

# A new genus and two new species of arctiine tiger moth (Noctuidae, Arctiinae, Arctiini) from Costa Rica

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## Abstract

*Leichosila* **gen. n.** is described based on two new species, *Leichosila talamanca* **sp. n.** and *L. wagneri* **sp. n.**, from montane rain forests of Costa Rica. *Leichosila* is allied to the North American *Hyphantria* Harris generic group (subtribe Spilosomina) which is largely temperate-subtropical in distribution, suggesting that *Leichosila* is derived from North American faunal elements rather than Andean/South American.

## Keywords

Arctiini, Spilosomini, Spilosomina, Arctiidae, Neotropics, taxonomy

## Introduction

The subtribe Spilosomina is a relatively small group in the New World, with 10 North American genera (Schmidt and Opler 2008) and approximately twelve more described and undescribed strictly Neotropical genera, excluding misplaced genera (Schmidt, in prep.). By comparison, more than 60 genera occur in the eastern hemisphere (Kôda 1988; Goodger and Watson 1995; Dubatolov 2006), with the greatest diversity in the Oriental and Afrotropical regions. Spilosomina has previously been treated either as a tribe (here ranked as a subtribe following the changes proposed by Lafontaine and Fibiger 2006), or considered synonymous with a broader concept of the Arctiina (*e.g.*

Arctiini *sensu* Franclemont 1983; Watson and Goodger 1986). Although a phylogeny of the Arctiina *sensu lato* with broader taxon- and character sampling is still needed, a preliminary phylogeny of the Arctiina (*s.l.*) (Schmidt 2007) shows that the Spilosomina are well supported as a monophyletic group.

The genus-level diversity of North American spilosomines is greatest in Mexico, where representatives of all genera occur, with the exception of *Phragmatobia* Stephens (northern boreo-cordilleran), *Caribartia* Ferguson (Hispaniolan) and *Seirarctia* Packard (Eastern North American). This suggests that the mid-latitude Americas are a possible centre of origin for many North American spilosomines, consistent with the fact that North American species associated *Spilosoma* Curtis are a paraphyletic group of species, none congeneric with Eurasian *Spilosoma* (*sensu stricto*) (Schmidt, in prep.).

As a rule, spilosomines feed on low-growing herbaceous plants as larvae (Wagner 2005), and are accordingly most common in non-forest habitats, typically xeric woodland, savannah, grasslands and wetlands. *Hyphantria cunea* (Drury) is the only known exception to this herb-feeding habit, and is exceedingly polyphagous on deciduous trees and shrubs (Wagner 2005). The discovery of a new genus related to temperate North American spilosomines was therefore surprising given that members of this new genus inhabit tropical forests, and occur much farther south than most other species of the group.

## Methods and materials

Adult genitalia were prepared following the methods detailed by Lafontaine (2004). Line drawings were prepared from genitalia suspended in 30 % ethanol, using a *camera lucida* mounted to a Leica M-165C dissecting microscope. Genitalia were photographed from Euparal-mounted microscope slides using a Nikon D200. Repository abbreviations are as follows:

CNC	Canadian National Collection of Insects, Arachnids, and Nematodes, Ottawa, Ontario, Canada.
INBIO	Instituto Nacional de Biodiversidad, Santo Domingo de Heredia, Costa Rica.
JBS	Personal collection of J. Bolling Sullivan, Beaufort, North Carolina.
BVC	Personal collection of Benoit Vincent, Saint-Denis, France.

## Systematics

### *Leichosila* Schmidt, gen. n.

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**Type species.** *Leichosila talamanca* Schmidt, sp. n.

**Diagnosis.** *Leichosila* can easily be distinguished externally from all other New World arctiines by the unique wing pattern and colour, consisting of a grey to whitish-

grey ground colour with a pattern of dark grey-black, incomplete forewing bands that are ochre yellow centrally (Figs 1, 2). Structurally, the following combination of characters is unique: male antennae simple (Fig. 9), juxta very broad and shallow ( $5 \times$  wider than long; Fig. 8); male valve lacking medioventral lobe (Figs. 3a, 4a), abdominal markings absent (Figs. 1, 2). The juxta shape is a putative autapomorphy of the genus and is unlike that of any other New World spilosomine.

