von Presidente Hayes gefunden, welches einige Eier ablegte. Im Labor wurden die Larven mit Blättern von *Lactuca sativa* L., *Senecio grisebachii* Baker, 1884 (beide Asteraceae) und mit Kunstfutter gefüttert. Eine Generation (Eiablage bis Imago) dauerte 42 Tage. Eier, Larvenstadien, Kokon, Puppe und Imagos werden abgebildet.

Key words: Paraguay, Erebidae, Arctiinae, early stages, *Hypercompe.*

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Introduction

From the large genus *Hypercompe* Hübner [1819], which contains in the Neotropical Region from Mexico to Argentina 87 described species (Vincent & Laguerre, 2014), have yet been recorded from Paraguay six species: *Hypercompe abdominalis* (Walker, [1865]), *H. brasiliensis* (Oberthür, 1881), *H. castronis* (Strand, 1919), *H. heterogena* (Oberthür, 1881), *H. indecisa* (Walker, 1855) and *H. obtecta* (Dognin, 1907). Further species of the genus will be found with certainty on closer examination. The hitherto known distribution of *H. indecisa* extends from Southern Brazil to Uruguay, Argentina, Paraguay and Bolivia. In Paraguay, the species has a widespread distribution over the western parts of the oriental region and the humid Chaco, known from the departments of San Pedro, Paraguarí, Cordillera, Central, Ñeembucú, Misiones, Presidente Hayes and Alto Paraguay (see map). Although the species is common in its distribution area and is considered a pest for different cultivated plants because of its extreme polyphagy (Dapoto et al., 2010), little has been reported about its immature stages with the exception of a study on fertility with artificial diet (Nava et al., 2008).

Material and methods

The starting materials for the breeding were a patch of ova originated from a female which was found in the department of Presidente Hayes in "Estancia 4 L" in the humid Chaco. Ova were transported to the laboratory and repeatedly sprayed with water until the hatching of larvae. The larvae were fed alternately with leaves of *Lactuca sativa* L., *Senecio grisebachii* Baker, 1884 (both Asteraceae) and artificial diet, modified after Bergomaz & Boppré (1986) and Harbich (1994), mixed with leaf powder of *S. grisebachii.* Larvae developed under ambient conditions and were housed in ventilated plastic containers. Frass of the first six instars was collected daily from the bottom of the rearing container to sort out the head capsules. Measurements of ova and head capsules were taken with a binocular microscope with micrometric eyepiece. The molts occurred almost simultaneously in all the larvae in all stages, a few specimens which retarded in their development were sorted out. Voucher specimens of adult moths will be deposited in the *Museo Nacional de Historia Natural del Paraguay.*

Immature stages

Egg: Ova are deposited in dense groups, have a diameter of 0.75 mm, are spherical and attached with the side opposite to the micropyle to the substrate. The pearly white surface is granular like a golf ball and turns violet brown before hatching of larvae (figs. 1,2).

First instar: First instar larvae hatched after six days since oviposition. The basic color of the body is amber, a lighter longitudinal stripe stretches dorsally over all segments, the first two thoracic segments darker than the rest. The head is light brown and hairy, the ocelli dark brown and thoracic legs blackish. Each segment has eight warts, two dorsally and sub-dorsally, which bear two black hairs of triple length of the body diameter and two laterally and sub-ventrally which bear shorter hairs (fig. 3). Average width of head capsule 0.37 mm (n=8). Duration of the first instar four days.

Second instar: The basic color of the body is still amber, brighter and darker marbled, a white longitudinal stripe stretches dorsally over all segments, the first two thoracic segments darker than the rest, similar to the previous stage, the middle warts now carry three to four hairs (fig. 4). Average width of head capsule 0.56 mm (n=8). Duration of the second instar three days.

Third instar: Similar to the previous stage, the warts are now much darker than the body and the hairiness is denser (fig. 5). Average width of head capsule 0.82 mm (n=8). Duration of the third instar three days.

