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Idaea nigra Hausmann & Bläsius, sp. n. from La Gomera, Canary Islands, Spain (Lepidoptera: Geometridae, Sterrhinae)

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Abstract

A new Sterrhinae species is described from La Gomera, Canary Islands: *Idaea nigra* Hausmann & Bläsius, sp. n.. The new species is placed in the *rusticata* species-group, close to *Idaea charitata* (Rebel, 1914). The differential diagnosis bases on morphological and molecular analysis. Data on biology, and larval morphology are given. Egg, larva, pupa, moth, and genitalia of both sexes are illustrated.
KEY WORDS: Lepidoptera, Geometridae, Sterrhinae, Idaea nigra, new species, mtDNA COI, La Gomera, Canary Islands, Spain

Idaea nigra **Hausmann & Bläsius, sp. n. de La Gomera, Islas Canarias, España (Lepidoptera: Geometridae, Sterrhinae)**

Resumen

Se describe de La Gomera, Islas Canarias una nueva especie: *Idaea nigra* Hausmann & Bläsius, sp. n.. La nueva especie está situada en el grupo de especies de *rusticata*, próxima a *Idaea charitata* (Rebel, 1914). El diagnóstico diferencial está basado sobre el análisis morfológico y molecular. Se dan datos sobre su biología y la morfología larval. Se ilustran el huevo, la larva, la crisálida, el adulto y la genitalia de ambos sexos.
PALABRAS CLAVE: Lepidoptera, Geometridae, Sterrhinae, *Idaea nigra*, nueva especie, mtDNA COI, La Gomera, Islas Canarias, España

Idaea nigra **Hausmann & Bläsius, sp. n. aus La Gomera, Kanarische Inseln, Spanien (Lepidoptera: Geometridae, Sterrhinae)**

Zusammenfassung

Eine neue Sterrhinae-Art aus La Gomera, Kanarische Inseln, wird beschrieben: *Idaea nigra* Hausmann & Bläsius, sp. n.. Die Art steht *Idaea charitata* (Rebel, 1914) nahe und wird vorläufig der *rusticata*-Artengruppe zugerechnet. Die Differentialdiagnose basiert auf morphologischer und molekularer Analyse. Daten zur Biologie und Larvalmorphologie sowie Abbildungen von Ei, Raupe, Puppe und Falter sowie der Genitalapparate beider Geschlechter werden vorgestellt.
SCHLÜSSELWÖRTER: Lepidoptera, Geometridae, Sterrhinae, *Idaea nigra*, neue Spezies, mtDNA COI, La Gomera, Kanarische Inseln, Spanien

Introduction

One of the authors, Rolf Bläsius, visited the Canary Island, La Gomera in the years of 2006 and 2007. Not far from the famous place in Valle Gran Rey where the endemic lizard species *Gallotia*

simonyi bravoana occurs it was possible to collect moths at light in some warm but windy nights. The site is in the subtropical climatic zone of the lowlands, where the annual rainfalls remain under 200 mm. The success of the collecting nights was not overwhelming in numbers but some specimens of an *Idaea* species were taken, which could not be identified by comparing them with the nearly complete set of Palaearctic Sterrhinae species at the Zoological State Collection Munich (ZSM). This species is neither mentioned in the Lepidoptera check list of the Canary Islands (BAEZ 1998) nor in the world catalogue of Geometridae species (SCOBLE, 1999) nor in the recently published Sterrhinae fauna of the Canary Islands (BACALLADO *et al.* 2006).

In 2005 F. Weisert described a new taxon, *Idaea curvata*, from the island of Hierro, Canary Islands. After kind discussion with the author and after checking the genitalia of the type series it got evident, that the taxon *curvata* belongs – as synonym or as subspecies - to *Idaea charitata* (Rebel, 1914). With this, the description of the specimens from La Gomera as a new species gets necessary.

Idaea nigra **Hausmann & Bläsius, sp. n.** (Figs 1–8)

Holotype: ♀, Canary Islands, La Gomera, Valle Gran Rey, La Playa, 50 m, e. o. 24-VIII-2006, leg. R. Bläsius, coll. ZSM.