**Description.** Male (female unknown). **Head** – Male antenna filiform in dorsoventral view, ciliate and subserrate ventrally; segment slightly longer than wide (Fig. 9); dorsal antennal scales greyish brown; palpi porrect, 3<sup>rd</sup> segment  $\frac{1}{2}$  length of 2<sup>nd</sup> segment; vestiture of palpi, frons and vertex dusty brown grey; haustellum reduced and poorly sclerotized, presumably non-functional. **Thorax** – Vestiture of vertex and ventrum of thorax, patagia, tegulae and legs dusty brown grey and shaggy; apex of prothoracic tibia with two subequal, blunt, triangular projections; two meso- and metathoracic tibial spurs, the posterior spur slightly longer than anterior, length of spurs approximately equal to tibial width at apex; metepisternum with rounded ridge along anterior margin, microtymbals absent. **Forewing** (Figs. 1, 2) – length 13.4 to 16.1 mm; ground colour dark mouse grey to whitish grey; 5 transverse bands of yellowish ochre, outlined in dark charcoal grey; bands evident as five discrete cells along costa, three basal bands obsolete in medio-basal area, and again present along anal margin except for basal-most band; ochre and grey areas of three distal bands confluent in costal half, with ochre scaling extending along veins; distal band often darkest and most complete; pattern similar ventrally, but colours washed-out. **Hindwing** (Figs. 1, 2) – ground colour dusty grey to whitish grey, with irregular dark-grey subterminal spots and medial spot, these varying in contrast from pronounced to obsolete against darker ground colour; pattern similar ventrally, but colours of subterminal spots washed-out; medial spot darker ventrally than on dorsum, often extending to costa and basally along costal margin. **Abdomen** – vestiture dusty brown grey dorsally and ventrally; evenly coloured without distinguishable markings (Figs. 1, 2); coremata between 7<sup>th</sup> and 8<sup>th</sup> sternite absent (Fig. 5); 8<sup>th</sup> sternite moderately sclerotized, trapezoidal,  $2 \times$  as wide as long (Fig. 5); lateral sclerites of 8<sup>th</sup> sternite moderate sclerotized basally, mem-

