

Adscita (Tarmannita) antoniovivesi Efetov & Tarmann, a new species of the genus *Adscita* Retzius, 1783, from Spain (Lepidoptera: Zygaenidae, Procridinae)

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Abstract

A new species of the genus *Adscita* Retzius, 1783, viz. *Adscita (Tarmannita) antoniovivesi* Efetov & Tarmann, sp. nov., was discovered in and is described from Spain. Information on biology and early stages is provided. The new species is named in honour of the Spanish lepidopterologist Dr Antonio Vives.

Keywords: Lepidoptera, Zygaenidae, Procridinae, *Adscita*, *Tarmannita*, *A. antoniovivesi*, *A. manni*, *A. bolivari*, Huéllamo, Cuenca, Spain.

Adscita (Tarmannita) antoniovivesi Efetov & Tarmann, una nueva especie del género *Adscita* Retzius,
1783, de España
(Lepidoptera: Zygaenidae, Procridinae)

Resumen

Una nueva especie del género *Adscita* Retzius, 1783, a saber, *Adscita (Tarmannita) antoniovivesi* Efetov & Tarmann, sp. nov., fue descubierta en España y se describe a partir de ella. Se proporciona información sobre la biología y los primeros estadios. La nueva especie se nombra en honor al lepidopterólogo español Dr. Antonio Vives.

Palabras clave: Lepidoptera, Zygaenidae, Procridinae, *Adscita*, *Tarmannita*, *A. antoniovivesi*, *A. manni*, *A. bolivari*, Huéllamo, Cuenca, España.

Introduction

The family Zygaenidae is represented on the Iberian Peninsula by 37 species (Vives Moreno, 2014; this publication) from three of five hitherto known subfamilies (Efetov, 1999; Efetov et al. 2014b; Efetov & Tarmann, 2017), viz. Zygaeninae (22 species), Chalcosiinae (1 species), Procridinae (14 species) (including the here newly described species). Six species are endemic.

In July 2018, the authors were on a scientific trip in Spain with the aim of studying the biology and early stages of the Iberian endemic zygaenid species *Rhagades (Wiegelia) predotae* (Naufock, 1930) (Efetov et al. 2019b; Efetov & Tarmann, 2020) and to test sex attractants for males of Procridinae in different biotopes. Nowadays, the application of sex attractants is an important part of the field investigations of the Zygaenidae fauna (Can et al. 2016; Can Cengiz et al. 2018; Drouet et al. 2021; Efetov et al. 2010, 2011, 2014a, 2014c, 2015b, 2016, 2018, 2022; Efetov & Kucherenko, 2020, 2021; Razov et al. 2017; Subchev et al. 2010, 2013, 2016; Vrenozzi et al. 2008). For example, new

attractants synthesized in the Crimean Federal University, viz. EFETOV-2, EFETOV-S-2 and EFETOV-S-S-2 gave interesting results when studying the Iberian fauna (Efetov et al. 2019b; Efetov & Tarmann, 2020).

On 13-VII-2018 near Huélamo (Cuenca) (Figures 7-8), after discovering a large population of *Rhagades predotae* with the help of EFETOV-S-S-2 (Efetov et al. 2019b), we decided to look for eggs of this species. We found 17 egg batches on the leaves of *Prunus ramburii* Boiss., 16 of them were from *Rh. predotae*, but one consisting of 14 eggs (Figure 3) belonged (as we realised later) to an *Adscita* sp. The first instar larvae emerged from these *Adscita* eggs during the next day (14-VII-2018), whereas all *Rhagades* larvae did not emerge until 22-VII-2018. When the first *Adscita* larvae appeared, we studied their L1-chaetotaxy because this character is important in the systematics of Procridae and strongly differs in different genera and even subgenera of this subfamily (Efetov, 2001a; Efetov & Hayashi, 2008; Efetov et al. 2006). We found that according to chaetotaxy, our larvae were not *Rhagades* but *Adscita* and have a combination of setae typical for species of the subgenus *Tarmannita* Efetov, 2000: the first abdominal segment with two dark, sclerotized dorsal setae, two dark, sclerotized subdorsal setae and two light, hair-like lateral setae. At that time, only two species of the subgenus were known, viz. *Adscita bolivari* (Agenjo, 1937) and *A. manni* (Lederer, 1853). *A. bolivari* is an endemic species of the Iberian Peninsula and is known from the locality where we found the eggs. Therefore, we thought at first that these eggs were just a mislaid batch from a female of *A. bolivari* on *Prunus ramburii* as the so-far known larval hostplants of this species are *Helianthemum* spp. (Cistaceae). The second species of the subgenus *Tarmannita*, viz. *A. manni*, is known from the Iberian Peninsula only from the Pyrenees (Figure 8). However, further investigations of the larvae and the finally emerged imagines showed, that these specimens from Huélamo were not *Adscita bolivari* but are more closely related to *A. manni*, from which they also differ, especially in genitalia structures. As a result, it is necessary to describe a new species that is the third species of the subgenus *Tarmannita* of the genus *Adscita*.