Fourth instar: The body now lacks the white longitudinal stripe, the thoracic segments and the first abdominal segment darker than the rest of the body, hair and warts black-brown. The warts of the other abdominal segments are orange-brown, as well as the hair of the third and fourth segments in the basal half. Hairiness is denser than in the previous stage (fig. 6). Average width of head capsule 1.45 mm (n=8). Duration of the fourth instar three days.

Fifth instar: The body is now marbled with black and violet, the lateral warts of the abdominal segments are orange brown, the remaining violet brown. All hair are black, the hair of the third and fourth segments orange brown in the basal half (fig. 7). Average width of head capsule 2.05 mm (n=8). Duration of the fifth instar four days.

Sixth instar: Similar to the previous stage, the hair of the third and fourth segments orange brown only the tips black (fig. 8). Average width of head capsule 2.65 mm (n=8). Duration of the sixth instar fife days.

Seventh instar: Similar to the previous stage, all warts, more or less bright red, barely visible because of the dense pubescence (fig. 9). Average width of head capsule 3.45 mm (n=8). Duration of the seventh instar fife days.

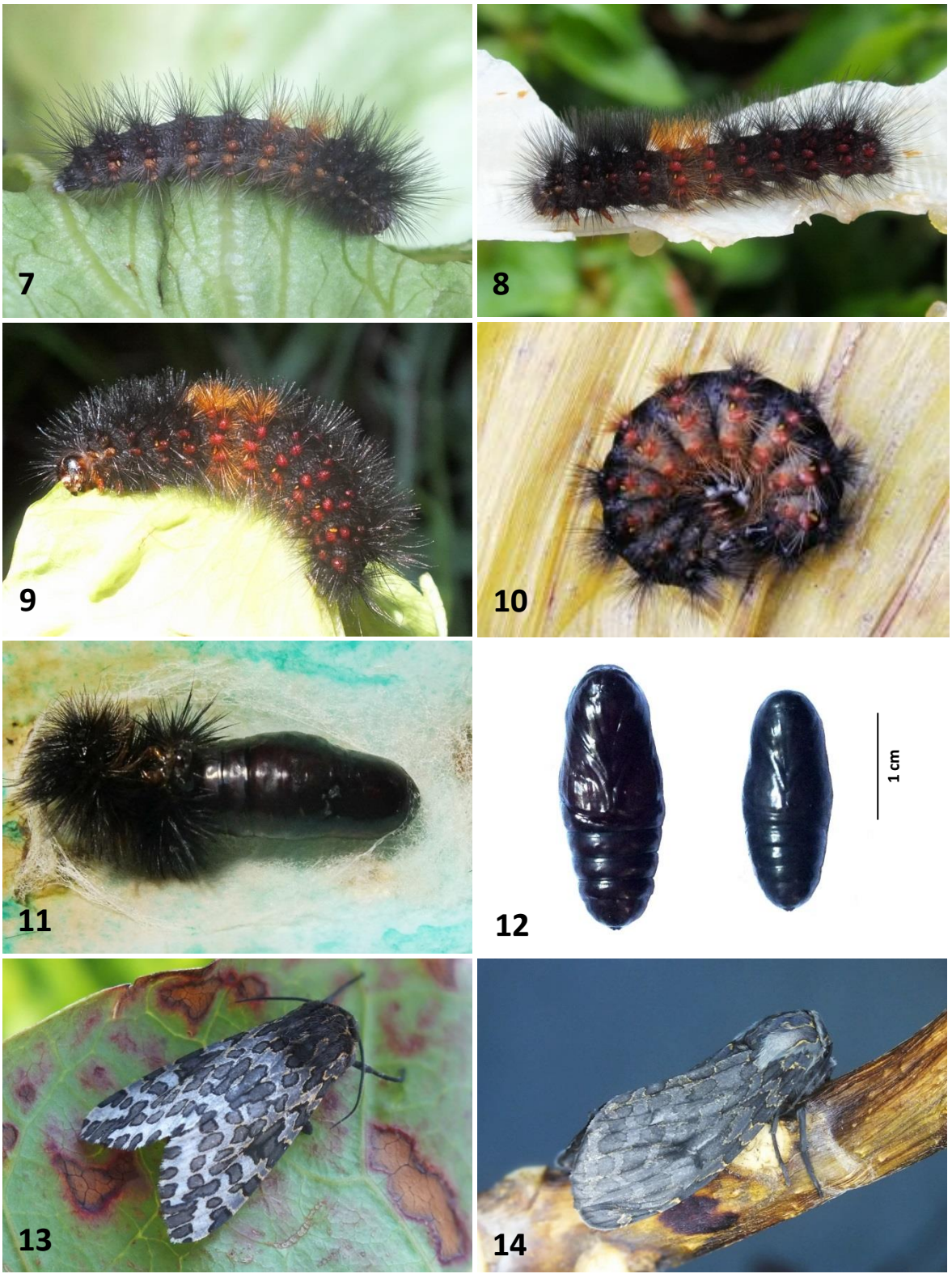
Prepupa: The prepupa has lost a large portion of the hair, which, however, is not woven into the cocoon (fig. 10).

