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# New species of *Zanola* Walker, 1855 (Part 2) (Lepidoptera: Apatelodidae)

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## Keywords:

Lepidoptera; Bolivia;  
Apatelodidae; Colombia;  
*Zanola*; Guatemala;  
biodiversity; Costa Rica;  
taxonomy; Paraguay;  
description; Peru;  
new species; Neotropical.

**Abstract.** – In preparation for a revision of the genus *Zanola* Walker, 1855, eight new species are described: *Zanola boyacana* n. sp., *Zanola chuspipata* n. sp., *Zanola drechseli* n. sp., *Zanola josemonzoni* n. sp., *Zanola mariposa* n. sp., *Zanola marta* n. sp., *Zanola minca* n. sp., *Zanola vidunua* n. sp. This is the second part of the preparatory work. Habitus and male genitalia are figured.

Herbin D., 2026. – New species of *Zanola* Walker, 1855 (Part 2) (Lepidoptera: Apatelodidae). *Faunitaxys*, 14(17) : 1 – 14.

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## Introduction

In a recent publication (Herbin, 2026), I described three new species of *Zanola* Walker, 1855, in addition to seven previously known species, resulting in a preliminary total of ten Neotropical species in the genus. Examination of specimens in the Witt collection in the Zoologische Staatssammlung München (Munich, Germany) (ZSM) and in the author's collection, coupled with barcoding, results in the description of a second set of previously unknown species. *Zanola* often show a similar habitus across species which has led to the name *Zanola virago* (Cramer, 1777) being applied to specimens from a wide distribution, from Mexico to Brazil (Draudt, 1929; Becker, 1996; Kitching et al., 2008). Availability of new tools, like DNA barcoding (see Materials and methods), provides evidence that there exists cryptic diversity in this group. Verification of genitalia confirms what is shown through these genetic analyses.

## Material and methods

This section follows my work in previous publications (Herbin 2015, 2016, 2017, 2018), thus details will not be repeated here. For descriptive terminology, colour names are based on the RAL K5 classic colour chart. DNA barcoding analyses were completed as part of the broader BOLD initiative, using well-established protocols (Ratnasingham & Hebert, 2007). Tissue consisted of legs removed from dried voucher specimens. DNA was extracted, amplified and sequenced at the "Canadian Centre for DNA Barcoding" (CCDB) in Guelph, Ontario. Sequences of mitochondrial DNA (COI gene), or DNA barcodes, were extracted from BOLD in Fasta format, imported, then aligned and processed with MEGA software (Tamura & al., 2021), with the neighbor joining method (Saitou & Nei, 1987) to generate the presented tree. Barcode Index Number (BIN) which is a unique taxonomic unit that closely corresponds to a species (Ratnasingham & Hebert 2013) is given in the tree. When different BIN numbers were allocated in BOLD, but no differences were found in habitus and genitalia, a conservative approach is taken, considering

these specimens belong to the same species, and this is reported in the text. The genitalia preparations for material in ZSM are given a double numbering: in a first step, the numbering in the author genitalia sequence, stored in vial in glycerol, then a numbering CW-xxx corresponding to a ZSM numbering sequence in the Witt collection when the genitalia will later be mounted in Euparal.

The holotypes are deposited in institutions: MNHN, ZSM or UNAB, as specified in each holotype section.

## Abbreviations

CDH: Personal collection of Daniel Herbin (Garidech, France).  
MNHN: Muséum National d'Histoire Naturelle (Paris, France).  
NHMUK: Natural History Museum (London, United Kingdom).  
UNAB: Museo Entomológico de la Facultad de Agronomía de la Universidad Nacional de Colombia, Bogotá, Colombia.  
USNM: United States National Museum, Smithsonian Institution (Washington D.C., U. S. A).  
UVGC: Universidad del Valle de Guatemala, Arthropod Collection, Guatemala City, Guatemala.  
ZSM: Zoologische Staatssammlung München (Munich, Germany).

## Results

### *Zanola chuspipata* n. sp.

(Fig. 1-2)

ZooBank : <https://zoobank.org/4332739F-3165-45C1-A5F0-95E840B8D6B>

**Diagnosis.** – Dark mahogany brown colour for the four wings. Forewing with a black antemedial line bordered proximally by white scales, a black postmedial line bordered distally by white scales. A patch of silvery white scales along the costa at mid wing, above the black streak surrounded by whitish scales at the extremity of the cell. Male genitalia with a pair of spiny processes at the base of valvae, ventrad, near sacculus. A pair of ventrad spiny processes at base of valvae costa, thicker than those of sacculus, and of similar length. Gnathos forming V, the arms fused mesally, their apex enlarged. The most diagnostic character appears to be the acute extension at the base of the valvae (arrows in Fig. 2a-2b).

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**Holotype**, ♂, bearing the following labels: *Zanola chuspipata* Herbin des. 2026 – Bolivie, Dept La Paz, Coroico à Chuspipata, env. 10 km de Chuspipata, 2355 m, 08.XI.2000, 16°16.315'S 67°47.167'W, leg. D. Herbin/M. Laguerre – CDH 3.097 – genitalia prep. D. Herbin ref H. 1209 – *In* MNHN.

**Paratypes** (3 ♂)

- 2 ♂, Same data as holotype. *In* CDH.

- 1 ♂, Bolivia, Cochabamba, Route Cochabamba-Villa Tunari, Piste Incachaca km 3.6, 2400 m, 27.I.1997, leg. D. Herbin – genitalia prep. D. Herbin ref H. 1207. *In* CDH.

**Description**

**Male** (Fig. 1a, 1b).

Forewing length: 17 mm; wingspan: 35 mm.

Antennae flagellum brown with dark grey rami, bipectinate to the tip. Head, thorax, abdomen brown with a central dorsal blackish line. Forewing subtriangular, elongated, a small notch in the termen below apex, then termen rounded, convex. Forewing colour mahogany brown with some tawny patches, particularly in basal area. A tawny rectangular spot below apex, between M2 and M3. Two patches of silvery white scales along costa: one at mid wing above black streak, surrounded by whitish scales, at extremity of cell, second one at intersection between postmedial line and costa. A blackish crenulate line in

submarginal area. Hindwing with peculiarly shaped costa: almost straight and inflated at apex. Upperside uniform reddish brown, no visible lines. Forewing underside, slightly lighter in submarginal area, the fringe brown bordered distally with cream. Hindwing underside paler reddish brown than upperside, a dark brown streak at apex, postmedial line black, crenulate, a medial transverse line thick, brown, with borders not well defined.

**Genitalia** ♂ (Fig. 2a, 2b, 2c).

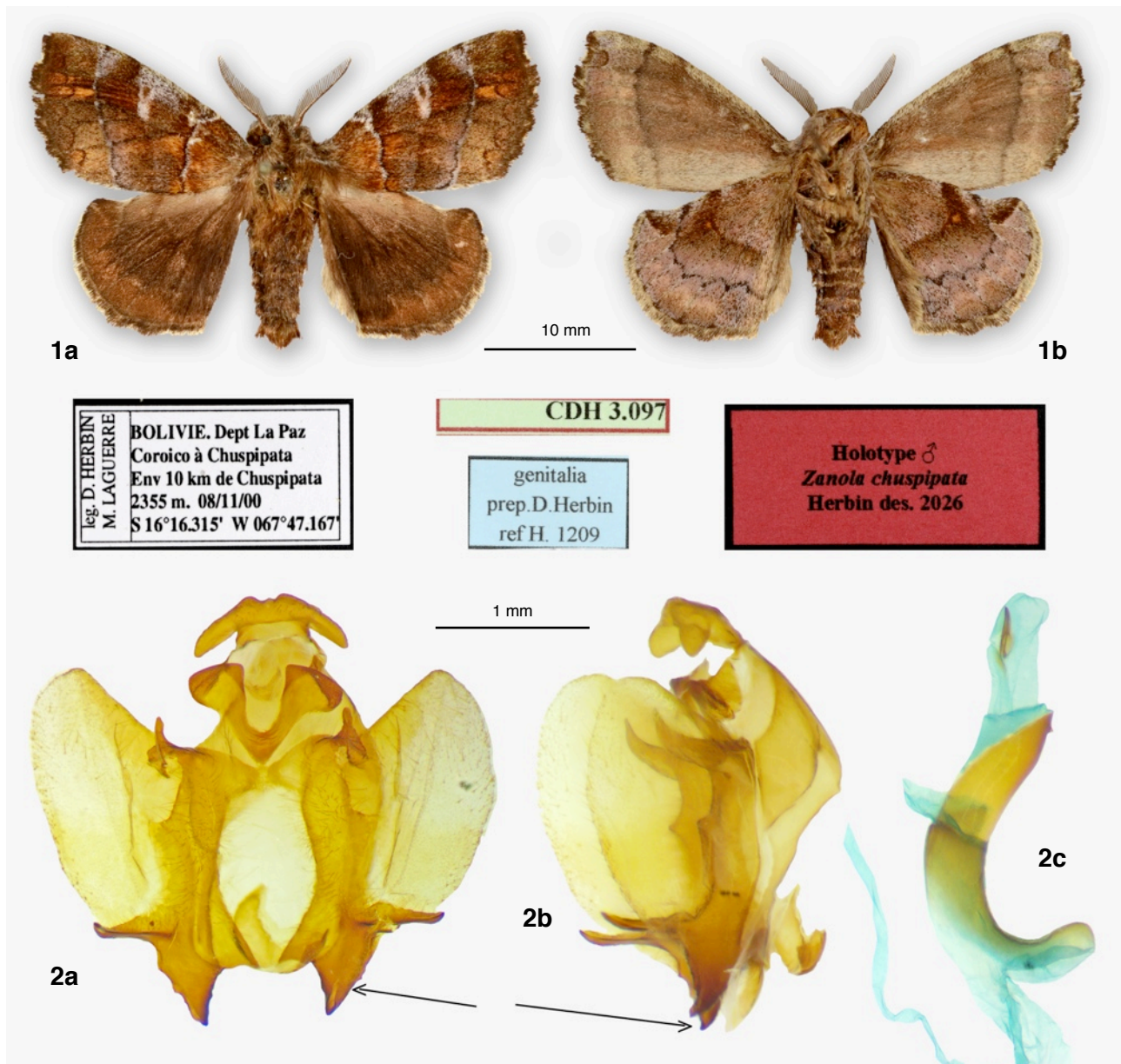
The uncus with wide rectangular base and apex with two small central rounded teeth separated by central notch, long lateral extension on each side. Gnathos a V-shaped plate, apex of V branches widened. Internally to base of valvae a sclerotized plate equipped with sclerotized spiny process at level of costa, and another double spiny process at level of sacculus. Shown by arrows in Fig. 2, this spiny process diagnostic as generally not found in other species of the genus. The aedeagus shaft curved in almost half circle, apex of shaft equipped with tiny cornutus. Vesica with rather long cornutus below apex.