Paratypes: 1 ♀, id., 30-V-2006 a. L. (gen. prp. 13701; DNATAX07473); 1 ♂, 2 ♀ ♀, id.; 1 ♂, id. (gen. prp. 13703); 1 ♂, id. (gen. prp. 13702); 1 ♂, id. (DNATAX 7634); 1 ♂, 10 ♀ ♀, id., 26-V / 6-VI-2006, at light, leg. et coll. Bläsius; 5 ♂ ♂, 4 ♀ ♀, id., coll. M. Leipnitz; 7 ♂ ♂, 11 ♀ ♀, id., e. o. (F1 from several females), 5-VIII / 3-IX-2006 (F1), coll. Bläsius; 1 ♂, id., e. o. (F2); 3 ♂ ♂, 2 ♀ ♀, id., e. o. (F1-F3), coll. M. Leipnitz; 5 ♂ ♂, 24 ♀ ♀, id., 27-V / 8-VI-2007, leg. et coll. Bläsius; 4 ♂ ♂, 1 ♀, id., e. o. (F1), 27-VIII / 7-IX-2007. 1 ♂, 1 ♀ Museo Nacional de Ciencias Naturales, Madrid, Spain.

Description. Adult (Figs 1-2). Wingspan ♂ and ♀ 12-16 mm, small males of subsequent generations (laboratory breeding) sometimes 11 mm only. Forewing apex pointed in male, forewing slightly broader and more rounded in ♀. Ground colour glossy, dirty grey. Antemedial line usually thin, medial and postmedial lines dark grey, undulate, broad and distinct. Medial line crossing the distinct cell spot. Terminal area concolorous to ground colour. Fringe dots conspicuous. Pattern of hindwing similar. Transverse lines and cell spots well developed also on the underside of wings. Proboscis well developed. Palpi small. Palpi and frons dark brown. Vertex sand coloured, collar brown. Antennae of ♂ filiform, ciliate-fasciculate, length of cilia about 1.4-1.9 times width of flagellum. Hindtibia of ♂ without pencil, sometimes with a pair of short spurs (present in only one of three examined males). Tarsus thin and very long, 1.25-1.3 times length of tibia.

Male genitalia (Fig. 3). Uncus broad, sub-triangular. Gnathos spatulate. Juxta without spinules. Saccus shortly projecting. Valva long, with sinuous costa, slightly bent at 2/3, terminally rounded, with a stout terminal spine at costa and small bristles at the rounded tip. Aedeagus comparatively short (1.5 mm), of medium width. Cornutus very slender, curved by an angle of 90º, at base with sclerotised triangular dilatation.

Female genitalia (Fig. 4). Length of apophyses posteriores twice that of apophyses anteriores. Antrum bilobous, with deep posterior invagination. Ductus bursae strongly dilated in the central part. Corpus bursae pyriform, posterior half sclerotised with wreath of spines at the margin towards the membranous sac. Ductus seminalis arising from posterior end of corpus bursae, close to the junction with the ductus bursae, broad at the origin, then gradually narrowing.

Differential diagnosis: In habitus slightly reminiscent of *Idaea vilaflorensis* (Rebel, 1911) from the Canaries, the latter differing in the well developed fine antemedial line, postmedial line bent towards base at forewing costa, forewing apex more rounded, genitalia completely different in both sexes. Structural analysis, e. g. similarity of male and female genitalia, long male hindtarsus, suggests a sister species relationship of the new species with *Idaea charitata* (Rebel, 1914) which is distributed on the Canary Islands, too. The latter differs by finer and less dark and more brownish transverse lines in habitus; male genitalia of the new species differing from those of *I. charitata* by the lack of the additional subterminal spine at the costa of valva, costa of valva more sinuous, cornutus longer and

much stronger curved; in female genitalia posterior notch of ductus bursae somewhat deeper, patch of spinules in the posterior part of the corpus bursae missing or very small, spinules at the margin towards the membranous sac much smaller and wreath-like positioned. Furthermore male antennal cilia longer.

Derivatio nominis: The name refers to the provisional name that was given during the rearing of the species (German 'die Schwarze').

The species-pair *I. nigra / I. charitata* may be, tentatively, placed in the *rusticata* species-group (cf HAUSMANN, 2004), as several genitalic features, the long male hindtarsus, the ribbed type of egg sculpturation and the short and thick larvae are reminiscent of equivalents in *Idaea intermedia* (Staudinger, 1879) and *I. completa* (Staudinger, 1892).

Data on distribution, bionomics and larval stages (by AH, ML & RB)

Distribution. Endemic to Canary Islands: La Gomera. The sister-species *Idaea charitata* occurs sympatrically in the type locality, such as a number of other Sterrhinae, e.g. *Idaea palmata* (Staudinger, 1901), *Idaea abnorma* (Pinker, 1960), *Scopula guancharia* (Alphéraky, 1889), *Scopula minorata* (Boisduval, 1833) and *Glossotrophia asellaria gerstbergeri* Hausmann, 1993.