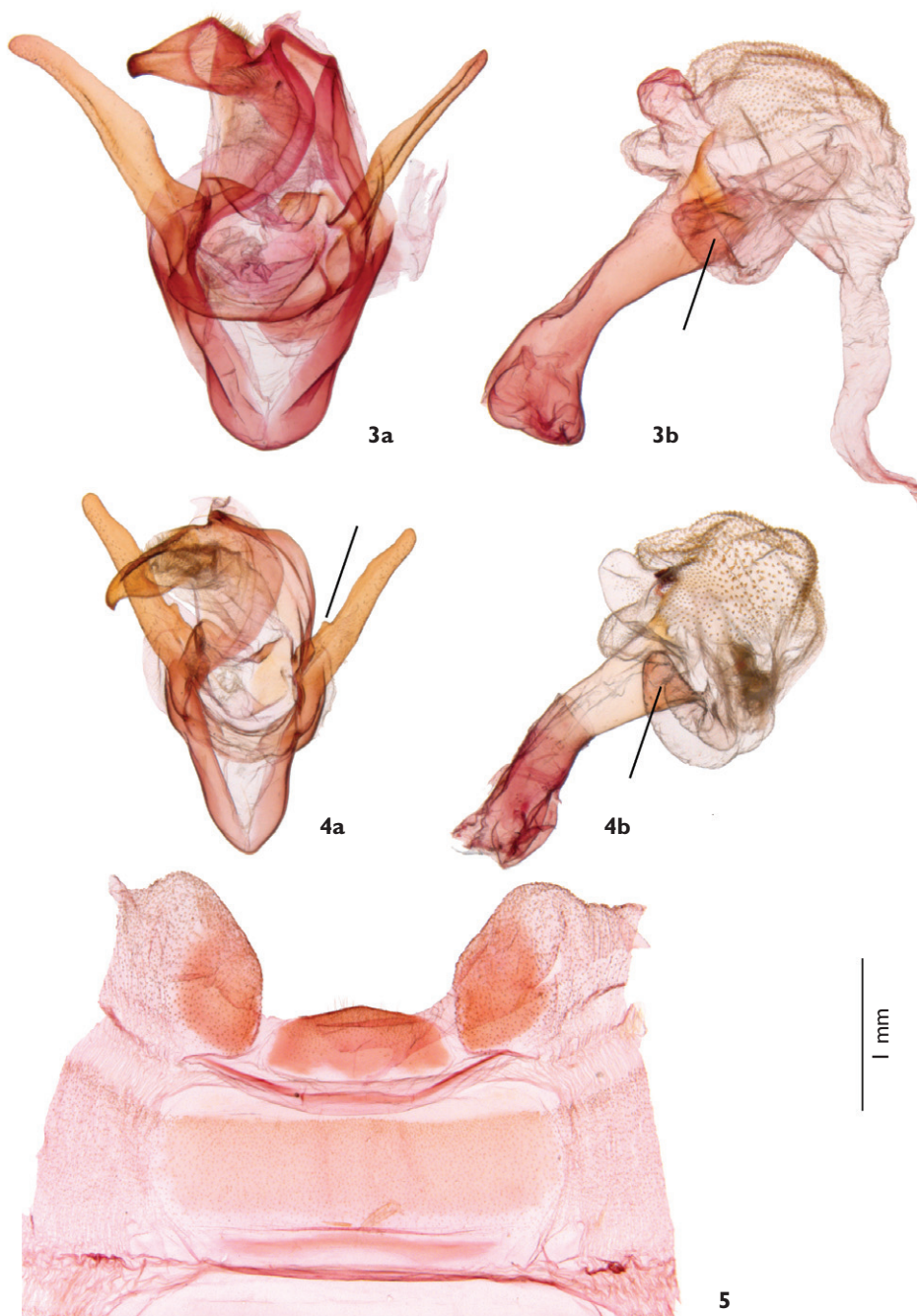


**Figures 1-2.** Adult habitus of *Leichosila* gen. n. **1.** *Leichosila talamanca* sp. n., male holotype. **2.** *Leichosila wagneri* sp. n., male holotype.

branous distally, equalling width of sternite in length (Fig. 5); 8<sup>th</sup> tergite sclerotized, entire. **Male genitalia** – Uncus triangular to bottle-shaped in dorsal view, length 2 × that of basal width (Figs. 6, 7); basal half sparsely setose; apical third flattened laterally, down curved, resembling a bird's beak in lateral view; apex truncate in caudal view; ventrally with membranous area extending halfway to apex (Figs. 6, 7); dorsal margin of tegumen recurved caudad, extending to base of uncus; valve consisting of a simple, sickle-shaped, slightly laterally flattened process (Figs. 3a, 4a) extending dorso-caudally as far as uncus apex (in natural position); valve devoid of processes and lobes (Fig. 3a), or with small sub-basal process on dorsal margin of costa (Fig. 4a); lateral process of transtilla consisting of a poorly delineated, sclerotized region contiguous with membranous area dorso-laterad of anellus, forming shallow, rounded pyramidal prominences directed dorsad; saccus broadly u-shaped, length equalling  $\frac{3}{4}$  height of genital capsule; juxta u-shaped and slightly convex ventro-caudally, very broad and shallow, about 5 × broader than height at midline (Fig. 8); phallus unadorned and relatively stout, approximately 4 × as long as wide (Figs. 3b, 4b); coecum strongly curved ventrad by 90°; vesica globose with four basal diverticula (Fig. 4b), total diameter equalling length of phallus; two diverticula positioned basally and left-laterad, adjacent to each other; two additional diverticula positioned ventro-basally and also adjacent to each other; left half of vesica scobinate, grading to smaller spicules on right side; ductus ejaculatorius positioned right laterad.

**Etymology.** The name is feminine in gender, and is derived from the Greek stem for lichen, *leichos*, and the Latin for yellow ochre, *silaceus*, reflecting the odd yellow-ochre colour of the forewing bands, very unusual for an arctiine. This colour pattern is presumably cryptic on lichen-covered trees.