**Female.** – Unknown.

**Immature stages.** – Unknown.

**Distribution.** – Bolivia, Dept La Paz, at high altitudes of ca. 2000 m.

**Etymology.** – Named with the noun of the locality Chuspipata in apposition.



**Fig. 1-2.** *Zanola chuspipata* n. sp. ♂ holotype (labels not to scale)

1. a. Dorsal view. b. Ventral view. 2. Genitalia (prep. H1209). a. Ventral view (with aedeagus). b. Lateral view (with aedeagus). c. Aedeagus.

***Zanola mariposa* n. sp.**

(Fig. 3-5)

ZooBank : <https://zoobank.org/C1FF0328-83AD-430E-B743-A6B25FD092FB>

**Diagnosis.** – Main diagnostic characters are on male genitalia in the particularly developed strong spiny process at the valvae sacculus (see Fig.4).

**Holotype**, ♂, Bearing the following labels: *Zanola mariposa*, Herbin des. 2026 – Perou, Pasco, Villa Rica, Restaurant Copaxa, 10°42'49.33"S 75°15'51.08"W, Alt. 1553 m, 30.I.2018, leg. F. Steiger – genitalia prep. D. Herbin ref H.1592. *In* MNHN.

**Paratypes (8 ♂, 1 ♀)**

- 1 ♂, Peru, Junin, San Martín de Pangoa, Amarin, 11°47'49.20"S 74°19'04.15"W, Alt. 1619 m, 12.X.2017, leg. D. Herbin – BC-Her5858. *In* CDH.

- 1 ♂, Peru, Junin, Satipo, Mariposa, 11°24'17.558"S 74°44'04.73"W, Alt. 1463 m, 13.X.2017, leg. D. Herbin – genitalia prep. D. Herbin ref H.1450 – BC-Her5140. *In* CDH.

- 2 ♂, Peru, Junin, Satipo, Mariposa, 11°24'17.558"S 74°44'04.73"W, Alt. 1463 m, 13.X.2017, leg. D. Herbin. *In* CDH.

- 2 ♂, Peru, Pasco, Bogaz, 10°39'49.70"S 75°11'52.35"W, Alt.1459 m, 20.X.2017, leg. D. Herbin. *In* CDH.

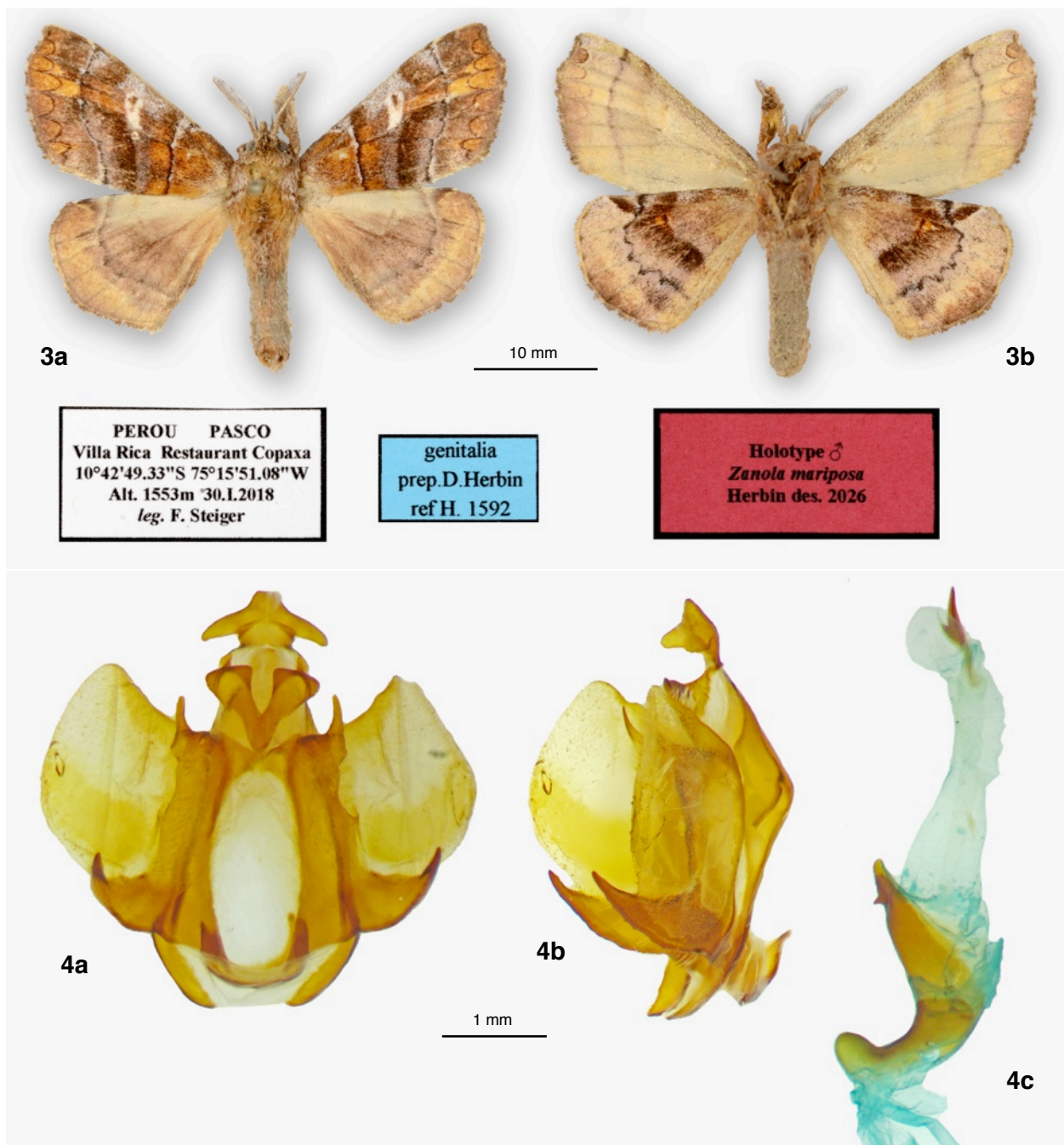
- 2 ♂, Peru, Pasco, Bogaz, Cumbre + 1km, 10°41'30.885"S 75°12'24.42"W, Alt.1749 m, 21.X.2017, leg. D. Herbin. *In* CDH.

- 1 ♀, Peru, Pasco, Villa Rica-Bermudez, Chatarra, 10°31'16.85"S 75°04'24.10"W, Alt. 594 m, 14.I.2018, leg. F. Steiger. *In* CDH.

**Description****Male** ( Fig. 3a, 3b).

Forewing length: 18 mm; wingspan: 36 mm.

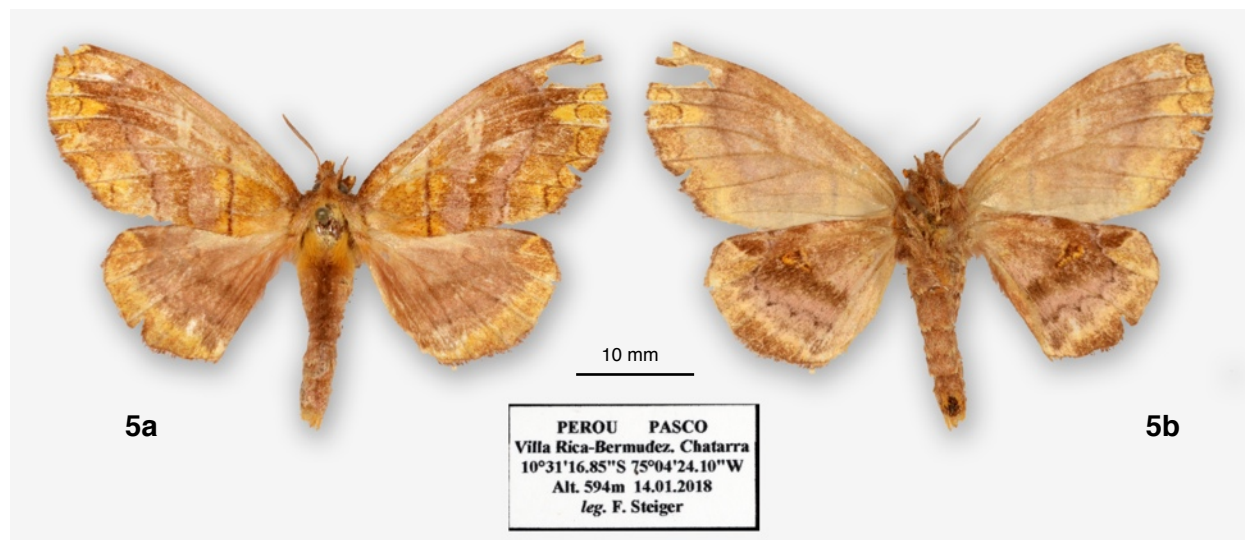
Antennae flagellum beige with brown scales, bipectinate to the tip. Head, thorax and abdomen brown beige. Forewing subtriangular, with notch in termen below apex, termen then convex. Forewing upperside: ground colour beige brown with multiple yellow orange patches: basal area yellow orange with speckling of brown scales, submarginal area, and medial area close to the antemedial line. Black antemedial line, bordered proximally by white scales,



