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Re-definition of *Toreulia* Razowski & Becker with description of four new species (Lepidoptera: Tortricidae)

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Abstract. The Ecuadoran genus *Toreulia* Razowski & Becker, 2000 is re-defined and four new species are described: *T. imminuta* n. sp., *T. placita* n. sp., T. *acanthina* n. sp., and *T. runtunana* n. sp. Female genitalia of *Toreulia* are described for the first time. Diagnoses of all species are provided.

Key words: entomology, taxonomy, Lepidoptera, Tortricidae, Euliini, *Toreulia*, new species, Ecuador, Andes, cloudforest.

INTRODUCTION

Toreulia was described to contain three Euliini species from the Carchì Province, Ecuador. In the course of the present study, four new species were discovered in this country. The genus has not been found outside of Ecuador but is expected to occur in the mountains of neighboring countries. The list of known species, with provinces in Ecuador included, is as follows:

T. basalis Razowski & Becker, 2000 - Carchì;
T. imminuta n. sp. - Napo;
T. nimia Razowski & Becker, 2000 - Carchì;
T. torrens Razowski & Becker, 2000 - Carchì;
T. placita n. sp. - Napo;
T. acanthina n. sp. - Napo;
T. runtunana n. sp. - Tungurahua.

Abbreviations used:

GS - Genitalia slide;
Prov. - Province;
sta - collecting station;
N, E, S, W - compass points;
MZUJ - Muzeum Zoologiczne, Uniwersytet Jagielloński (Zoological Museum, Jagiellonian University);
CVPR - Collection Volker PELZ, Ruppichteroth, Germany;
SMFL - Lepidoptera collection of Forschungsinstitut und Naturmuseum Senckenberg, Frankfurt am Main, Germany.

NOTE. The specimens newly collected by Volker PELZ are in the CVPR collection. The holotypes will be eventually deposited in the Senckenberg Museum, Frankfurt/Main, Germany. The specimens collected by Janusz WOJTUSIAK are in the MZUJ collection. The diagnoses of three formerly known species are by the senior author. Numbers included in descriptions of the labial palpus refer to the proportion of their total length to the horizontal diameter of the compound eye.

SYSTEMATICS

Toreulia RAZOWSKI & BECKER, 2000

Toreulia RAZOWSKI & BECKER, 2000, SHILAP Revta lepid.,28(109): 111; type-species *Toreulia basalis* RAZOWSKI & BECKER, 2000 - by original designation.

This genus was originally compared with *Ecuadorica* RAZOWSKI & BECKER, 2000, currently treated as a synonymy of *Anopinella* POWELL, 1986 (BROWN & ADAMSKI 2003, RAZOWSKI & PELZ 2004). The large, well sclerotized laterally socii, the presence of prominences or thorns of lateral arms of gnathos, the large, thorny terminal part of sacculus, large, thorny median part of transtilla, medially curved aedeagus and the lack of cornuti in vesica of *Toreulia* were mentioned as the characters differing from *Ecuadorica*. As the putative autapomorphy of *Toreulia*, the helmet-shaped, thorny median part of transtilla was given. The shape of arms of gnathos was supposed to represent another apomorphy.

Basing on the available material, we suppose that the pattern of forewing is of autapomorphic importance for *Toreulia*. Further autapomorphies are: (1) the white oblique line extending from beyond mid-costa to postbasal or submedian portion of dorsum connected to (2) the short concolorous costal line and irregular line terminating at tornus, and (3) the dark blotch representing median fascia enclosed between costal portions of white lines. Another putative autapomorphy is the broad median part of transtilla. It is typically developed in *T. nimia* and *T. basalis* and has somewhat concave terminal edge. In *T. placita* that edge is convex and in *T. torrens, T. acanthina* and *T. runtuana* the median part of transtilla is suboval. The inner surface of transtilla is thorny.

Other apomorphic characters (e.g. the processes of arms of gnathos, the termination of sacculus) are of convergent importance and are found in several groups of tortricines or are inconstant.