Cocoon: The loosely woven cocoon consists of few white threads and is concealed under leaves or under objects lying on the ground (fig. 11).

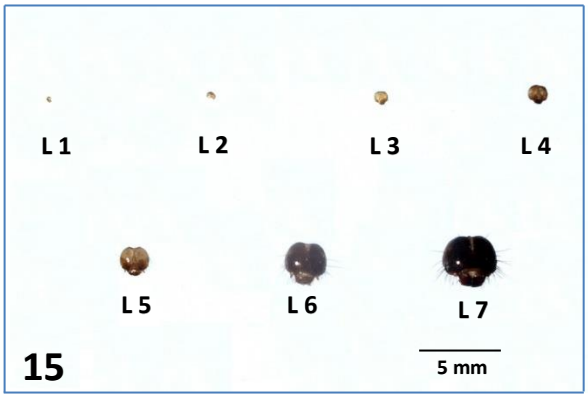
Pupa: Pupae are black-brown with glossy surface, reaching the largest width at the second abdominal segment. The female pupae are clearly bigger than the males (fig. 12).

Imago: The first moth, a male (fig. 13), hatched thirteen days after spinning the cocoon, the first female (fig. 14) three days later.

Figs. 1-6: *Hypercompe indecisa;* 1) ova freshly laid; 2) ova after five days; 3) first instar; 4) second instar; 5) third instar; 6) fourth instar



Figs. 7-14: *H. indecisa;* 7) fifth instar; 8) sixth instar; 9) seventh instar; 10) prepupa; 11) cocoon; 12) pupae, male right, female left; 13) adult male; 14 adult female



Figs. 15-16: *H. indecisa;* 15) head capsules of all seven instars; 16) distribution in Paraguay

Discussion

In the publication of Nava et al. (2008) six larval instars are reported. However, we found seven instars in this breed as well as in another breeding carried out years before.

First instar larvae show a "bungee jumping" behavior (Silva et al. 2014). A larva feeling threatened jumps off its leaf where it has left attached a thread of silk and is suspended in the air from where it hauls itself back again. Last instar larvae were repeatedly observed to feed on their own companions. This cannibalistic behavior is probably due to the breeding conditions, in which ten larvae were kept on 300 cm² surface, and the extreme polyphagy of the larvae, since they disperse after hatching and are not gregarious.

Acknowledgements

The first author wishes to thank Carlos Valiente for logistic support and Gustavo Peter, the owner of Estancia 4 L for hospitality and the opportunity to carry out the studies.

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FRONT COVER PHOTO: *Psilocybe cubensis* Earle (Singer) (Strophariaceae), Paraguay, Dep. Paraguarí, Caapucú, 16. IV. 2013.