**Fig. 3-4.** *Zanola mariposa* n. sp. Holotype ♂ (labels not to scale).

3. a. Dorsal view. b. Ventral view. 4. Genitalia (prep. H.1592). a. Ventral view. b. Lateral view. c. Aedeagus





**Fig. 5.** *Zanola mariposa* n. sp. Paratype ♀ (labels not to scale).

a. Ventral view. b. Lateral view. c. Aedeagus. 5.. a. Dorsal view. b. Idem, ventral view.

distally by yellow orange. Medial wide line defined proximally by a ribbon made of a mixture of beige and brown beige scales, distally by darker ribbon mainly made of brown scales. S-shaped black postmedial line, bordered distally by white scales. Crenulate black line in submarginal area, with seven lunulae, filled distally of yellow orange. Yellow orange patch between M2 and M3. Ivory comma at extremity of cell, with brown streak inside. Hindwing upperside much paler than forewing, sand yellow, grey postmedial line, slightly crenulate. Submarginal area pastel yellow. Forewing underside uniform, ivory with only postmedial line, brown, partly erased. Three or four weakly defined lunulae below apex. Hindwing underside darker, brown beige. Crenulate black postmedial line, thick mahogany brown transverse line in medial area, inside which orange spot at extremity of cell.

**Genitalia** ♂ (Fig. 4a, 4b, 4c).

Uncus base wide, overcome by two side lobes. Gnathos V-shaped, made of two arms fused mesally, with wide V-branches enlarged apically. Valvae with sclerotized thick plate attached all along base, and long, curved sclerotized ventrad spiny process with wide base, and smaller ventrad spiny process at base of valvae costa. Aedeagus, curved, tiny spine at apex. Long tubular vesica with single apical sclerotized cornutus.

**Female** (Fig. 5a, 5b)

Forewing length: 24 mm; wingspan: 48 mm.

The only available female shows the same ornamentation as the male, in particular the orange brown colour, the lunulae, the paler submarginal area of hindwing. The antennae are thinner, with shorter rami.

**Genitalia** ♀: not examined.

**Immature stages.** – Unknown.

**Distribution.** – Peru, Pasco, at medium altitudes.

**Etymology.** – Species named by apposition of the name of the locality for three of the paratypes in Peru, Junin: Mariposa.

### *Zanola boyacana* n. sp.

(Fig. 6-7)

ZooBank : <https://zoobank.org/0E056D71-939D-40F0-8559-E5F71F8DA66B>

**Diagnosis.** – Habitus uniform orange brown, with poorly contrasting lines. Male genitalia mainly diagnostic: combination of trifold uncus, V-shaped gnathos with granular apices, and relatively short spiny process at base of valvae.

**Holotype**, ♂, Bearing the following labels: Holotype ♂, *Zanola boyacana*, Herbin des. 2026 – Colombie, Boyacá, Pajarito, Curisi, 5°22'18.15"N 72°41'10.23"W, Alt. 1065 m, 30.IV.2019, leg. Herbin/Vincent/Durand – genitalia prep. D. Herbin ref H.1594 – BC-Her5254 – Export permit ANLA, Colombia n°01540, 2019. In UNAB.

### Paratypes (5 ♂)

- 2 ♂, Colombia, Boyacá, Sendero Almenara, Munic. Santa Maria, 1220 m, 04°52'45"N 73°17'13"W, 19-20.X.2014, leg. Sinyaev, Marquez & Machado. In ZSM.

- 1 ♂, Colombia, Boyacá, Pajarito, Curisi, 5°22'18.15"N 72°41'10.23"W, Alt. 1065 m, 30.IV.2019, leg. Herbin/Vincent/Durand. In CDH.

- 1 ♂, Colombia, Boyacá, Santa Maria, Reserve naturelle de Santa Maria, 04°52'44"N 73°15'13"W, 1170 m, 11.IX.2015, R. Rougerie & J. Barbut leg., IAVH-E-190896 – Bc-Her5209 – genitalia prep. D. Herbin ref H.1593. In CDH.

- 1 ♂, Venezuela, Edo. Merida, Rio Frio, 8°51.8'N 71°17.8'W, 700 m, 29 February 2008, leg. N. Flauger – genitalia prep. D. Herbin ref H.1809 (= CW 228). In ZSM.

### Description

**Male** (Fig. 6a, 6b).

Forewing length: 17 mm; wingspan: 34 mm.

Antennae bipectinate to the tip, flagellum cream, rami dark grey. Forewing subtriangular with termen straight and oblique from apex to M3, then convex down to tornus. Ground colour orange brown, antemedial area orange fawn, antemedial and postmedial lines brownish, not very contrasting on the background. In the submarginal area, three lunulae bordered proximally and distally with orange. At the edge of cell, beige orange vertical streak, with internal brown small streak. Hindwing costa almost straight. Hindwing upperside uniform orange brown, vague brownish postmedial line, submarginal area slightly paler and more orange. Forewing underside uniform beige red with vague brownish postmedial line, and thick line, yellowish beige, parallel to termen, with three lunulae below apex. Hindwing underside darker, basal and medial areas mahogany brown with brown spot surrounded by orange scales at the cell; submarginal area paler, crenulate blackish postmedial line, crenulate yellowish beige line in submarginal area.

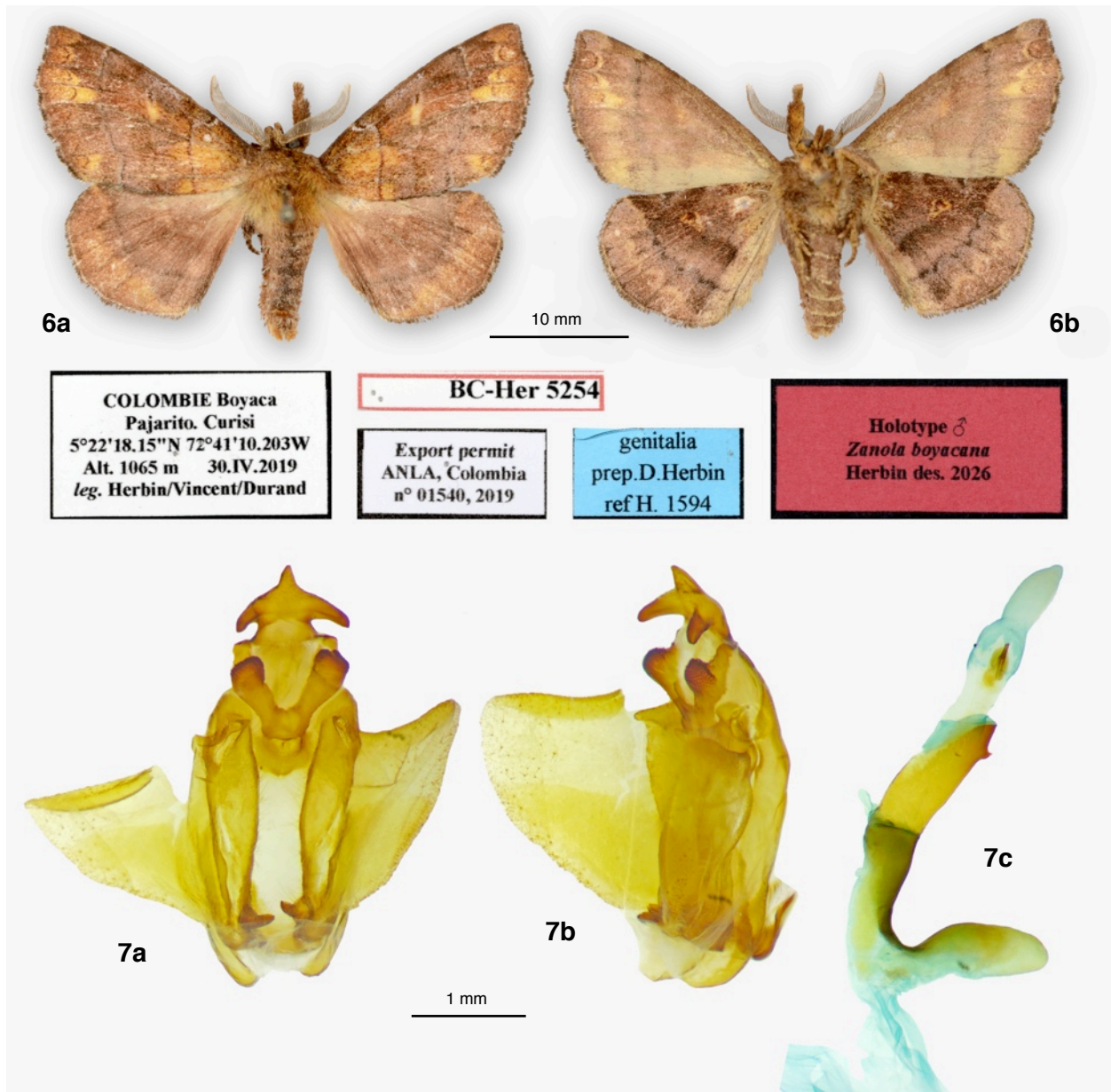
**Genitalia** ♂ (Fig. 7a, 7b, 7c).

