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## Research article

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# Five new species of the genus *Singularia* Arenberger, 1988 (Lepidoptera, Pterophoridae)

Vasilij KOVTUNOVICH<sup>1</sup>, Peter USTJUZHANIN<sup>2</sup>, Mildred MARQUEZ<sup>3</sup> &  
Anna USTJUZHANINA<sup>4,\*</sup>

<sup>1</sup> Moscow Society of Nature Explorers,

c/o Malaya Filevskaya str., 24/1, app. 20, 121433, Russia.

<sup>2</sup> Altai State University, Lenina 61, Barnaul, 656049, Russia.

<sup>3</sup> National Autonomous University of Honduras, Siguatepeque, Comayagua, Honduras.

<sup>4</sup> National Research Tomsk Polytechnic University, Lenina 30, Tomsk, 634050, Russia.

<sup>1</sup> E-mail: [vasko-69@mail.ru](mailto:vasko-69@mail.ru)

<sup>2</sup> E-mail: [petrust@mail.ru](mailto:petrust@mail.ru)

<sup>3</sup> E-mail: [mildredpmarquez@gmail.com](mailto:mildredpmarquez@gmail.com)

\* Corresponding author: [uak@tpu.ru](mailto:uak@tpu.ru)

<sup>1</sup> [urn:lsid:zoobank.org:author:1959492D-B1A5-45F7-9C11-F079D399B42B](http://urn.lsid:zoobank.org:author:1959492D-B1A5-45F7-9C11-F079D399B42B)

<sup>2</sup> [urn:lsid:zoobank.org:author:60F67CCF-F6C9-4CD4-A2DF-F3216DC46958](http://urn.lsid:zoobank.org:author:60F67CCF-F6C9-4CD4-A2DF-F3216DC46958)

<sup>3</sup> [urn:lsid:zoobank.org:author:6D2884AB-DE79-4454-9E20-D3D83DB1FAAA](http://urn.lsid:zoobank.org:author:6D2884AB-DE79-4454-9E20-D3D83DB1FAAA)

<sup>4</sup> [urn:lsid:zoobank.org:author:4A20CB2F-2FA9-4FB6-9983-82E203FFB0E1](http://urn.lsid:zoobank.org:author:4A20CB2F-2FA9-4FB6-9983-82E203FFB0E1)

**Abstract.** Expeditions of Ron Brechlin, Viktor Synjaev, Mildred Márquez, Juan Machado, Oleg Romanov and other colleagues over the last five years in Colombia, Ecuador and Bolivia have resulted in significant collections of Pterophoridae Zeller, 1841. The article describes five new species: *Singularia brechlini* Kovtunovich & Ustjuzhanin sp. nov., *Singularia sinjaevi* Kovtunovich & Ustjuzhanin sp. nov., *Singularia guajiro* Kovtunovich & Ustjuzhanin sp. nov., *Singularia tolima* Kovtunovich & Ustjuzhanin sp. nov. and *Singularia lesya* Kovtunovich & Ustjuzhanin sp. nov.

**Keywords.** Lepidoptera, Pterophoridae, *Singularia*, new species, Colombia, Ecuador, Bolivia.

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## Introduction

*Alucita walsinghami* Fernald, 1898 was described in a different genus, *Singularia* Arenberger, 1988. Later, Gielis & Matthews (1994) described the genus *Chocophorus* and included in it three known species and two new for science: *Aciptilia alternaria* Zeller, 1874, *Pterophorus carabayus* Arenberger, 1990, *Alucita leptochorda* Meyrick, 1913, *Chocophorus solisi* Gielis & Matthews, 1994 and *Chocophorus venedictoffi* Gielis & Matthews, 1994. In a subsequent publication, Gielis (2011) described one more

species, *Chocophorus mayaensis* Gielis, 2011. Gielis (2012) synonymized *Chocophorus* under the genus *Singularia*.

The genus *Singularia*, widespread in South and Central America, comprises 12 species, including those described in the present paper: *Singularia alternaria* (Zeller, 1874), *Singularia carabayus* (Arenberger, 1990), *Singularia leptochorda* (Meyrick, 1913), *Singularia mayaensis* (Gielis, 2011), *Singularia solisi* (Gielis & Matthews, 1994), *Singularia venedictoffi* (Gielis & Matthews, 1994), and *Singularia walsinghami* (Fernald, 1898). The species of this genus mainly inhabit mountain forests.