There are two types of aedeagi in *Toreulia,* one short, weakly bent, broad beyond zone (in *T. nimia, T. placita, T. imminuta*) and slender, distinctly bent (in *T. basalis, T. torrens,* and *T. acanthina* which is probably intermediate). Sacculus varies distinctly from species to species; it is large, thorny in *T. nimia, T. runtunana* and *T. torrens* and strongly reduced in the remaining three species.

The female genitalia (unknown until now) to some degree reminiscent of those of *Gorytvesica* Razowski, 1997. They are characterized by large sterigma, whose anteostial part forms a pair of lateroproximal pockets. The accessory bursa originates from distal portion of ductus bursae ventrally. Bursa copulatrix is membranous except for the most distal portion which is weakly sclerotized.

Distribution and biology. Nothing is known except for the distribution in Ecuador. The moths were collected at the altitudes of 1860 m - 3170 m in cloudforests and brushlands.

Systematic arrangement is based on the shapes of the median part of transtilla and the sacculus.

Toreulia basalis Razowski & Becker, 2000

Toreulia basalis Razowski & Becker, 2000, SHILAP Revta lepid.,28(109): 111, figs 3, 4, 15.

Diagnosis. Externally similar to *T. placita* and *T. nimia* having dark rust brown proximal blotch of forewing extending from mid-costa to postbasal part of dorsum. Male genitalia distinguished by a slender aedeagus and short, terminal part of sacculus.

Toreulia imminuta n. sp.

(Figs 1, 9)

Diagnosis. Closely related to *T. basalis* but can be distinguished from *T. basalis* by the more creamy ground colour of forewing. Male genitalia distinguished from gentalia of *T. basalis* by very short termination of sacculus and stout aedeagus.

Etymology. The species name concerns strongly reduced end part of sacculus; Latin: imminuta - diminished.

Description. Wing span 19.0 mm (in paratype 15.0 mm). Head and median part of thorax whitish, the rest rusty brown; labial palpus 2.7, terminal joint creamy-white, remainder creamy-white dorsally, cinnamon rusty brown laterally. Ground colour of forewing whitish creamy, suffused and sparsely strigulated with rusty brown; dorsal and postmedian suffusions nearly concolorous; large basal blotch rust brown with orange shades; terminal part of wing pale rusty brown (somewhat worn), marked with brown suffusion extending from end of median cell to apex of wing; dark brown blotch near middle of costa. Cilia (worn) ferruginous. Hindwing creamy with brownish suffusions; cilia creamy.

Male genitalia (Fig. 9). Socii moderate; postmedian part of arm of gnathos broadened, angulate; sacculus slender, angulate, reaching about mid-length of valva, with minute termination; median part of transtilla large, weakly concave apically; aedeagus stout, with long ventroterminal part.

Female unknown.

Holotype male: "Ecuador, Napo – Prov., 10 km SSE Cosanga, 2180 m, 0°37'13"S 77°49'29"W, 23.X.2002, sta 35, leg. Gielis & Pelz"; GS 2805-V.P., CVPR eventually SMFL.

1-8. Adults of *Toreulia*: 1 – *T. imminuta* n. sp. holotype male; 2 – *T. placita* n. sp. holotype male; 3, 4 – *T. nimia* Razowski et Becker, 3 – male, Ecuador: Las Gralarias (GS 2953-V.P.), wing span 21.5 mm; 4 – female, Ecuador: Las Gralarias (GS 2948-V.P.), wing span 28.5 mm; 5-7 – *T. acanthina* n. sp., 5 – male, Ecuador: Cosanga (GS 2002-V.P.), wing span 21.0 mm; 6 – holotype male; 7 – male, Ecuador: Cosanga (GS 3132-V.P.), wing span 17.0 mm; 8 – *T. runtunana* n. sp. holotype male

Paratypes: 2 males: 1 male with same data as holotype, GS 3214–V.P., CVPR; 1 male: Ecuador, Prov. Morona Santiago, N.P. Sangay, Qda Shillñan via Guamote Macas, 24.01.2004, 3100m, leg. Wojtusiak & Pyrcz; GS 85 MZUJ

Toreulia nimia Razowski & Becker, 2000

(Figs 3, 4, 10, 15)

Toreulia nimia Razowski & Becker, 2000, SHILAP Revta lepid.,28(109): 111, figs 5, 6, 16.