Uncus with rectangular base, and trifid apex, acute central hook, with two lateral less acute projections. Gnathos V-shaped, with apex of arms rounded and granular (this configuration of gnathos, with V branches and irregular granular surface appears to be diagnostic for this species). Spiny process at base of valvae much weaker and smaller than in many other species: rather small at sacculus level, and very small at costa level. Aedeagus long, curved at 90°, or even with smaller angle, minute cornutus, preapical to shaft apex. Vesica digitiform with rather small cornutus at intermediate level (i.e. not apical nor preapical).

**Female.** – Unknown.

**Immature stages.** – Unknown.

**Distribution.** – Colombia, Dept Boyacá, at medium altitudes.



**Fig. 6-7.** *Zanola boyacana* n. sp., holotype ♂ (labels not to scale).

6. a. Dorsal view. b. ventral view. 7. Genitalia (prep. H. 1594) ♂. a. Ventral view. b. Lateral view. c. Aedeagus.

**Etymology.** – The species name is derived from the Boyacá department, where the holotype was collected.

**Discussion.** – A specimen from Venezuela, slightly larger in size (wingspan: 42 mm), presenting same habitus, and identical genitalia, is added to the paratypes, although we do not have the barcode for confirmation. We have two barcodes from Colombia, Boyacá, in two different localities situated on the same slopes to Amazonian basin at similar altitudes. The specimens share the same habitus and genitalia, we therefore consider they represent the same species, although BOLD allocated two different BIN numbers for these specimens: AEC2716 and ADT2216 (see mention in materials and methods section). We also noticed that the given GPS coordinates for the Sendero Almenara do not correspond to the given altitude of 1220 m, but to an altitude above 2000 m. We suspect after investigations on Google Earth that there could be an error in 73°17'13"W coordinate, and that it might better be 73°15'13"W (also coherent with the coordinates by Rougerie & Barbut in the same reserve). In such case, the given altitude of 1220 m would correspond.

***Zanola josemonzoni* n. sp.**

(Fig. 8-10)

ZooBank : <https://zoobank.org/185D27B3-6B4B-448D-8B37-6FA355EE4992>

**Diagnosis.** – Male genitalia are mainly diagnostic, as habitus is similar to some other species (including the above *Z. boyacana* n. sp.). Uncus quadrifid, gnathos with relatively thin arms fused mesally, forming a W when seen in ventral view. Each gnathos arm with a perpendicular digitiform projection. A pair of short spiny processes at level of sacculus, a pair of longer spiny processes near costa of valvae.

**Holotype**, ♂, Bearing the following labels: Holotype ♂, *Zanola josemonzoni*, Herbin des. 2026 – Guatemala, San Marcos, San Marcos. Camino Fraternidad a El Bojonal, 1600 m. 29 Junio 2008, 14.9459 -91.8806, coll. Monzón y Camposeco – genitalia prep. D. Herbin ref H.1208 – BC-Her4212 – CDH 3.096. In MNHN.

**Paratypes (6 ♂, 2 ♀)**

- 5 ♂, same locality, date and collectors (3 specimens barcoded: Bc-Her4198, Bc-Her4199, Bc-Her4200). In CDH.

- 1 ♀, same locality, date and collectors, barcode Bc-Her4201. In CDH.



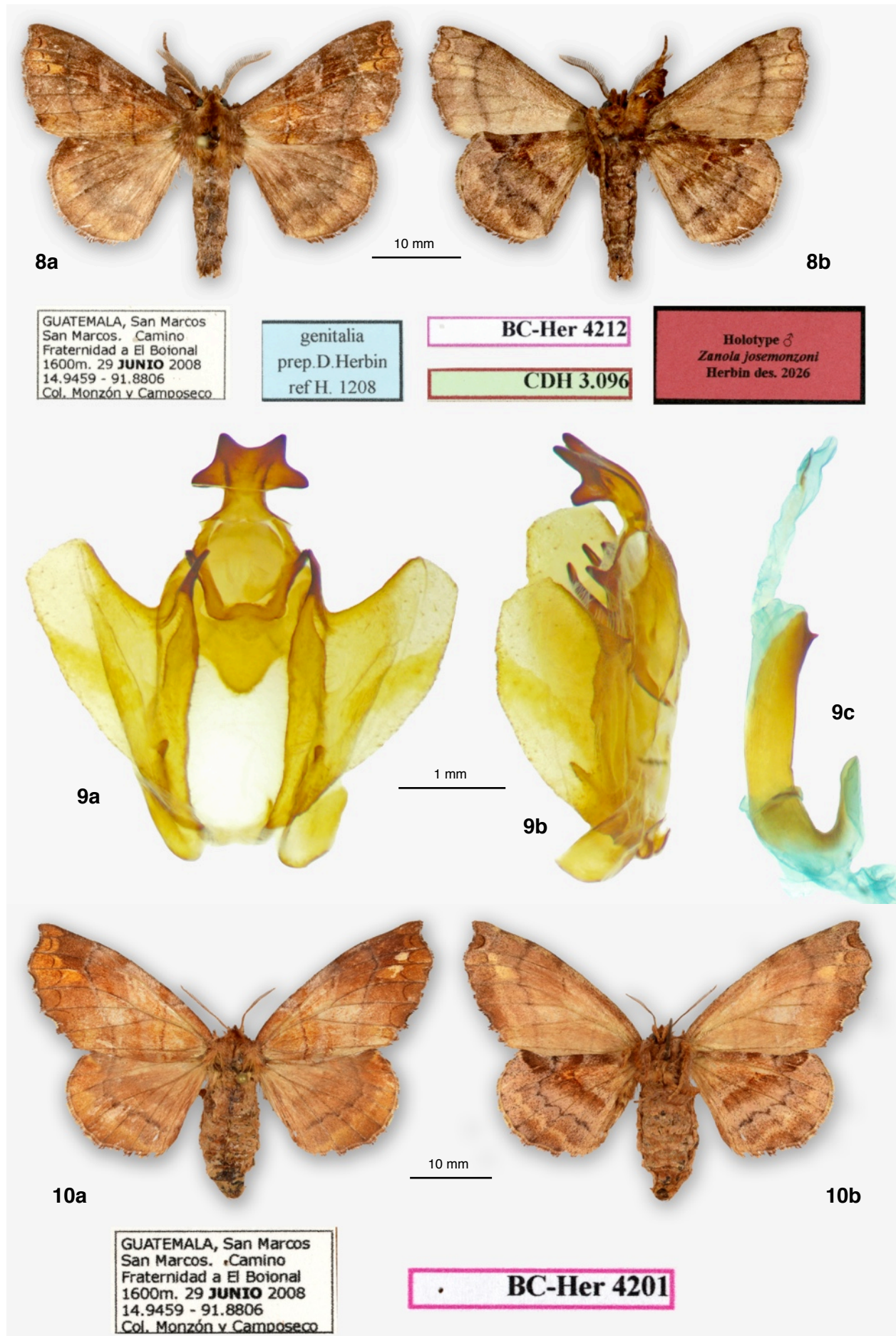


Fig. 8-10. *Zanola josemonzoni* n. sp. (labels not to scale).

8-9. Holotype ♂. 8. a. Dorsal view. b. Idem, ventral view. 9. Genitalia (prep. H. 1208) ♂. a. Ventral view. b. Lateral view. c. Aedeagus.  
10. Paratype ♀. a. Dorsal view. b. Idem, ventral view.



- 1 ♂, Guatemala, San Marcos, San Marcos. Camino Fraternidad a El Bojonal, 1600 m. 27 Julio 2008, 14.9459 -91.8806, coll. Monzón y Camposeco. In UVGC.

- 1 ♀, Guatemala, San Marcos, Camino Fraternidad a El Bojonal, 1600 m. 28 Julio 2008, 14.9459 -91.8806, coll. Monzón y Camposeco. In UVGC.

### Description

**Male** (Fig. 8a, 8b).

Forewing length: 19 mm; wingspan: 40 mm.

Habitus identical to above species *Zanola boyacana* n. sp., but slightly darker. Lines on forewing and hindwing upperside not contrasting with background. Only antemedial and postmedial lines of forewing can be distinguished by careful examination. Three preapical lunulae and orange rectangle patch between M2 and M3, not very contrasting, appearing fused with ground colour.

**Genitalia** ♂ (Fig. 9a, 9b, 9c).

Uncus quadrifid with four branches of equal length. Gnathos arms fused mesally, forming a W, seen in ventral view (Fig. 9a). Spiny process at base of valvae longer at costa side, and small at sacculus side. Aedeagus long, U-curved, preapical small cornutus on the shaft, vesica with a preapical cornutus. Combination of uncus and gnathos shapes is key diagnostic for this species.

**Female** (Fig. 10a, 10b). Forewing length: 24 mm, wingspan: 47 mm. Antennae fine, narrower than in male, and finely bipectinate to the tip. Same ornamentation as male, colour rather uniform, pastel yellow for both forewing and hindwing upperside, with antemedial, medial and postmedial lines weakly contrasting with the background. Notch in forewing termen, below apex, more pronounced than in male. Hindwing underside lines well contrasting from background, same ornamentation as in male.

**Genitalia** ♀: not examined.

**Immature stages**. – Unknown.

**Distribution**. – Guatemala.

**Etymology**. – The species name is dedicated to Jose Monzón Sierra, an excellent field entomologist and curator at UVGC in Guatemala City.

**Discussion**. – Seven specimens from the type series were collected the same night in Dept San Marcos. Five specimens were barcoded with BOLD, resulting in two groups: one group of three with an identical sequence (given BIN number AAB6303, two specimens only presented in Fig. 19 tree) and a second group of two (given BIN number ACF3038, one specimen only presented in Fig. 19 tree), the two groups with a 1.2% pairwise distance. We cannot distinguish them by habitus, the genitalia are identical, we therefore concluded they are the same species, although BOLD allocates them two different BIN numbers.