**Remarks.** The caudally recurved dorsal margin of the tegumen and lateral lobes of the 8<sup>th</sup> sternite of *Leichosila* are unique autapomorphies of the Spilosomina (Schmidt 2007). The morphology of the male genitalia (valve prong-like and relatively simple, uncus broadly triangular) and wing shape/pattern place *Leichosila* near the *Hyphantria* Harris group of genera, consisting of *Hyphantria*, “*Spilosoma*” (*sensu lato*), *Alexicles* Grote, *Estigmene* Hübner, and the “*Hypercompe*” *permaculata* (Packard) group, although I could find no synapomorphies to suggest a possible sister genus. The fili-form antenna and absence of dorsal abdominal markings are rare among all spilosomines, but this condition occurs in some *Hypercompe* species and *Spilosoma vagans* (Boisduval), respectively. An incomplete ‘barcode’ fragment (319 base pairs) of the *cox1* mtDNA gene of a single *L. talamanca* specimen (Barcode of Life Data System; Ratnasingham and Hebert 2007) was approximately equally divergent from species of all *Hyphantria*-group genera by 5.6 % to 7 %. This level of divergence is congruent with the highly autapomorphic morphology of *Leichosila*, but unfortunately does not provide possible clues to generic relationships to the rest of the group. The *Hyphantria* group is restricted to Central and North America (except for *Estigmene albida* (Stretch) which occurs south to Colombia), but *Leichosila* is more closely allied to this group than to Neotropical *Paracles* Walker and Andean “*Phragmatobia*” to which *Leichosila* shows some superficial similarities but structurally it is quite different.



**Figures 3-5.** Male genitalia of *Leichosila*. **3a.** *L. talamanca* (paratype), genital capsule (ventral view); **3b.** phallus (left lateral view), with inflated vesica (ventrobasal diverticulum highlighted); **4a.** *L. wagneri* (holotype), genital capsule (ventral view); **4b.** phallus (left lateral view) with inflated vesica (ventrobasal diverticulum highlighted); **5.** *L. talamanca*, 8<sup>th</sup> abdominal sternite, showing medioventral sclerite and lateral lobes.



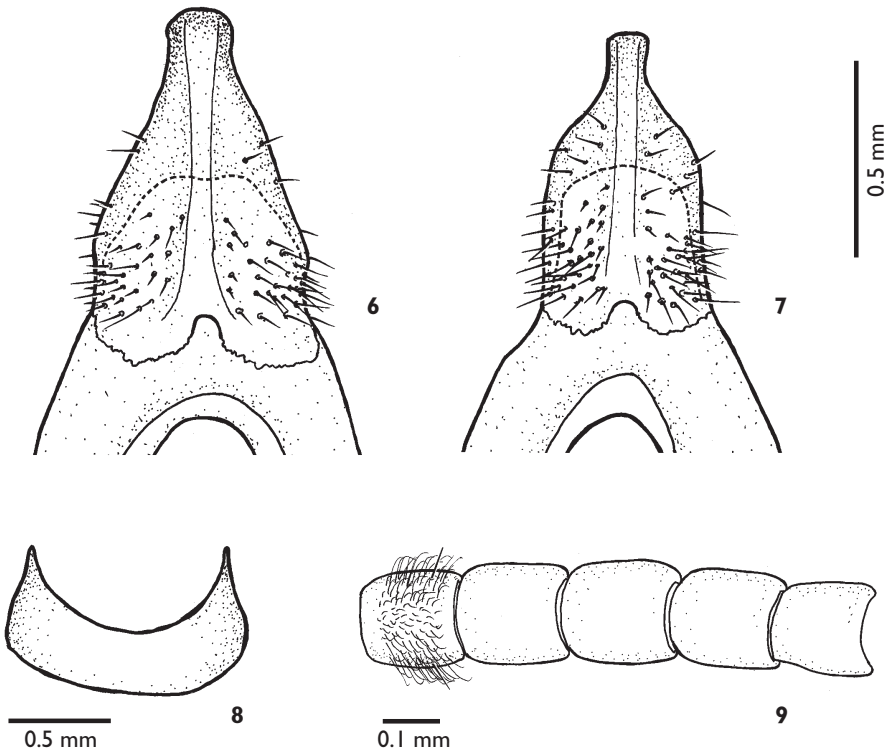
***Leichosila talamanca* Schmidt, sp. n.**

urn:lsid:zoobank.org:act:7EB77263-5DE4-4AA2-86AE-C02C45C7C0E4

(Figs 1, 3, 5, 6, 8, 9)

**Type material.** **Holotype** male – “Costa Rica: P[rovincia]. Cartago [locality actually in San José Province] / R. F. Los Santos / Sendero Los Robles / 9° 33' 25.51 N 83° 47' 55.47 W / 2400 m, 21-27 March 2004 / J.B. Sullivan & J.D. Lafontaine;” “Data-based for CNC / NOCTUOIDEA # / 13709” [green label]; Barcodes of Life Project / University of Guelph / DNA # Noctuoidea / 13709” [blue label]; HOLOTYPE / *Leichosila* / *talamanca* / Schmidt” [red label]; deposited in INBIO. **Paratypes** – 15 ♂♂, same data as holotype [INBIO, CNC, JBS]; 5 ♂♂, Costa Rica, San Jose, Parc national Chirripo, sentier pédestre vers Mont Chirripo Km 4.7, 2310m, 1 V 2005, leg B. Vincent [white label]; BV 392 to BV 396 [white label]; [BVC].