Diagnosis. Close to *T. imminuta* but distinguished by the long, thorny termination of sacculus and darker, more chestnut brown forewing. Aedeagus similar to that in *T. imminuta*.

Female genitalia (Fig. 15). Sterigma moderately short, weakly sclerotized medially, with anteostial part forming a pair of shallow lateral pockets; colliculum ill-defined, marked with weak sclerites; accessory bursa short; sculpture of corpus bursae indistinct.

Material examined: 2 males, 1 female: 1 male: Ecuador, Pichincha – Prov., 2,5 km SE Santa Rosa, Reserva Las Gralarias, 2068m, 0°0'37"S 78°43'50"W, 3.-5. XI. 2005, leg. Volker Pelz, GS 2953-V.P.; 1 female: same data GS 2948-V.P., both CVPR, 1 male: Ecuador, Prov. Cotopaxi, Francisco de las Pampas, Res. La Otonga, 2.02.2002, 1935m, leg. J. Wojtusiak, GS 86 MZUJ.

Remark. Our specimens are smaller (wing span 21.5 mm in male and 28.5 mm in female) than the male holotype (wing span 32.0 mm).

Toreulia placita n. sp.

(Figs 2, 11)

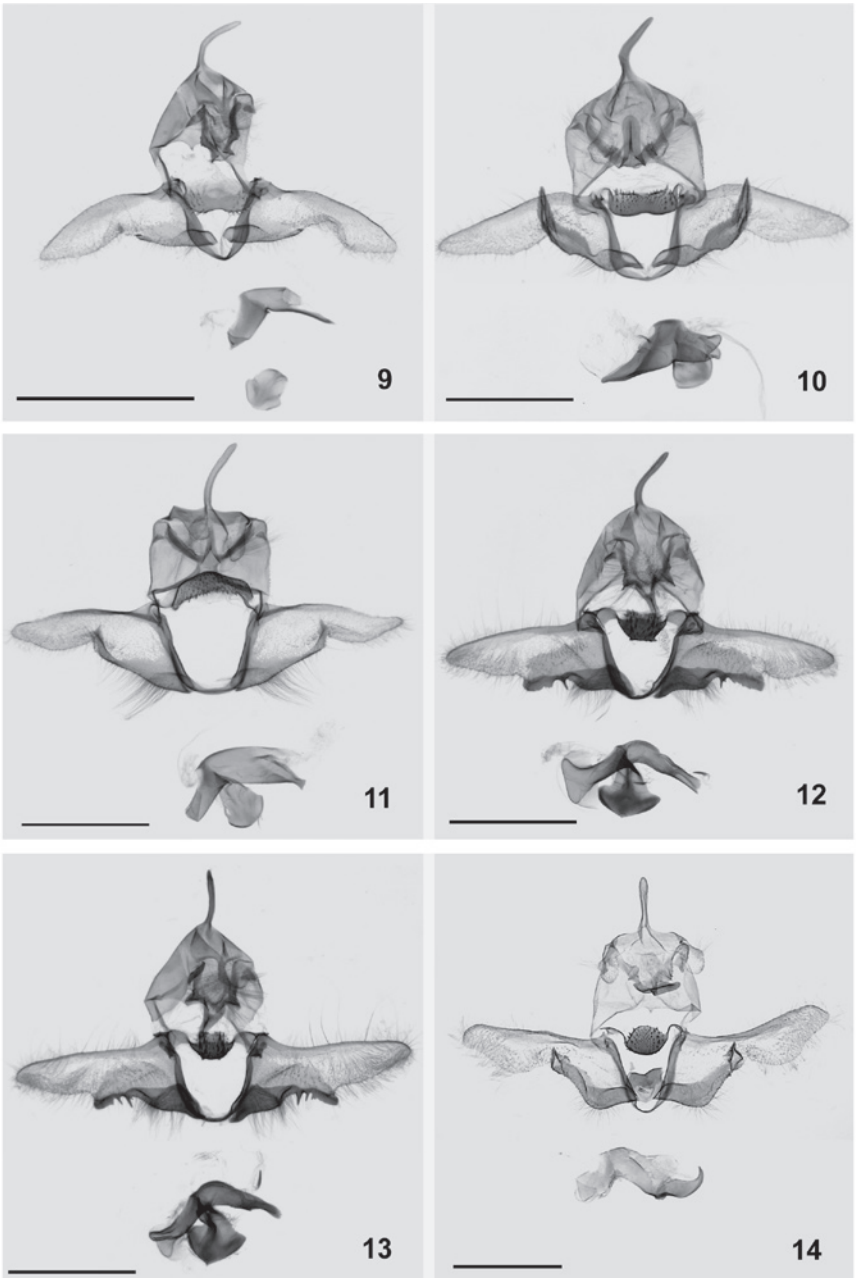
Diagnosis. Externally similar to *T. nimia* but easily distinguished by the broad, convex median part of transtilla and the presence of ventroterminal thorn of aedeagus. Free termination of sacculus is slightly longer than that of *T. imminuta*.