### *Zanola vidunua* n. sp.

(Fig. 11-12)

ZooBank : <https://zoobank.org/05C2AF44-2D7C-4B3C-A73A-B8D8AE34861B>

**Diagnosis**. – Small Andean species from high altitudes, with a typical habitus for the genus, diagnostic characters are found in the male genitalia: uncus with two lateral extensions widely separated, and a sclerotized plate at valvae sacculus level with two separate spiny apices. Absence of cornutus at apex of the aedeagus shaft.

**Holotype**, ♂, Bearing the following labels: Holotype ♂, *Zanola vidunua*, Herbin des. 2026 – Bolivia, 2.5 km W. Unduavi, 16°18.5'S 67°53.9'W, 05.I. 2010, H= 3200 m, Leg/coll. Viktor & Svetlana Sinyayev + Alexei Zamesov – genitalia prep. D. Herbin ref H.1804 (= CW 0225). In ZSM.

### Paratypes (2 ♂)

- 1 ♂, Bolivia, Prov. La Paz, Cotapata, 16°16.5'S 67°51.6'W, 24-25.X. 2010, 3200 m, leg. V. Sinyayev & O. Romanov. In ZSM.

- 1 ♂, Bolivia, Prov. La Paz, Cotapata, 16°16.5'S 67°51.6'W, 24-25.X. 2010, 3200 m, leg. V. Sinyayev & O. Romanov – genitalia prep. D. Herbin ref H.1810 (= CW 0227). In ZSM.

### Description

**Male** (Fig. 11a, 11b).

Forewing length: 14 mm; wingspan: 31 mm.

Antennae bipectinate to the tip, flagellum beige, rami dark grey.

Forewing subtriangular with rounded crenulate termen, and preapical notch. Ground colour green brown, basal area ochre brown, the antemedial line black bordered proximally with white scales, a whitish triangle at cell's extremity with a central brown spot; sinuous postmedial line black, bordered with white scales distally and beige proximally. Thin crenulate black line in submarginal area bordered distally with ochre brown. Broom yellow rectangular patch between M2 and M3. Speckling of white scales along costa. Hindwing upperside brown beige, postmedial beige line parallel to termen. Beige streak at apex. Fringe brown. Forewing upperside beige, postmedial brown line. Preapical brown spot, reddish brown fringe. Hindwing underside beige brown, thick chocolate brown line from apex, black crenulate postmedial line bordered with whitish scales distally followed by rather thick parallel brown line.

**Genitalia** ♂ (Fig. 12a, 12b, 12c).

Uncus with wide rectangular base overcome by quasi-quadrifid uncus: two central points separated by wide notch with two lateral extensions. Gnathos V-shaped with wide apices of the V. Strong spiny process at base of valvae costa. Sclerotized plate at base of valvae sacculus, with two separated acute apices. Aedeagus curved at 90°, absence of cornutus at apex of shaft. Cornutus at apex of vesica.

**Female**. – Unknown.

**Immature stages**. – Unknown.

**Distribution**. – Bolivia, La Paz department, at high altitudes.

**Etymology**. – The species name is built from an anagram of the type locality: Unduavi.

### *Zanola drechselsi* n. sp.

(Fig. 13-14)

ZooBank : <https://zoobank.org/EDBC4BE9-510D-4146-8673-639FD9E77F9E>

**Diagnosis**. – Small species with peculiar habitus: abdomen dorsum blackish, dark brown forewing with convex rounded termen. The hindwing costa convex, absence of prominent tooth at apex (present in many species of the genus). Male genitalia with very short aedeagus, absence of small spine at apex of the shaft. Shape of gnathos unique, with thick branches fused mesally, shaped in U with right angles. The combined configuration of uncus, gnathos and spiny process is unique.

**Holotype**, ♂, Bearing the following labels: Holotype ♂, *Zanola drechselsi*, Herbin des. 2026 – Paraguay, Dep. Alto Parana, Estancia Dimas, 25°33'S 55°13'W, 6-7.V.2011, leg. U. Drechsel – genitalia prep. D. Herbin ref H. 1210 – BC-Her5032 – CDH 3.098. In MNHN.

### Paratypes (1 ♂)

- 1 ♂, Paraguay, Dep. Alto Parana, Estancia Dimas, 25°33'S 55°13'W, 23-25.IX.2011, leg. U. Drechsel – BC-Her5192. In CDH.

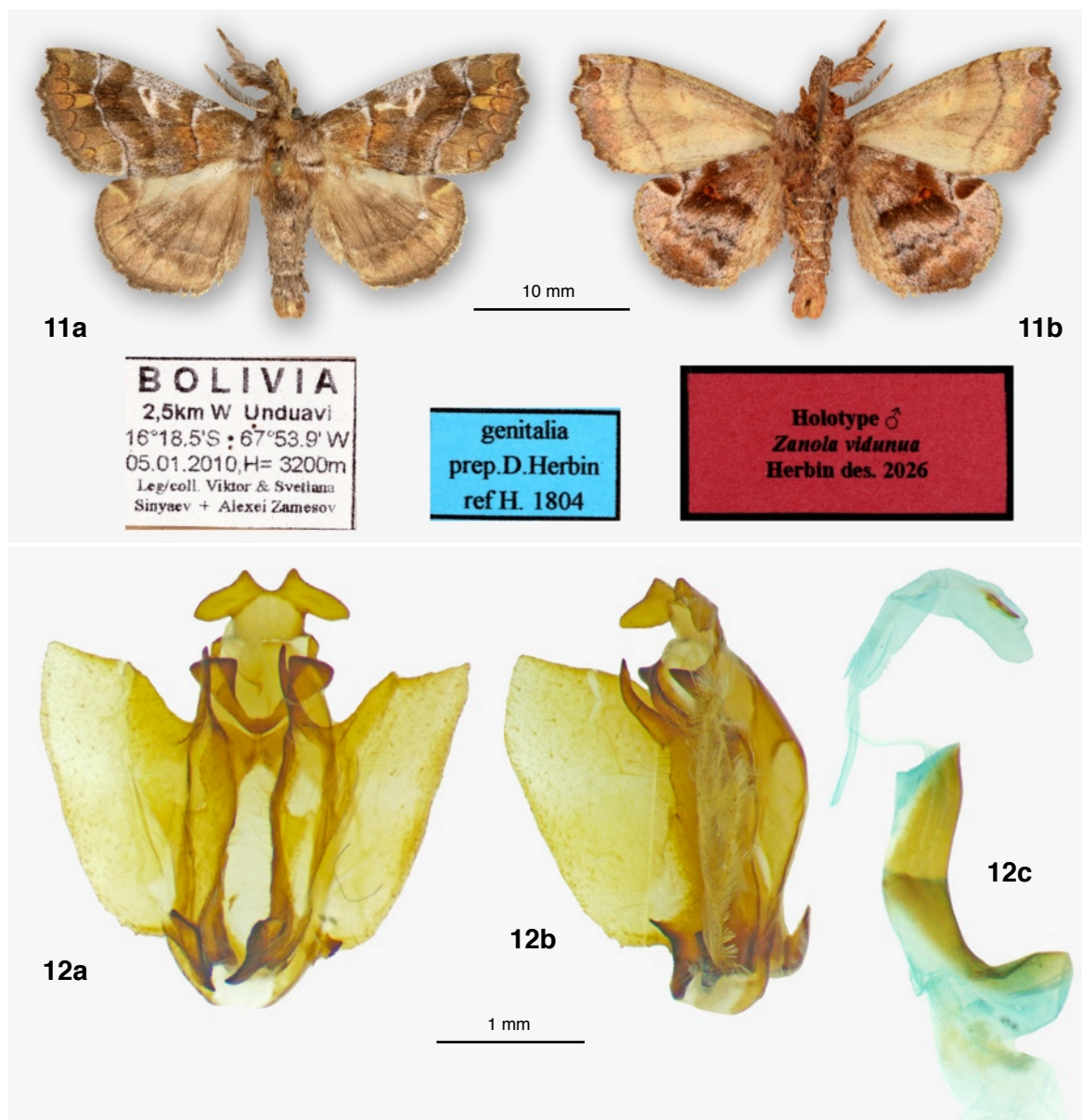
### Description

**Male** (Fig. 13a, 13b).

Forewing length: 13 mm; wingspan: 28 mm.

Antennae bipectinate to the tip, flagellum covered by a mix of cream and brown scales, rami dark grey.

Forewing subtriangular with rounded convex termen (notch below apex present in many other species of the genus is here absent). Upperside nut brown, antemedial line thin, black, bordered proximally with white scales, distally with orange and black scales, medial line thicker, dark brown, postmedial line black, bordered distally by white scales. In submarginal area,



**Fig. 11-12.** *Zanola vidunua* n. sp., holotype ♂ (labels not to scale).

**11.** a. Dorsal view. b. Idem, ventral view. **12.** Genitalia (prep. H. 1804). a. Ventral view. b. Lateral view. c. Aedeagus.

crenulate black lines, three lunulae below apex bordered distally with orange scales. Brown streak at extremity of cell surrounded by whitish scales, patch of silverish white scales between this streak and costa. Hindwing upperside uniform beige red, with slightly darker postmedial line parallel to termen. Paler beige oblique streak at apex. Forewing underside brown beige with blackish postmedial line. In marginal area, single preapical lunula filled with brown until termen. Hindwing costa almost straight (not concave with prominent apex like we see in *Z. chuspipata* n. sp. (Fig. 1)). Medial thick dark brown transverse line present, starting from apex and parallel to termen. Crenulate postmedial black line. Antemedial area mainly chocolate brown. Speckling of dark brown scales all over wing.

**Genitalia** ♂ (Fig. 14a, 14b, 14c).

Uncus quadrifid with central bifid process and lateral longer extension rounded apically. Gnathos U-shaped.