## Material and methods

Holotypes and paratypes of the species described are stored in the collections listed below. Preparation of genitalia is necessary for the identification of Pterophoridae Zeller, 1841. Dissections were performed using standard methods.

## Institutional abbreviations

BMNH = Natural History Museum, London, U.K.

CUK = Research collection of P. Ustjuzhanin and V. Kovtunovich, Novosibirsk and Moscow, Russia

ZISP = Zoological Institute, St. Petersburg, Russia

ZMHB = Zoologisches Museum der Humboldt Universität, Berlin, Germany

## Results

Class Hexapoda Blainville, 1816  
Order Lepidoptera Linnaeus, 1758  
Superfamily Pterophoroidea Kuznetsov & Stekolnikov, 1979  
Family Pterophoridae Zeller, 1841  
Subfamily Pterophorinae Zeller, 1842  
Tribe Pterophorini Bigot, Gibeaux, Nel & Picard, 1998  
Genus *Singularia* Arenberger, 1988

*Singularia brechlini* Kovtunovich & Ustjuzhanin sp. nov.

[urn:lsid:zoobank.org:act:EB77F98D-436D-4C7B-A75F-0F9FE26AA9F8](https://zoobank.org/act:EB77F98D-436D-4C7B-A75F-0F9FE26AA9F8)

Figs 1–3

## Diagnosis

The male genitalia of *Singularia brechlini* Kovtunovich & Ustjuzhanin sp. nov. resemble those of *S. carabayus*, but differ from them by rodlike anellus arms, which are wider and shorter in *S. carabayus*. The female genitalia of the new species are similar to those of *S. alternaria* in the shape of the antrum and signum, but differ by the shorter and more narrow antrum, and the wider signum.

## Etymology

The species is named after the prominent German entomologist Dr. Ronald Brechlin, specialist in Saturniidae and Sphingidae, organizer and member of the expeditions during which this species was collected.

**Material examined**

**Holotype**

COLOMBIA: ♀, adult, Valle del Cauca, Res. Forest La Albania, 3°57' N, 76°23' W, 1640 m, 2–5 Nov. 2013, V. Synjaev & M. Márquez leg. (ZISP 1836).