Etymology. The name refers to colouration of moth; Latin: placita - nice.

Description. Wing span 18.5 mm (in paratype 17.0 mm). Head and median part of thorax whitish lateral parts of thorax cinnamon; labial palpus 3.0, white dorsally, cinnamon laterally, except for the completly white terminal joint. Ground colour of forewing pale cinnamon suffused with white near white line and in terminal part of wing; strigulation brownish. Markings rusty brown in form of costal blotch marked with black postbasally and subterminal fascia terminating near end of termen. Cilia brownish cinnamon, whitish at tornus. Hindwing brownish white, whitish basally, strigulated with greyish brown; cilia whitish.

Male genitalia (Fig. 11). Uncus uniformly slender, pointed; arm of gnathos simple, without process; valva tapering terminad with costa fading distally; sacculus slender, convex near base, with minute free termination; median part of transtilla broad, short, convex dorsally; aedeagus stout with ventroterminal thorn.

Female unknown.



9-14. Male genitalia of *Toreulia*: 9 – *T. imminuta* n. sp., holotype; 10 – *T. nimia* Razowski et Becker, Ecuador: Las Gralarias (GS 2953-V.P.); 11 – *T. placita* n. sp., holotype; 12,13 – *T. acanthina* n. sp. 12 – holotype; 13 - paratype, Ecuador: Cosanga (GS 3131-V.P.); 14 – *T. runtunana* n. sp., holotype (scale bar: 1.0 mm)

Holotype male: "Ecuador, Napo – Prov., 15 km SE Cosanga, Cocodrilo, 1850 m, 0°38'56"S 77°47'34"W, 27.X.2002, sta 39, leg. Gielis & Pelz"; GS 1686–V.P., CVPR eventually SMFL.

Paratype: 1 male: same data as holotype, GS 3133–V.P., CVPR.

Toreulia torrens Razowski & Becker, 2000

Toreulia torrens Razowski & Becker, 2000, SHILAP Revta lepid.,28(109): 112, figs 7, 8, 18.

Diagnosis. Similar to *T. acanthina* but paler; forewing in major part orange rust. Male genitalia disinguished from *T. acanthina* by sharp subterminal process and reduced free termination of sacculus, the subtriangular median part of transtilla and the slender aedeagus with some terminal thorns.

Toreulia acanthina n. sp.