Spiny process at sacculus level strongly sclerotized, longer than spiny process at valvae costa. Aedeagus short, caecum penis curved at 90°. Absence of preapical cornutus on shaft. Long cornutus on vesica.

**Female.** – Unknown.

**Immature stages.** – Unknown.

**Distribution.** – Paraguay, Dept Alto Parana.

**Etymology.** – The species name is dedicated to Ulf Drechsel, renowned entomologist in Paraguay, who kindly provided us with this material for study.

***Zanola marta* n. sp.**

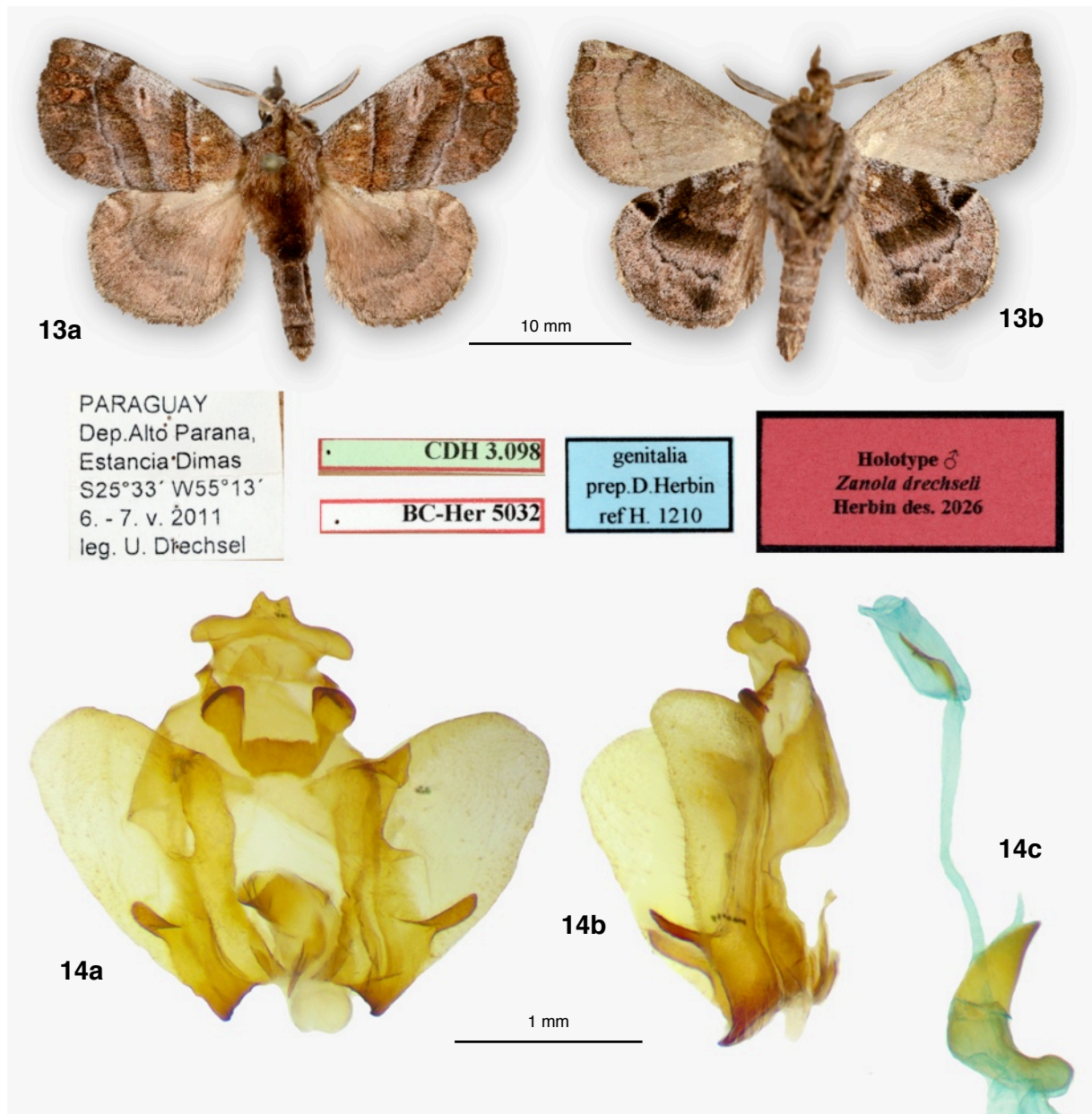
(Fig. 15-16)

ZooBank : <https://zoobank.org/4BCC69AE-EC2A-4B0F-BE6A-2208CE2D9F1F>

**Diagnosis.** – *Z. marta* n. sp. closest species is *Z. josemonzoni* n. sp. by the quadrifid configuration of the uncus. The shape of gnathos, a small ventrad rectangular plate connected with two lateral arms, and the strong spiny process at valvae costa level are diagnostic. The habitus is significantly different however, much more contrasted in *Z. marta*, and with different colour: beige brown instead of orange brown. The genetic distance between the two species in the tree (Fig. 19), is significant: ca. 8%.

**Holotype**, ♂, Bearing the following labels: Holotype ♂, *Zanola marta*, Herbin des. 2026 – Costa Rica, Dept Cartago, Reserva silvestre La Marta, 750 m, 13 Septembre 2009, 09°47'00.76"N 83°41'20.13"W, leg. D. Herbin/ML Montagnani – genitalia prep. D. Herbin ref H.1206 – BC-Her3954 – CDH 3.095. In MNHN.





**Fig. 13-14.** *Zanol drechseli* n. sp., holotype ♂ (labels not to scale).

**13.** a. Dorsal view. b. Idem, ventral view. **14.** Genitalia (prep. H. 1210). a. Ventral view (with aedeagus). b. Lateral view. c. Aedeagus.

#### Paratypes (7 ♂, 3 ♀)

- 1 ♂, Costa Rica, Valle Central, Prov. Heredia, National Park Braulio Carillo, Sector Zurqui, 1500 m, Regenwald, 12-16.V.1999, leg. Rudloff, Museum Witt. *In* ZSM.
- 1 ♂, Costa Rica, Puntarenas, Coto Bruis, Campo Tres, 1100 m, 17 km S. San Vito, March-August 2000, leg. Frischeisen. *In* ZSM.
- 1 ♂, Costa Rica, Alajuela prov., Area de conservacion Guanacaste, Sector San Cristobal, Sendero Danta, 10.861N 85.379W, 27.II.2003, 890 m, leg. Gloria Sihezar, Barcode: 08-SRNP-100663/BLPCK570-08. *In* USNM.
- 1 ♂, Costa Rica, Alajuela prov., Area de conservacion Guanacaste, Sector San Cristobal, Rio Blanco Abajo, 10.9N 85.373W, 21.XI.2004, 500 m, leg. O. Espinoza, Barcode: 04-SRNP-60434/MHAXA012-06. *In* USNM.
- 1 ♂, Costa Rica, Alajuela prov., Area de conservacion Guanacaste, Sector San Cristobal, Rio Areno, 10.914N 85.382W, 10.IV.2006, 460 m, leg. O. Espinoza, Barcode: 06-SRNP-1720/MHMXD186-06. *In* USNM.
- 1 ♂, Costa Rica, Alajuela prov., Area de conservacion Guanacaste, Sector Rincon rain forest, Jabalina, Manta Pizote, 10.973N 85.315W, 06.II.2008, 288 m, leg. S. Rios & R. Franco, Barcode: 08-SRNP-100663/BLPCK570-08. *In* USNM.
- 1 ♂, Costa Rica, Alajuela prov., Area de conservacion Guanacaste, Sector Rincon rain forest, Finca Esmeralda, 10.93548N 85.25314W, 03.III.2012, 288 m, Barcode: 12-SRNP-75350/MHMY54375-14. *In* USNM.

- 1 ♀, Costa Rica, Alajuela prov., Area de conservacion Guanacaste, Sector San Cristobal, Sendero Vivero, 10.867N 85.387W, 22.II.2005, 730 m, leg. Gloria Sihezar, Barcode: 05-SRNP-089/MHAXA008-06. *In* USNM.
- 1 ♀, Costa Rica, Alajuela prov., Area de conservacion Guanacaste, Sector Rincon rain forest, Flecha, 10.94741N 85.31501W, 22.I.2015, 491 m, Barcode: 14-SRNP-82117/MHMYK7867-15. *In* USNM.
- 1 ♀, Costa Rica, Alajuela prov., Area de conservacion Guanacaste, Sector Pitilla, Sendero Manguera, 10.9959N 85.39842W, 16.VII.2017, 470 m, Barcode: 17-SRNP-72183/BLPAA12146-18. *In* USNM.