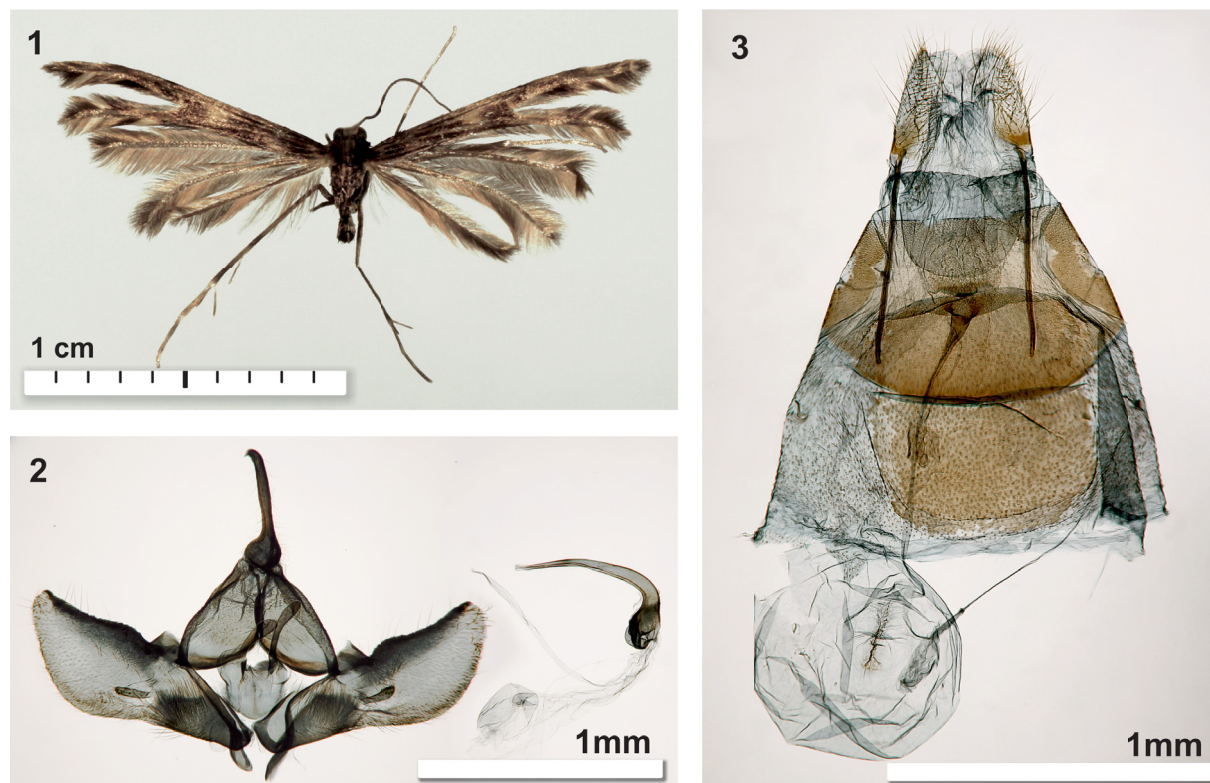
**Paratypes**

COLOMBIA: 1 ♀ same data as holotype, V. Synjaev & M. Márquez leg. (BMNH 22768); 1 ♀, 2 ♂♂, Boyacá, Vereda Suralá, 5°04' N, 73°39' W, 2750 m, 12 Nov. 2013, V. Synjaev & M. Márquez leg. (ZISP 1837, CUK); 5 ♂♂, Tolima Nevado, El Rancho, 04°36' N, 75°20' W, 2710 m, 2–7 Apr. 2014, V. Synjaev, M. Márquez & J. Machado leg. (CUK); 1 ♀, Tolima Vereda El Campanario, 04°26' N, 75°34' W, 3600 m, 29–31 Mar. 2014, V. Synjaev, M. Márquez & J. Machado leg. (CUK).

ECUADOR: 3 ♂♂, Carchi road Tulcan – El Chical, 0°48' N, 78°00' W, 3400 m, 12–13 Feb. 2013, V. Synjaev & O. Romanov leg. (BMNH 22769, ZMHB 201603, ZMHB 201604); 7 ♂♂, Napo Prov., Papallacta, Rio San Pedro, 0°22' S, 78°07' W, 10 m, 18 Jan. 2012, R. Brechlin & V. Synjaev leg. (CUK 248, BMNH 22770, CUK); 2 ♂♂, Napo Prov., Rio Papallacta, 0°26' S, 77°58' W, 2125 m, 7 Nov. 2011, R. Brechlin & V. Synjaev leg. (CUK); 1 ♀, Carchi Prov., El Angel Ecological Reserve, 0°46' N, 78°03' W, 2786 m, 9–11 Nov. 2012, R. Brechlin & V. Synjaev leg. (CUK).

**Description**

EXTERNAL CHARACTERS. Wingspan of holotype 19 mm and paratypes 19–23 mm. Head covered with grey setae, thorax brown with pale longitudinal stripes. Labial palps short, straight, pointed at tip, half eye diameter. Fore wings with spotted pattern. Portions of pale spots traced on brown-grey background at



**Figs 1–3.** *Singularia brechlini* Kovtunovich & Ustjuzhanin sp. nov. **1.** Holotype (ZISP 1836). **2.** Holotype, genitalia (ZISP 1836). **3.** Paratype, ♀, genitalia (CUK 247).

wing base, in central part and at cleft base. Fringe inside cleft dark grey, noticeably lightened only at base. Hind wings and fringe unicolorous ash-grey. Legs mottled brown with lightened portions.

**MALE GENITALIA.** Valves symmetric, strongly widened in middle part and narrowed in apical part. Small finger-like processes in basal part of both valves. Anellus arms rod-like, slightly widened at apices. Saccus wide, horseshoe-like. Uncus narrow, long, strongly tapered and bent at apex. Phallus thin, slightly concave, equal to uncus in length.

**FEMALE GENITALIA.** Papillae anales oval. Apophyses posteriores thin, long. Apophyses anteriores not developed. Antrum short, in shape of narrow funnel. Ductus bursae narrow and long, poorly sclerotized. Bursa copulatrix round, signum fusiform.