It is interesting to note that the larvae of the new species were reared until hibernation on the leaves of *Prunus spinosa* L., but from beginning of the fourth larval instar (after hibernation) they willingly changed hostplant to the newly offered *Helianthemum nummularium* (L.) Mill. Once having accepted *Helianthemum* they refused to accept *Prunus* leaves.

Abbreviations

- KAE Collection of Konstantin A. Efetov, Crimean Federal University, Simferopol, Crimea
 MNCN Museo Nacional de Ciencias Naturales, Madrid, Spain
 TLMF Sammlungs- und Forschungszentrum der Tiroler Landesmuseen, Ferdinandeum, Hall in Tirol, Austria

Adscita (Tarmannita) antoniovivesi Efetov & Tarmann, sp. nov. (Figures 1-2, 6, 9-13, 19)

Material: Holotype ♂ (Figures 1, 2). With printed pin-labels: "IBERIA centr., Castilla-La Mancha, // Province Cuenca, 3 km NE // Huelamo (Huelamo 3), // 1225 m, ex ovo, 13-V-2019; // W 01°47'39" / N 40°17'27" // leg. K. A. Efetov & G. M. Tarmann // TLMF 2019-013 // Gen. Prep. Z 4422 ♂"; "DNA Barcode // TLMF Lep 23975"; "2019/051"; "2019/052" (TLMF). Paratypes 2 ♂, 1 ♀: 1 ♂ with printed labels: "IBERIA centr., Castilla-La Mancha, // Province Cuenca, 3 km NE // Huelamo (Huelamo 3), // 1225 m, ex ovo, 14-V-2019; // W 01°47'39" / N 40°17'27" // leg. K. A. Efetov & G. M. Tarmann // Gen. Prep. Z 4405 ♂"; "DNA Barcode // TLMF Lep 23976"; "2019/046"; "2019/047" (MNCN). 1 ♂ with printed labels: "IBERIA centr., Castilla-La Mancha, // Province Cuenca, 3 km NE // Huelamo (Huelamo 3), // 1225 m, ex ovo, 12-V-2019; // W 01°47'39" / N 40°17'27" // leg. K. A. Efetov & G. M.

Tarmann" (genitalia in glycerol) (KAE). 1 ♀ with printed labels: "IBERIA centr., Castilla-La Mancha, // Province Cuenca, 3 km NE // Huelamo (Huelamo 3), // 1225 m, ex ovo, 15-V-2019; // W 01°47'39" / N 40°17'27" // leg. K. A. Efetov & G. M. Tarmann // TLMF 2019-013 // Gen. Prep. Z 4404 ♀"; "2019/048" (TLMF).

Description: Male. Forewing length 12.0-12.8 mm (holotype 12.5 mm), forewing breadth 5.0-5.6 mm (holotype 5.0 mm); hindwing length 9.0-9.5 mm (holotype 9.1 mm), hindwing breadth 4.2-5.5 mm (holotype 4.5 mm); length of body (from frons to abdominal apex) 7.6-9.0 mm (holotype 8.5 mm); length of antenna 7.2-7.4 mm (holotype 7.2 mm). Female crippled. Habitus of all specimens similar to *Adscita mannii*. Head capsule spherical, strongly covered with shiny golden green scales, the scales arranged in a flat layer ventrally and laterally but strongly "hairy" dorsally on vertex, especially between the bases of the antennae. Compound eyes black, breadth of frons ca 1.5 times breadth of the compound eyes in frontal view; ocelli white. Chaetosema triangular, dark brown. Labial palps short, curved upwards, not reaching frons. Antenna long, bipectinate in male, biserrate in female, with 46 segments (in all four known specimens), the eight distal segments of antenna form a well pronounced club. Thorax and forewing upperside shiny golden green, abdomen shiny bluish green; on underside body shiny green. Legs shiny green. Wings greyish on underside, with weak green colour at basal parts, not so strong and shiny as in *A. mannii*.

Genitalia male (Figures 9-13): Uncus heavily sclerotized, long, two times longer than tegumen. Valva with rounded apex, without any process. Aedeagus 1.5 times longer than uncus. In two males (including the holotype) vesica with one small, straight, needle-shaped, narrow cornutus with pointed apex, length of cornutus more than 20 times shorter than length of aedeagus. The cornutus is situated on the apex of a narrow distal process of the vesica (if everted) (Figures 10-11). However, in one paratype (ex pupa 14-V-2019), there are five narrow straight cornuti of different length on the apex of the distal process of the everted vesica (Figures 12-13).

Female genitalia (Figure 19): Ostium bursae broad, antrum pot-shaped, middle part of ductus bursae broad, straight, sclerotized, with dorsal process (such process of ductus bursae is typical for all three species of *Tarmannita* Efetov, 2000), distal part of ductus bursae narrow, twisted, translucent, with folded walls; corpus bursae double-lobed, elongate.