Habitat (Figs 9-10). The type locality is situated close to a banana plantation, at 50-100 m above sea-level on a southwest-facing slope under the 600 m high basaltic wall of the Risco de la Merica mountain. The habitat is characterised by the stony ground of volcanic (lava) origin, which is typical for the whole island of La Gomera. The original vegetation belongs to the typical vegetation type of the basal climatic zone, i. e. succulent scrubland, but at the type locality this is rather degenerated and mostly replaced by banana plantations. The climate of this site is subtropical, arid/semiarid (annual precipitations under 200 mm), and is characterised by high summer temperatures which often exceed, by far, 30º C.

Phenology. In nature only collected in late May and early June, so far. Data from laboratory breeding indicating, however, the probable bi- or even trivoltinism also in nature.

Rearing data. Under laboratory conditions F1 rearing started with 137 L1 larvae, but many larvae lost by Acari. The whole cyclus from egg to hatching of the moth took 8-11 weeks. In the F2 generation the losses were still larger: From about 150 eggs only one female could be successfully reared. Most losses (up to 90%) occur in the last larval stage without any obvious reason, or in the delicate pupal stage, which seems to be very sensitive to dryness. In a large mix of offered host-plants young larvae preferred flowers of *Daucus carota*, and flowers of *Rubus idaeus*, but also leaves of *Daucus carota*, *Achillea millefolium* and *Bellis communis* were accepted. Full grown larvae are less food-specific and feed regularly on many different plants, e.g. leaves of *Daucus carota*, *Achillea millefolium, Taraxacum officinale* and flowers of *Rosa* sp.. Young larvae of the related species *Idaea charitata* preferred leaves of *Polygonum* and flowers of *Taraxacum*, but accepted also flowers of *Chamomilla, Rosa*, leaves of *Achillea millefolium* and *Taraxacum*.

Morphology of immature stages (Figs 5-8). Egg oval, length ca 5 mm, sculpturation with irregularly shaped longitudinal and transversal ridges (ribbed type). Larvae of the new species in structure and pattern reminiscent of that of *Idaea charitata*, belonging to the short type without conspicuous keel but with stalked warts and setae. Larva of *I. obsoletaria* with lateral keels stronger developed. Pupa structurally well corresponding to those of other *Idaea* species, comparatively slender, length about 6 mm, cremaster basally broad, with one pair of terminally hooked setae; cremaster long and narrow at tip, here with three pairs of terminally hooked setae.

Results from the molecular analysis (by AH & MM)

Mitochondrial DNA was analysed using the standard procedure according to KNÖLKE *et al.* (2005). A 440 bp long fragment of the COI gene was sequenced, detailed data on nucleotides under accession numbers: AM920324, AM920325 (GenBank).

In a small set of 10 West-Palaearctic *Idaea* species, *Idaea charitata* clearly resulted as sister

species of *Idaea nigra*, with a nucleotide divergence of only 3.6%. This is a comparatively low infrageneric value demonstrating close relationship between both species. For comparison: Among the West-Palaearctic *Idaea* species, so far barcoded in the geometrid campaign of the AllLeps project (AH & Paul Hebert, Canada), the mean infraspecific nucleotide variability between populations of the same species is 0.34%, the mean infrageneric nucleotide variability between species is 10.1% (n = 44 species, 115 individuals).

The comparison with the above mentioned 9 congeneric species preliminarily supports the hypothesis, that this species belongs, together with *Idaea charitata*, to the *rusticata* species-group: *Idaea rusticata* (Denis & Schiffermüller, 1775) (6,1% nucleotide divergence) and *Idaea filicata* (Hübner, 1799) (7,5% divergence) are clustering as nearest neighbours to the sister clade *I. nigra* & *I. charitata* in the NJ tree (not shown).

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We thank Dr. Antonio Vives and the authorities of La Gomera (D. Santiago Martín of Cabildo Insular de la Gomera, Canary Islands) for supporting our studies by providing a regular collecting permit. Dr. Paul Hebert, Canada, provided comparative sequences (DNA barcodes) of *Idaea* species in the framework of the geometrid campaign of the AllLeps project. kmbs (kmbioservices.de) served in molecular labwork. Friedrich Weisert, Vienna, helped to clear up the identity of *Idaea curvata*.