### Distribution

Ecuador, Colombia.

### Flight period

January, April, March, November.

*Singularia sinjaevi* Kovtunovich & Ustjuzhanin sp. nov.

[urn:lsid:zoobank.org:act:E6BC1817-2B31-42C7-821A-D817D56CD206](https://zoobank.org/urn:lsid:zoobank.org:act:E6BC1817-2B31-42C7-821A-D817D56CD206)

Figs 4–5

### Diagnosis

The male genitalia of *Singularia sinjaevi* Kovtunovich & Ustjuzhanin sp. nov. resemble those of *S. walsinghami*, but differ from them by the narrow, long rod-like anellus arms whereas those of *S. walsinghami* are shorter and angulate. The phallus of the new species is strongly thickened and bent at a right angle in the basal part, whereas the phallus of *S. walsinghami* is almost straight.

### Etymology

The species is named after Viktor Synjaev, the prominent Russian traveller and entomologist, who collected this species.



**Figs 4–5.** *Singularia sinjaevi* Kovtunovich & Ustjuzhanin sp. nov. **4.** Holotype (ZISP 1838). **5.** Holotype, genitalia (ZISP 1838).

### Material examined

#### Holotype

BOLIVIA: □, Cochabamba, 3 km from Corani, 17°13' S, 65°51' W, 2650 m, 14–18 Oct. 2010, V. Synjaev & O. Romanov leg. (ZISP 1838).

### Description

#### Male

EXTERNAL CHARACTERS. Wingspan of holotype 19 mm. Head, thorax and tegulae grey. Labial palps very short, 2.5 times shorter than eye diameter. Fore wings ash-grey. Small black spot at cleft base. Fringe inside cleft dark grey, slightly lightened only at base. Hind wings and fringe unicolorous ash-grey. Legs mottled brown with pale portions.

MALE GENITALIA. Valves symmetric, rather wide, smoothly narrowed in distal part. Anellus arms long, rod-like, slightly concave. Uncus narrow, long, tapered at apex. Phallus rather short, strongly thickened, bent at right angle in basal part, in distal part significantly narrowed, equal to uncus in length.

#### Female

Unknown.

### Distribution

Bolivia.

### Flight period

October.

*Singularia guajiro* Kovtunovich & Ustjuzhanin sp. nov.  
[urn:lsid:zoobank.org:act:81C3A982-DE9D-4539-BF93-8357370173A1](https://doi.org/10.12101/zoobank.org/act:81C3A982-DE9D-4539-BF93-8357370173A1)

Figs 6–8

### Diagnosis

The male genitalia of *Singularia guajiro* Kovtunovich & Ustjuzhanin sp. nov. are similar to those of *S. alternaria* in the form of the valves, but differ from them in the wide uncus and the zigzag-shaped phallus. The female genitalia of the new species resemble those of *S. brechlini* sp. nov. in the long filiform signum, but differ from them by the structure of the antrum and the apophyses anteriores.

### Etymology

The species is named after one of the indigenous peoples of Colombia, the Guajiro.

### Material examined

#### Holotype

COLOMBIA: □, Cundinamarca dept., Vereda La Concepción, Bosque La Guajira, 4°47' N, 75°46' W, 2910 m, 8–12 Nov. 2014, V. Synjaev, M. Márquez & J. Machado leg. (ZISP 1842).