#### Description

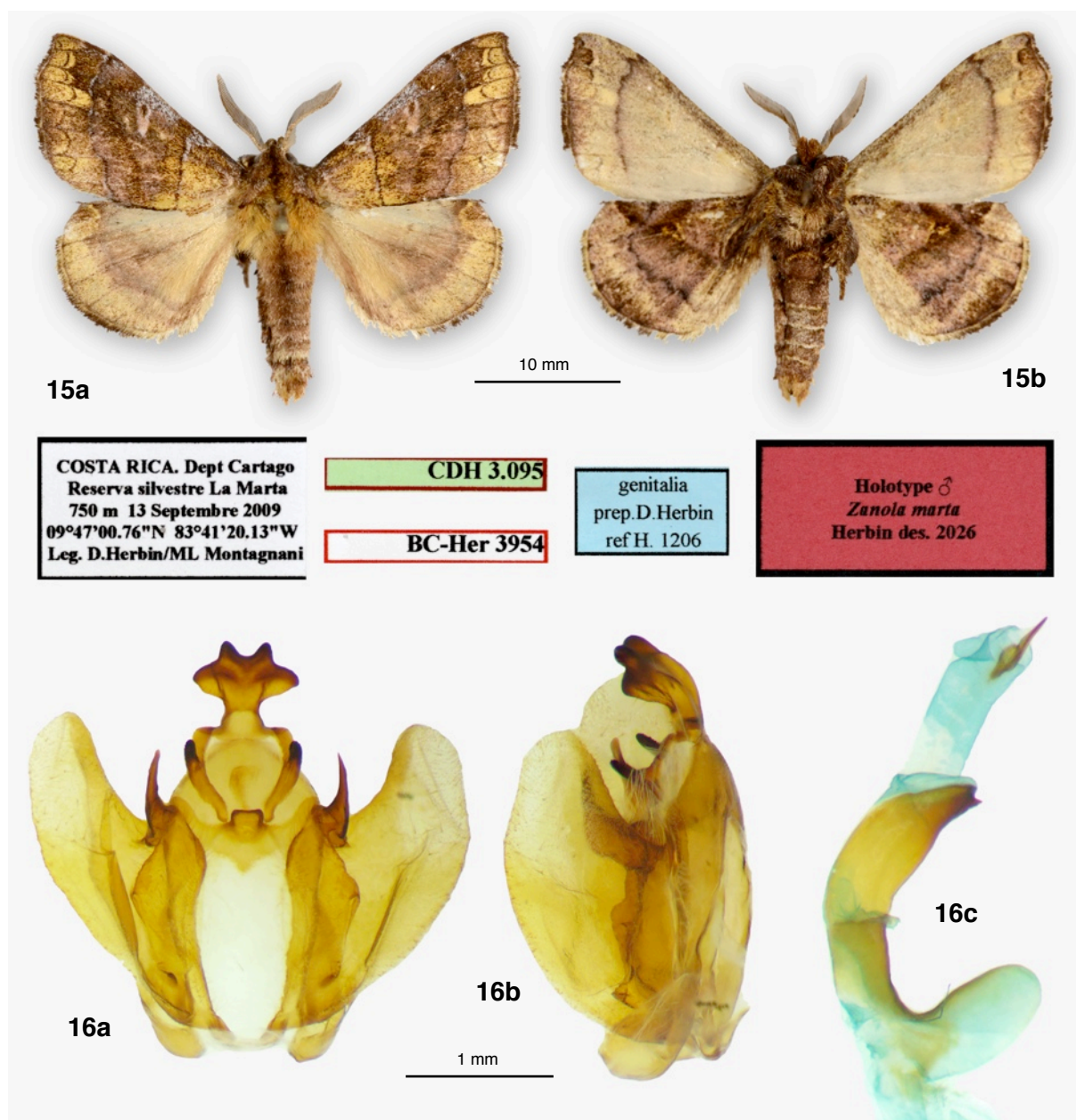
##### Male (Fig. 15a, 15b).

Forewing length: 15 mm; wingspan: 31 mm.

Antennae bipectinate to the tip, flagellum beige, the rami dark grey.

Head, thorax and abdomen brown beige, with central chocolate brown thick line; patch of sand yellow hair at interface thorax with abdomen.

Forewing subtriangular with rounded termen, reduced notch below apex. Upperside brown beige, antemedial line thin, black, bordered proximally with white and sand yellow scales, medial line thicker, brown and rather vaguely defined, postmedial line thin, black, crenulate and bordered distally by white scales. Basal area sand yellow turning to



**Fig. 15-16.** *Zanola marta* n. sp., holotype ♂ (labels not to scale).

**15.** a. Dorsal view. b. Idem, ventral view. **16.** Genitalia (prep. H. 1206). a. Ventral view. b. Lateral view. c. Aedeagus.

brown near costa. Crenulate black line in submarginal area, lunulae defined by this line filled in with sand yellow. Brown spot present at extremity of cell, surrounded by paler white and beige scales. Along costa, speckling of white scales. Hindwing upperside beige, slightly paler in submarginal and marginal areas. Short beige oblique streak at apex. Forewing underside beige with brown postmedial line, three subapical brown lunulae in marginal area. Hindwing costa slightly concave, dark clay brown, with thick chocolate brown transverse line originating from apex. Black, crenulate, postmedial line parallel to termen. Area along inner margin beige.

**Genitalia** ♂ (Fig. 16a, 16b, 16c)

Uncus quadrifid with central dorsal groove, narrowed base with two arms leading to a gnathos small rectangular plate ventrad. A digitiform ventrad process at mid length of these arms, with granular apex. A strong spiny process at base of valvae costa, whereas only small triangular process present at level of valvae sacculus. Aedeagus caecum penis curved at 90°, small cornutus at apex of shaft, apical longer cornutus on vesica.

**Female**

Same ornamentation than the male with thinner antennae, very short rami. Photos in BOLD: [v4.boldsystems.org/index.php/MAS\_DataRetrieval\_OpenSpecimen?selectedrecordid=MHAXA008-06]

**Immature stages.** – Photos of *Zanola* caterpillars in Costa Rica, that we allocate to *Zanola marta* n. sp., can be found on inaturalist web site. A link: <https://www.inaturalist.org/observations/35956278>. *Zanola* caterpillars are immediately recognizable to their long hair on thoracic and caudal segments, with a terminal enlarged flat black brush. Referring to the work by Cramer & Stoll, the plate XXIV of supplement illustrates the caterpillar of *Zanola verago* (Cramer, 1777) in figure 6. Obviously, this figure 6 does not correspond to a *Zanola* caterpillar, but the figure 2 in the same plate does correspond (see illustration available in Wikispecies link: < [https://species.wikimedia.org/wiki/Zanola\\_verago](https://species.wikimedia.org/wiki/Zanola_verago) >). We suspect incorrect reference, the text in page 120 of supplement should have likely referred to figure 2.

**Distribution.** – Costa Rica, provinces of Cartago, Guanacaste.



**Etymology.** – The species is named according to the private natural reserve: “Refugio de Vida Silvestre La Marta” in Cartago Province.

***Zanola minca* n. sp.**

(Fig. 17-18)

ZooBank : <https://zoobank.org/0FFBFB16-F792-4340-B7EB-5E32F762065C>

**Diagnosis.** – *Z. minca* n. sp. differs from all other *Zanola* species by its habitus: very small species (24 mm wingspan), pale colour, absence of brown streak at extremity of the forewing cell, and by male genitalia: uncus with a pair of lateral lobes overcome by a perpendicular acute spine. Gnathos formed by two parallel arms with a weak mesal link. Valvae with apex not rounded but terminated by a narrow finger-like projection. Aedeagus short with long cornutus on vesica, almost as long as aedeagus shaft.

**Holotype**, ♂, Bearing the following labels: Holotype ♂, *Zanola minca*, Herbin des. 2026 – Colombia, La Guajira, Carretera Via Palomino-Mingueo, Cabañas El Bosque, 55 m, 11°13'0"N 73°28'29"W, 6-9.X.2016, leg. Sinyayev & [coll.] Dr. R. Brechlin – Thomas Witt Stiftung – genitalia prep. D. Herbin ref.H.1807 (= CW 0226). In ZSM.

**Paratypes (1 ♂)**

- 1 ♂, Colombia, Magdalena, Municipio de Minca, Reserva El Faunal, 11°07'56"N 74°08'10"W, 19-21.XI.2014, leg. Sinyayev, Marquez & Machado – genitalia prep. D. Herbin ref.H.1808. In ZSM.

**Description**

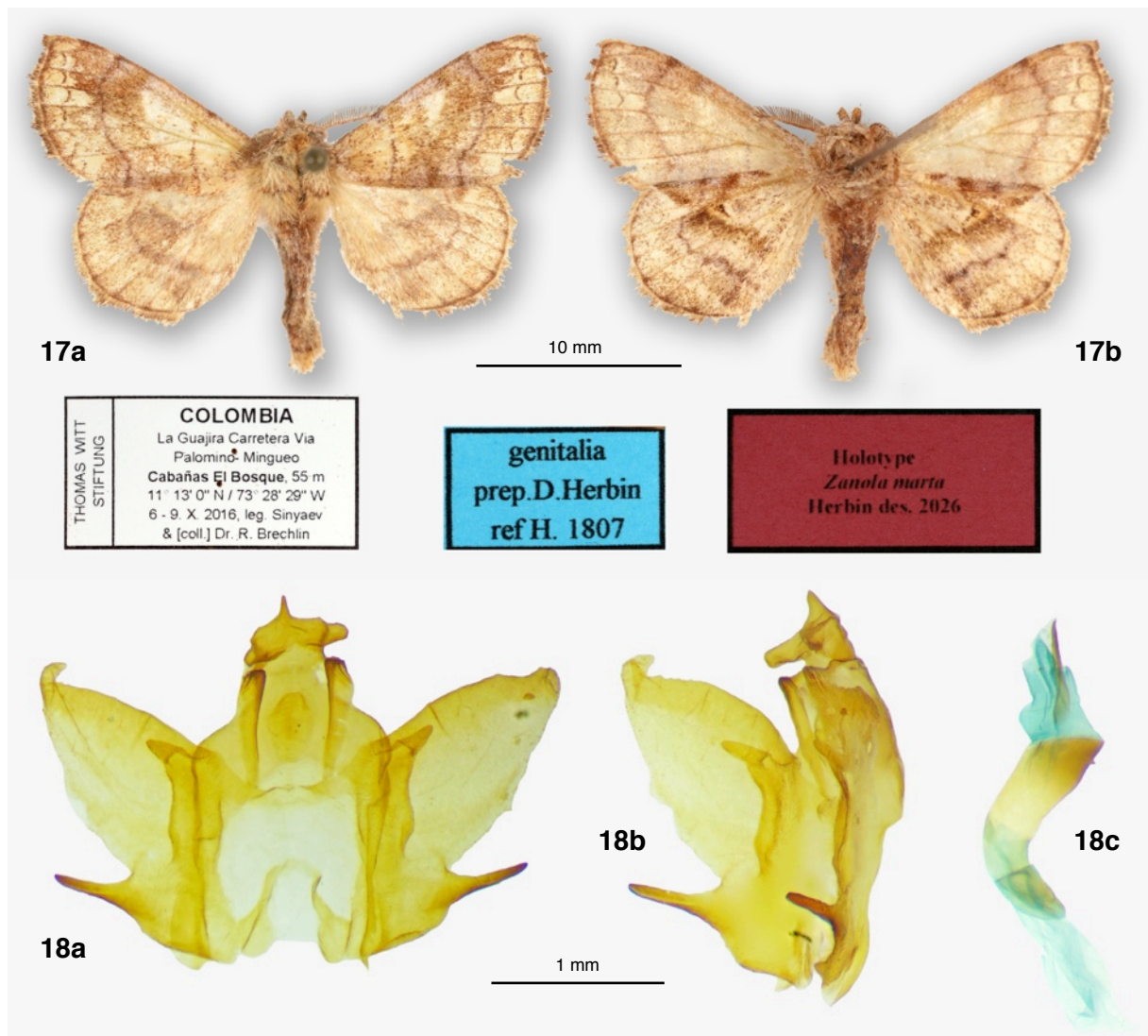
**Male** (Fig. 17a, 17b).