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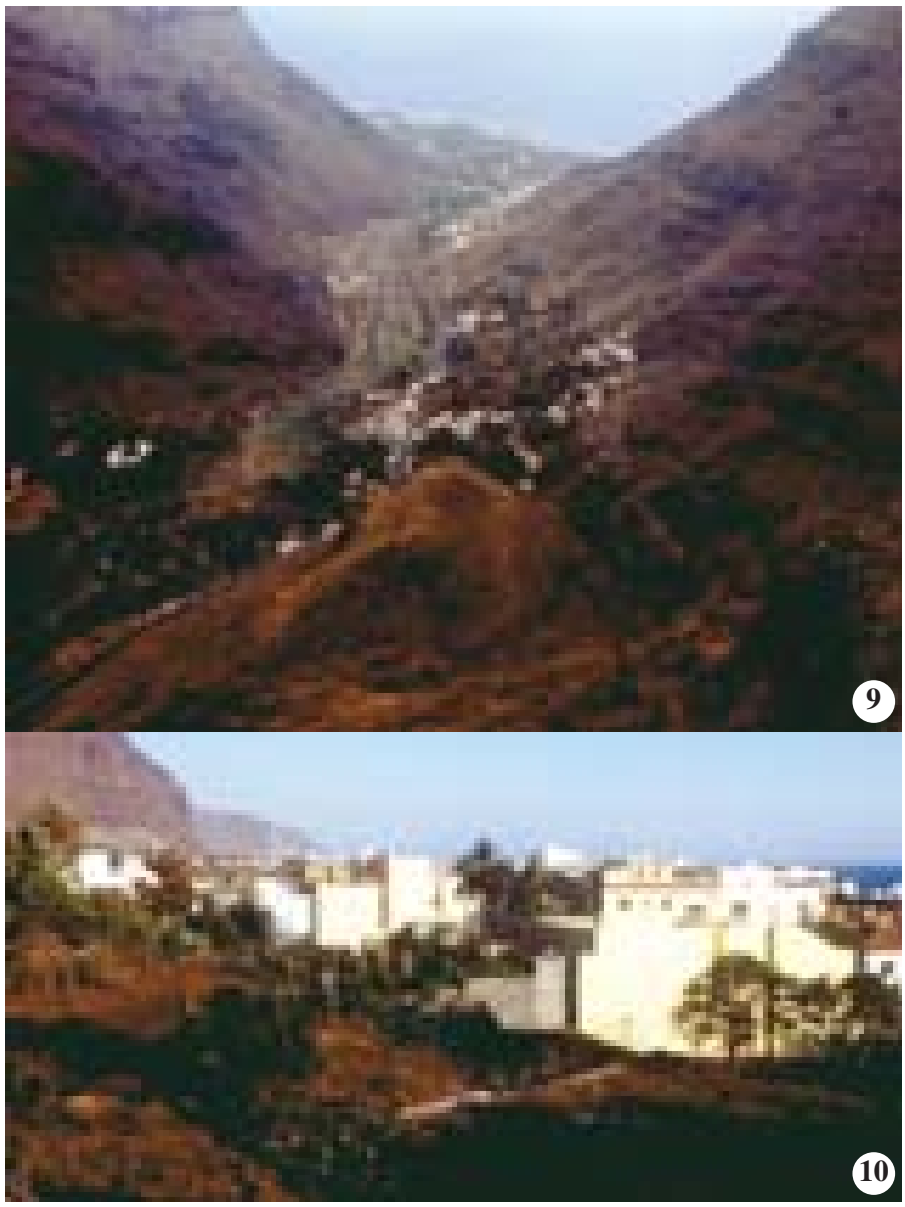
Figs 1-4.– 1-2. *Idaea nigra* Hausmann & Bläsius, sp. n.. **1.** Holotype ♀, Canary Islands, La Gomera, Valle Gran Rey, La Playa, 50 m, e. o., 24-VIII-2006, leg. R. Bläsius, coll. ZSM (photo AH). Scale bar = 1 cm. **2.** ♂ in resting position (paratype), Canary Islands, La Gomera, Valle Gran Rey, La Playa, 50 m, e. o. F2, November 2006 (photo ML). **3-4.** *Idaea nigra* sp. n., genitalia; scale bars = 1 mm. **3.** male genitalia (gen.prep. ZSM G 13703; photo AH). **4.** *Idaea nigra* sp. nov., female genitalia (gen. prep. ZSM G 13701; photo AH). Scale bar = 1 mm.

Figs 5-8.– Immature stages of *Idaea nigra* sp. nov.. **5.** egg shell after hatching of larva (SEM, scale bar = 20 µm, Photo AH). **6.** full grown larva (Photo ML). **7.** pupae (left: lateral view; mid: ventral view, old; right: *Idaea charitata* for comparison) (Photo ML). **8.** pupa, detail of cremaster region (SEM, scale bar = 20 µm, Photo AH).



Figs 9-10.– La Gomera, Canary islands: habitat (type locality) of *Idaea nigra* sp. n.. **9.** view from north to south on the Valle Gran Rey, the type locality close to the sea on the right hand. **10.** type locality in the surroundings of "La Playa" village (Photos RB).