#### Paratype

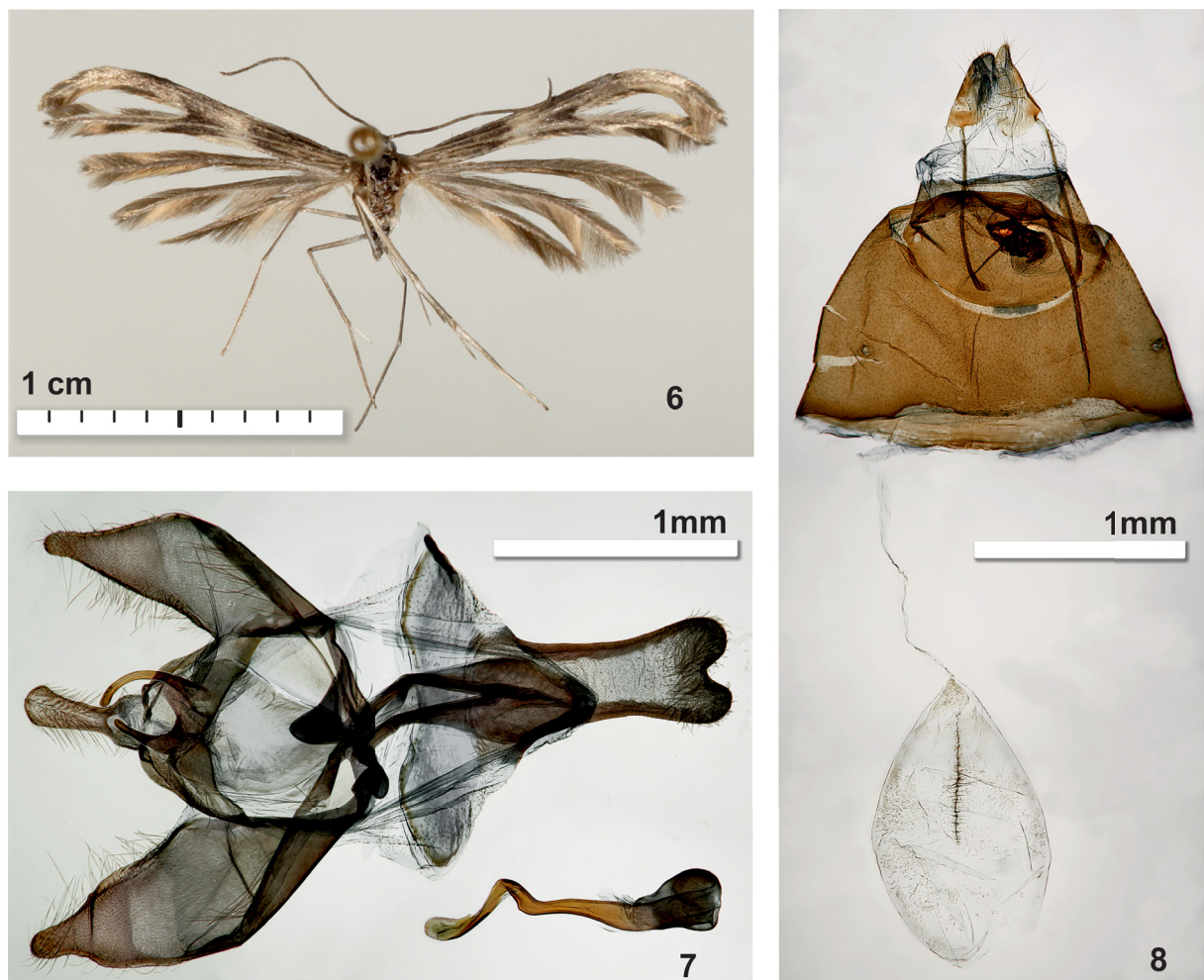
COLOMBIA: 1 □, Boyacá, Vereda Suralá, 5°04' N, 73°39' W, 2750 m, 12 Nov. 2013, V. Synjaev & M. Márquez leg. (ZISP 1843).

## Description

**EXTERNAL CHARACTERS.** Wingspan of holotype 21 mm and paratype 19 mm. Head, thorax and tegulae with dark grey scales. Labial palps dark brown, rather short, half eye diameter. Fore wings brown-grey with portions of pale spots at wing base and in central part. Fringe inside cleft dark brown with alternation of yellow portions. Hind wings and their fringe unicolorous grey. Legs pale brown.

**MALE GENITALIA.** Valves symmetric, smoothly narrowed in distal part. Anellus arms rather short, rod-like, left arm shorter than right one, right arm slightly concave. Uncus small, noticeably widened in distal part. Phallus rather long, equal to length of valve, zigzag-shaped in distal part, thickened in basal part. Process of sternum VIII narrow and long with oval notch at tip.

**FEMALE GENITALIA.** Papillae anales narrow triangle. Apophyses posteriores thin, long, slightly widened and bent at apices. Apophyses anteriores narrow, short. Antrum short tubular, sinuously curved. Ductus thin, very long, poorly sclerotized. Bursa copulatrix oval, signum narrow long, filiform, covered with small spiculae throughout its length.