**Diagnosis.** Both *Leichosila talamanca* and *L. wagneri* can be easily distinguished from all other New World arctiines by the wing pattern and colour, consisting of a grey to whitish grey ground colour with a pattern of dark grey-black, incomplete forewing bands which are ochre yellow centrally (Figs 1, 2). *Leichosila talamanca* differs from



**Figures 6-9.** Structural features of *Leichosila*. **6.** *L. talamanca*, uncus (dorsal view); **7.** *L. wagneri*, uncus (dorsal view); **8.** *L. talamanca*, juxta; **9.** *L. talamanca*, antenna (segments 14 – 18), ventral view (setae and cilia omitted except on segment 14).

*L. wagneri* in its larger size, paler grey colouration of the wings, and internally by the more triangular uncus (parallel-sided in *L. wagneri*, figs 6, 7), lack of a basal process on the costal margin of the valve (Fig. 3), and a broadly joined pouch-like diverticulum of the vesica that is pointed and conical in *L. wagneri* (Figs 3b, 4b).

**Description.** A detailed description is given above in the generic description. Characters specific to *L. talamanca* are as follows: Male (female unknown). **Forewing** – length averaging 15.4 mm (14.9–16.1 mm,  $n = 4$ ); ground colour mouse grey to whitish grey. **Hindwing** – ground colour mouse grey to whitish grey, with irregular dark-grey subterminal spots, and medial spot. **Male genitalia** – Uncus triangular in dorsal view; vesica with left diverticulum of two ventro-basal diverticula pouch-shaped and broadly joined to main chamber of vesica (Fig. 3b).

**Etymology.** This species occurs in montane broadleaf forest of the Cordillera de Talamanca, Costa Rica, hence the name.

**Distribution and biology.** *Leichosila talamanca* is known only from two localities in the Cordillera de Talamanca. At the type locality, the habitat is dominated by mature oaks (*D. Lafontaine*, pers. comm.) within the Talamancan montane forest at 2400 m elevation. Collection dates are for the last week of March and early May.

***Leichosila wagneri* Schmidt, sp. n.**

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(Figs. 2, 4, 7)

**Type material.** **Holotype** male – “C[osta]. RICA: Heredia: / 6 km ENE Vara Blanca, / 1950–2050m, 10°11'N / 84 07'W; 15 ii 2002 / David L. Wagner coll”; “INBio-OET-ALAS / transect / 20/L/01/011”; “Project / ALAS / INB0003216237”; “HOLOTYPE / *Leichosila* / *wagneri* / Schmidt” [red label]; “Genitalia / CNC slide # / 14541”; deposited in INBIO.

**Diagnosis.** Distinguished from *L. talamanca* by the smaller size and darker colouration of *L. wagneri*, and by the genitalic characters given under the diagnosis for *L. talamanca*.

**Description.** A detailed description is given above in the genus description. Characters specific to *L. wagneri* are as follows: Male (female unknown). **Forewing** – length 13.4 ( $n = 1$ ); ground colour dark grey. **Hindwing** – ground colour dark grey, with indistinct, irregular dark grey subterminal spots and medial spot. **Male genitalia** – Uncus parallel-sided basally, then tapering apically, *i.e.* bottle-shaped in dorsal profile (Fig. 7); vesica with left diverticulum of two ventro-basal diverticula conical and pointed (Fig. 4b).

**Etymology.** This species is named after David L. Wagner, who collected the type specimen, and whose studies continue to vastly improve our knowledge of the larval biology of North American Lepidoptera.

**Distribution and biology.** *Leichosila wagneri* is known only from the type specimen, collected in high elevation forest (1950–2050 m) on Volcán Barva (Cordillera Central) in mid February.

## Acknowledgements

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