(Figs 5, 6, 7, 12, 13)

Diagnosis. Facies similar to those of *T. nimia* and *T. placita*. Closely related to *T. placita* but readily distinguished by the slender, simple aedeagus and the medioventral spine of sacculus. Median part of transtilla of *T. acanthina* subtriangular, broader than that of *T. torrens*.

Etymology. The name refers to the presence of thorns of sacculus; Greek: akantha - a thorn.

Description. Wing span in holotype 21.0 mm, in paratypes 17.0 mm – 25.0 mm(mean: 21.0 mm, n=6) . Head white, labial palpus over 2.5, terminal joint white, remainder white dorsally, cinnamon brown laterally; thorax cinnamon brown, whitish medially. Ground colour of forewing brownish cinnamon; basal area suffused with brown and blackish, markings with subcostal suffusion; some orange rust suffusions before

15 - Female genitalia of *Toreulia nimia* Razowski et Becker: Ecuador: Las Gralarias (GS 2948-V.P.). Scale bar: 1.0 mm

middle of wing and along costa. White markings broad costally, fading towards dorsum. Cilia orange cinnamon. Hindwing brownish white, suffused with brownish except for base, with concolorous strigulation. Cilia rather concolorous with base of wing.

Variation. One male (GS 2002–V.P.) with strong brown and blackish suffusions and weaker orange shades. White markings in from of two or three spots along costa and fine line reaching mid dorsum.

Male genitalia (Figs 12, 13). Uncus slender; subterminal process of arm of gnathos pointed; basal third of sacculus broad, one distinct and occasionally two or three minute thorns in median concavity, distal part fairly broad, free termination small, rounded; median part of transtilla small, subtriangular, concave terminally; aedeagus slender, bent, with small ventropostmedian prominence; coecum penis long; one cornutus in vesica.

Female unknown.

Holotype male: "Ecuador, Napo – Prov., 10 km SSE Cosanga, 2180 m, 0°37'13"S 77°49'29"W, 23.X.2002, sta 35, leg. Gielis & Pelz"; GS 2806-V.P., CVPR eventually SMFL.

Paratypes: 5 males: 4 males with same data as holotype (GS 3131-V.P., 3129-V.P., 3130-V.P., 2002-V.P.); 1 male same locality as holotype but 26.X.2002, sta 38, leg. Gielis & Pelz; GS 3132-V.P., all CVPR.

Toreulia runtunana n. sp.

(Figs 8, 14)

Diagnosis. Related to *T. acanthina* as the shape of transtilla shows but distinguished by the shape of sacculus. Sacculus reminescent that of *T. nimia* but its termination and the posterior edge are short. Differing from all known species of *Toreulia* by large ventral termination of the aedeagus.

Etymology. The name refers to the type locality, Runtun.

Description. Wing span 28.5 mm. Head and dorsolateral part of labial palpus (ca 2 times longer than diameter of eye) creamy, remaining part of palpus chestnut brown; antenna brownish; median part of thorax whitish, lateral parts including tegula chestnut brown; collar creamy, sparsely scaled with rusty. Forewing brown with two indistinct nearly parallel to termen, white lines,: postbasal and median; median line ???latter suffused with white at costa and middle of wing; indistinct subterminal area extending from tornus whitish scaled with brown; two white dots at costa subapically. Cilia brown with rust basal line. Hindwing pale brownish cream tinged with brownish grey strigulation and suffusions in distal half. Cilia whitish creamy.

Male genitalia (Fig. 14). Arm of gnathos broad with a series of small lateral folds and dents; socius short, broad; basal third of valva broad; sacculus angulate with oblique posterior edge and short thorny terminal portion; median part of transtilla oval, spiny; aedeagus distinctly bent, with large, hooked ventral termination.

Female unknown.

Holotype male: " Ecuador, [Province] Tungurahua, Baños - Runtun, 3170 m, 22.01. 2002, leg. J. Wojtusiak"; GS 80 MZUJ.

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