**Figs 6–8.** *Singularia guajiro* Kovtunovich & Ustjuzhanin sp. nov. **6.** Holotype (ZISP 1842). **7.** Holotype, genitalia (ZISP 1842). **8.** Paratype, ♀, genitalia (ZISP 1843).

### Distribution

Colombia.

### Flight period

November.

*Singularia tolima* Kovtunovich & Ustjuzhanin sp. nov.

[urn:lsid:zoobank.org:act:7797B80E-5332-414D-8903-74BD1A80B1E0](https://zoobank.org/act:7797B80E-5332-414D-8903-74BD1A80B1E0)

Figs 9–10

### Diagnosis

The male genitalia of *Singularia tolima* Kovtunovich & Ustjuzhanin sp. nov. resemble to those of *S. walsinghami* in the short phallus and the tapered distal part, but differ from them by the asymmetric valves and the uncus, which is widened in the middle part.

### Etymology

Toponymic name, after the state of Tolima where the new species has been collected.

### Material examined

#### Holotype

COLOMBIA: □, Tolima Nevado, El Rancho, 04°36' N, 75°20' W, 2710 m, 2–7 Apr. 2014, V. Synjaev, M. Márquez & J. Machado leg. (ZISP 1839).

#### Paratypes

COLOMBIA: 2 □□, Tolima Nevado, El Rancho, 04°36' N, 75°20' W, 2710 m, 2–7 Apr. 2014, V. Synjaev, M. Márquez & J. Machado leg. (CUK); 2 □□, Planes de San Rafael Parque Nacional Tatama, 5°29' N, 76°00' W, 2100 m, 18–21 Mar. 2015, V. Synjaev, M. Márquez & J. Machado leg. (CUK).

### Description

#### Male

EXTERNAL CHARACTERS. Wingspan of holotype 23 mm and paratypes 22–23 mm. Head grey, thorax grey with white longitudinal stripes. Labial palps thin, rather long, slightly smaller than eye diameter. Fore wings with mottled pattern. Bright thin white stripes from wing base along streaks. Medial part of wing



**Figs 9–10.** *Singularia tolima* Kovtunovich & Ustjuzhanin sp. nov. **9.** Holotype (ZISP 1839). **10.** Holotype, genitalia (ZISP 1839).

with bright white spot. First and second lobe from middle to apex brightly white. Fringe inside cleft dark grey with alternation of white portions. Hind wings ash-grey. Fringe of first lobe monochrome grey, second lobe with portion of white hairs in distal part, outer fringe of third lobe from base and further beyond the middle lightened with white hairs. Legs mottled brown with pale portions.

**MALE GENITALIA.** Valves asymmetric, left one wider than right one. Distal part of both valves noticeably narrowed. No finger-like processes at valve bases. Anellus arms thin, of different lengths, left one two times shorter than right one. Saccus narrow with deep notch. Uncus strongly widened in middle part, tapered at apex. Phallus short, smoothly curved, thickened in basal part, tapered in distal part.

#### **Female**

Unknown.

#### **Distribution**

Colombia.

#### **Flight period**

April.

*Singularia lesya* Kovtunovich & Ustjuzhanin sp. nov.

[urn:lsid:zoobank.org:act:83710892-5531-4A08-95EC-A74FB5F0F27E](http://urn:lsid:zoobank.org:act:83710892-5531-4A08-95EC-A74FB5F0F27E)

Figs 11–13

#### **Diagnosis**

The male genitalia of *Singularia lesya* Kovtunovich & Ustjuzhanin sp. nov. are similar to those of *S. carabayus* in the curved phallus, the arched saccus and the uncus, which is widened in the middle part and tapered at the apex. They are different in the strong saber outgrowths in the lower basal part of the sacculus, the rhomboid valves and the absence of finger-like processes at the valve bases. The female genitalia are distinguished by the absence of the signum and the broad lobe of the lamina postvaginalis in *S. lesya* sp. nov.

#### **Etymology**

The species is named after Olesya Snigur.

#### **Material examined**

##### **Holotype**

ECUADOR: ♀, Carchi Prov., El Chical – Carolinae, 0°50' N, 78°13' W, 2360 m, 20 Nov. 2012, R. Brechlin & V. Synjaev leg. (ZISP 1840).