Forewing length: 12 mm; wingspan: 24 mm.

Antennae bipectinate to the tip, flagellum beige, the rami dark grey. Head, thorax and abdomen brown beige. Forewing with convex rounded termen, absence of preapical notch. Upperside ground colour beige with speckling of darker brown beige scales. Brown beige antemedial and postmedial lines. Crenulate brown beige line in submarginal area, made of six lunulae. Only a pale beige triangle at extremity of cell, without the typical brown streak of other *Zanola* species. Hindwing costa straight, upperside uniform beige with speckling of brown beige scales; single slightly darker line, parallel to termen. Underside identical to upperside for both forewing and hindwing, small brown streak at cell.

**Genitalia** ♂ (Fig. 18a, 18b, 18c).

Uncus with wide base overcome by a pair of side lobes, with perpendicular acute spine. Gnathos: two parallel arms mesally fused via thin bridge, valvae



**Fig. 17-18.** *Zanola minca* n. sp., holotype ♂ (labels not to scale).

**17. a.** Dorsal view. **b.** Idem, ventral view. **18.** Genitalia (prep. H. 1807). **a.** Ventral view. **b.** Lateral view. **c.** Aedeagus.

terminated by finger like apex. Saccus with long strong sclerotized spiny process. Smaller and less acute finger like process at costal base of valvae. Aedeagus short, preapical tiny cornutus on the shaft, long cornutus on vesica, almost as long as shaft.

**Female.** – Unknown.

**Immature stages.** – Unknown.

**Distribution.** – Colombia, departments of Magdalena and La Guajira.

**Etymology.** – The species is named by apposition of the name of the municipality: “Minca”, where the paratype was collected.

## Neighbor Joining Tree

The tree presented in Fig. 19 is inferred using a neighbor joining method in MEGA, based on sequences extracted from BOLD, aligned with MUSCLE. The numbers on the branches represent the distance between various taxa. Only a very limited number of taxa described in this article appear in this tree, mainly due to the fact that a number of specimens were not collected recently, resulting in either poor sequence recovery or no attempt made at sequencing. A more complete tree will be presented in a forthcoming revision of the genus (Herbin in prep.). Notable points from this preliminary tree include:

Two separate taxa are present in French Guiana, presently under the name *Zanola verago* (Cramer, 1777), with a significant (10%) genetic difference between them, despite very similar habitus.

Barcoded material from Guatemala suggests the presence of three separate taxa, one of which is described above. This result further exemplifies high degrees of crypsis in the genus.

The same issue of crypsis occurs in specimens from Peru; therefore, we certainly can expect many more species to be discovered in future work.

In some cases, BOLD would allocate different BIN numbers to series of specimens, which cannot otherwise be discriminated based on habitus, even with examination of genitalia. In such cases, distances below or in the order of magnitude of 2% are observed, suggesting further cryptic species diversity. At this stage, I consider these sets of specimens as representing the same species. For example, in the tree, *Zanola josemonzoni* n. sp., for which the barcoded specimens were collected at the same locality on the same night, show genetic differences among them despite all sharing the same habitus and the same genitalia. Barcoding would result in a distance of ca. 1.4% among them, and two BIN numbers were allocated: BOLD: ACF3038 and BOLD: AAB6303. For *Zanola boyacana* n. sp., in a similar case I observe a distance above 2%.

## Acknowledgements

Our thanks to Dr Axel Hausmann and Mei-Yu Chen in ZSM for providing access to Witt collection and communication of specimens for study. Jose Monzón Sierra provided support in Guatemala for collecting specimens and formalities for export. Pr. Serna in National University in Bogotá, Colombia (Facultad de Agronomía) supported our project including obtaining collecting and export permits. Mario Castell, student at university in Bogotá, accompanied us in our collecting efforts in Colombia. Diego Bonilla provided very valuable support too. Ulf Drechsel in Paraguay provided material for study. Frank Steiger in Peru provided specimens, thanks to Serfor for providing export authorizations. Daniel Janzen and Winnie Hallwachs provided logistics support in Guanacaste, with a mention to the ‘gusaneros’

there. The “Refugio de Vida Silvestre La Marta” in Costa Rica, Cartago, allowed us to stay for one collecting night inside the refuge, with an impressive diversity of moths. The DNA analyses were done thanks to BOLD project.

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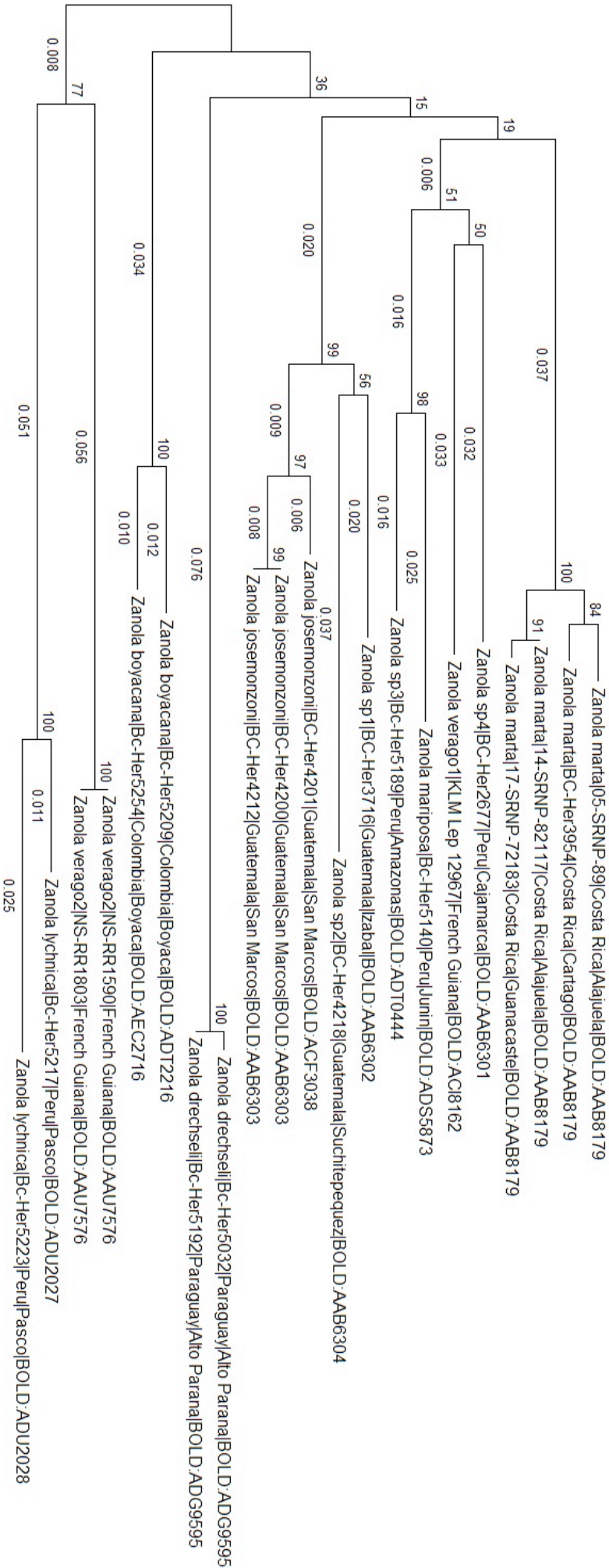


Fig. 19. Evolutionary relationships of 21 taxa in *Zanola* genus.

## Résumé

Herbin D., 2026. – Nouvelles espèces de *Zanola* Walker 1855 (Seconde partie) (Lepidoptera: Apatelodidae). *Faunitaxys*, 14(17) : 1 – 14.

En préparation pour une révision du genre *Zanola* Walker, 1855, huit nouvelles espèces sont décrites : *Zanola boyacana* **n. sp.**, *Zanola chusipata* **n. sp.**, *Zanola drechseli* **n. sp.**, *Zanola josemonzoni* **n. sp.**, *Zanola mariposa* **n. sp.**, *Zanola marta* **n. sp.**, *Zanola minca* **n. sp.**, *Zanola vidunua* **n. sp.** Ceci est la seconde partie du travail préparatoire. L'habitus et les genitalia mâles sont illustrés.

Mots-clés. – Lepidoptera, Apatelodidae, *Zanola*, biodiversité, taxonomie, description, nouvelle espèce, Néotropical, Bolivie, Colombie, Guatemala, Costa Rica, Paraguay, Pérou.

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**Illustration de la couverture :**

*Zanola* sp. (Ecuador, Pastaza).

Crédits:

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