##### **Paratypes**

ECUADOR: 2 ♀♀, 1 ♀, same data as holotype (CUK); 3 ♀♀, 2 ♀♀, Pichincha, Camping Bella Vista, 0°00' S, 78°41' W, 2230 m, 1 Dec. 2011, V. Synjaev & O. Romanov leg. (ZISP 1841, CUK); 1 ♀, Planes de San Rafael Parque Nacional Tatama, 5°29' N, 76°00' W, 2100 m, 18–21 Mar. 2015, V. Synjaev, M. Márquez & J. Machado leg. (CUK); 1 ♀, Carchi Prov., El Chical – Carolinae, 0°49' N, 78°13' W, 1970 m, 16 Dec. 2012, R. Brechlin & V. Synjaev leg. (CUK); 1 ♀, Napo Prov., 6 km SE Cosanga, 0°37' S, 77°54' W, 2240 m, 22 Jan. 2012, R. Brechlin & V. Synjaev leg. (ZMHB 201606); 1 ♀, Pichincha, Camping Tambo Tanda, 0°01' S, 78°38' W, 1969 m, 25 Dec. 2011, V. Synjaev & O. Romanov leg. (CUK); 1 ♀, Carchi Prov., El Chical – Carolinae, 0°49' N, 78°13' W, 2150 m, 18 Nov. 2012, R. Brechlin &



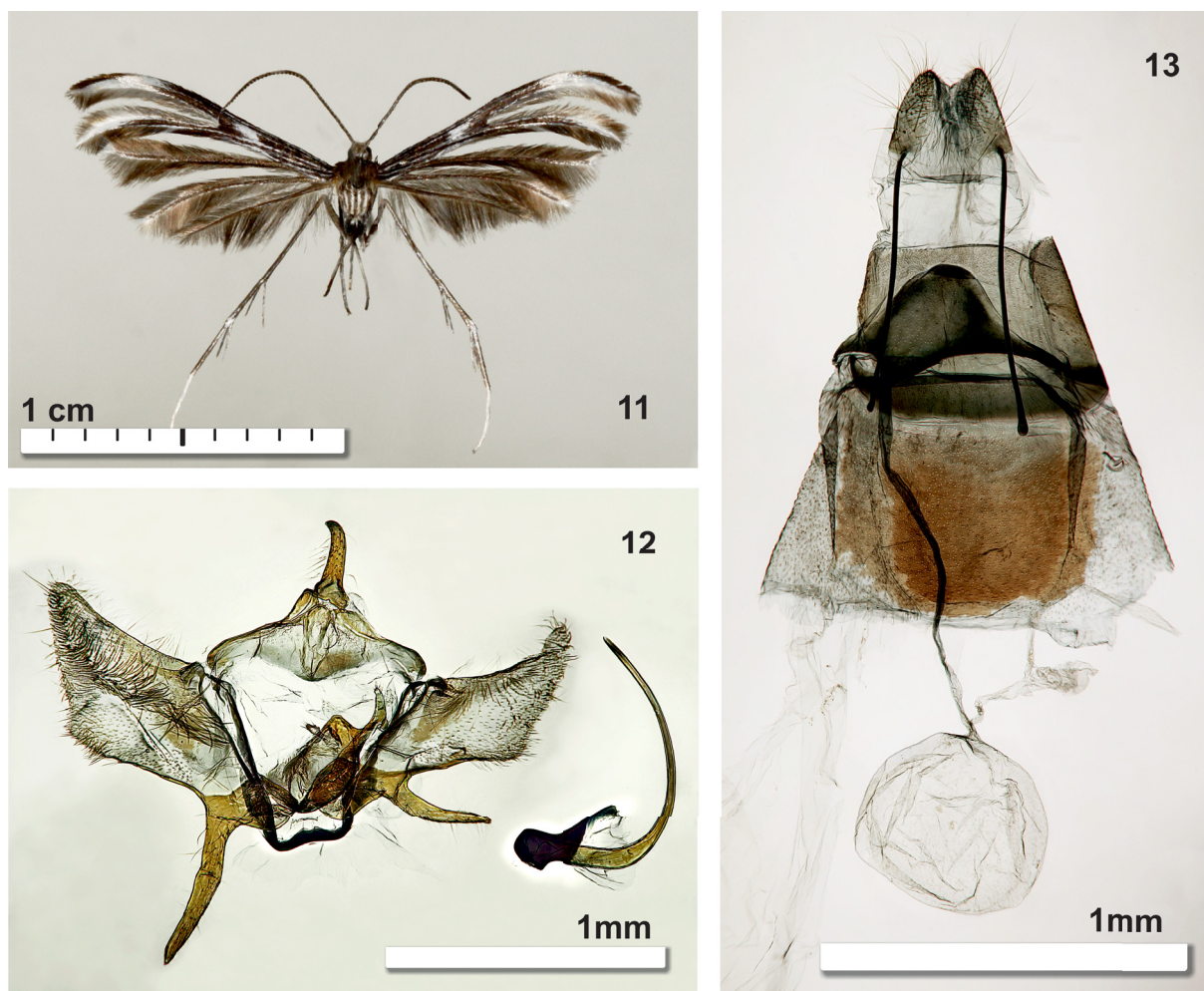
V. Synjaev leg. (ZMHB 201605); 2 ♀♀, Carchi, road Tulcan – El Chical, 0°48' N, 78°00' W, 3400 m, 12–13 Feb. 2013, V. Synjaev & O. Romanov leg. (CUK).

COLOMBIA: 5 ♀♀, 1 ♂, Risaralda, Termales de San Vicente, 4°51'18" N 75°31'46" W, 2560 m, 5–7 Nov. 2015, V. Synjaev & J. Machado leg. (CUK 264, CUK 266, CUK).

### Description

**EXTERNAL CHARACTERS.** Wingspan of holotype 18 mm and paratypes 16–22 mm. Head pale grey, thorax brown with pale longitudinal stripes. Labial palps thin, long, equal to eye diameter. Fore wings with mottled pattern. Bright thin white stripes from wing base along streaks. Medial part of wing with bright white spot. First lobe from middle brightly white, on outer margin in apical part circled with distinct dark brown touch. Second lobe brown with white ending. Fringe inside cleft pale with mixture of grey hairs. Hind wings and fringe unicolorous grey. Legs pale brown.

**MALE GENITALIA.** Valves symmetric, rhomboid. Strong saber outgrowths from lower basal area of sacculus. No finger-like processes in valves base. Uncus short, slightly bent. Anellus arms of different lengths, left one two times shorter than right one. Saccus arcuate. Phallus thin, arcuate, thickened in basal part.



**Figs 11–13.** *Singularia lesya* Kovtunovich & Ustjuzhanin sp. nov. **11.** Holotype (ZISP 1840). **12.** Holotype, genitalia (ZISP 1840). **13.** Paratype, ♀, genitalia (ZISP 1841).

FEMALE GENITALIA. Papillae anales narrow oval. Apophyses posteriores thin, long, slightly thickened at tips. Apophyses anteriores developed. Lamina postvaginalis as a big broad lobe. Antrum short, funnel form. Ductus narrow, long, poorly sclerotized. Ductus seminalis at confluence of ductus into bursa copulatrix. Bursa copulatrix round, without signa.

### **Distribution**

Ecuador, Colombia.

### **Flight period**

October–February.

### **Remarks**

An image of the female of this species was presented in the work of Gielis (2011) as the female of *Singularia carabayus*. An image of the real *S. carabayus* female was published in the description of this species by Arenberger (1990).

### **Discussion**

The rich neotropical fauna of insects, including that of Pterophoridae, is still poorly studied today. Entomological expeditions in recent years have resulted in the discovery of these five Pterophoridae species new to science. Species of *Singularia* inhabit remote mountain areas of Southern and Central America, and so they are rare in collections. As a result of our study, we now know 12 species of *Singularia*, and it is possible that this number will significantly increase in the future with further investigations in these hardly accessible areas of Central and South America.

### **Acknowledgments**

We are sincerely grateful to the organizers of the expeditions – Dr. Ron Brechlin (Pasewalk, Germany) and Viktor Synjaev (Moscow, Russia) and also to the expedition members: Oleg Romanov (Santa Cruz, Bolivia) and Juan Machado (La Libertad, Comayagua, Honduras).

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