Differential diagnosis: *Adscita antoniovivesi* Efetov & Tarmann, sp. nov. differs from *A. mannii* externally by the lack of intensively green shiny scales on the underside of the wings (especially on the hindwings). *A. antoniovivesi* has 46 antennal segments, but there are fewer (38-43) in *A. mannii* (counted on material from several populations from Spain throughout southern Europe to Sicily and southern Greece). In the male genitalia in *A. antoniovivesi* sp. nov. there is one cornutus on the vesica, which is short, needle shaped, and situated on a transparent appendix of the vesica (when the vesica is everted). (In one paratype there are five cornuti). In *A. mannii* there is one transparent cornutus which is larger and of long triangular shape with an even base and a pointed tip (Figures 15, 16). Very rarely there are two cornuti in *A. manni* (Figures 17-18). The cornuti in *A. antoniovivesi* sp. nov. are over 20 times shorter than the aedeagus but the single cornutus in *A. mannii* is only 10 or less times shorter than the aedeagus. The valva with ventral margin of sacculus smooth, without pronounced dentations in *A. antoniovivesi* sp. nov. (Figure 9), while in *A. mannii* it is more or less serrated (Figure 14).

The female of *A. antoniovivesi* sp. nov. has a tube-like sclerotized middle part of the ductus bursae (which is more translucent in *A. mannii*) and the double lobed corpus bursae is elongate, not rounded as in *A. mannii* (Figures 19-20).

Bionomics: The flight of imagines starts most probably from mid-May and continues until early July (specimens in captivity emerged in May and the eggs were found in July). The larval hostplant is *Prunus ramburii* Boiss. (in nature), *Prunus spinosa* L. and *Helianthemum* spp. (in captivity).

On 14-VII-2018 a small flat layer of 14 whitish yellow eggs was found on the underside of a leaf of *Prunus ramburii* (Figure 3). The first larvae emerged on the same day. The L1 larva is yellowish-

white. It has a black head capsule and a blackish brown thoracic shield that covers the dorsal part of the first thoracic segment. The setae of the first abdominal segment of the L1 larva are: D: *2d*, *0l*; SD: *2d*, *0l*; L: *0d*, *2l* (D = dorsal, SD = subdorsal, L = lateral, *d* = dark, sclerotized, *l* = light, hair-like setae).

The larva is not leaf mining but feeds from the very beginning by scratching off the parenchyma from the underside of the leaves of the hostplant. Before hibernation, the larva does not change its colour, only a few weak brownish lines appear. The hibernation takes place in L3. After hibernation, the larva changes its habitus and the close relationship to *A. mannii* is obvious. The ground colour of the body is raspberry-red and can be seen on the double mediodorsal line and the lateral and lateroventral part of the larva. Two broad dirty-white to yellow (variable in colour) dorsal bands are in strong contrast to the mediodorsal line and the lateral raspberry-red ground colour (Figures 4-5). Dorsolaterally, the light band is limited by a narrow dark brown line that is interrupted where the segments meet. The verrucae of the body are covered with long light and short dark setae. The cuticle of the body is covered with many heavily sclerotized dark brown multispined macrotubercles that are visible without magnification as small black dots. The head is still black, but the thoracic shield is lighter than in the earlier instars. Pupation takes place after L7 in a flimsy white transparent cocoon. The imagines hatch after ca 20 days.

Etymology: The new species is named in honour of our friend and celebrated Spanish lepidopterist Dr Antonio Vives who helped us many times in organizing of our field work in Spain.

Results and discussion

Biogeographically, the isolated occurrence of an endemic Iberian species, closely related to the widespread Adriato-Mediterranean *Adscita mannii* (Figure 8), can be seen as a parallel example to the case of *Jordanita vartianae* (Malicky, 1961) (endemic in central and southern Spain) and *J. globulariae* (Hübner, 1793) (widespread in Europe from central and northern Spain eastwards). However, at this moment, we have no knowledge about the range of *A. antoniovivesi* outside of the type locality.

The description of a new *Adscita* species in Europe based on only four specimens may be criticised on the first view. Moreover, we reared the new species from the egg and the early stages do not significantly differ from those of *A. mannii*. Therefore, we decided to barcode two of these four specimens as DNA barcoding is an important contemporary tool of molecular systematics (Efetov & Tarmann, 2014b, 2016a, 2016b; Efetov et al. 2019a). However, the result shows that barcodes of these two specimens do not differ significantly from those of *A. mannii*. As we know from our experience, barcode information does not work in some groups of Procridae, viz. in the subgenus *Jordanita* Verity, 1946 (genus *Jordanita*), in the genus *Pollanisus* Walker, 1854 etc. (Efetov et al. 2019a; Mollet & Tarmann, 2023). Although we were convinced from the very first moment when we saw the male and female genitalia that this population from Huélamo could not be *A. mannii* or *A. bolivari*, we postponed the description from year to year (and now for four years) trying to obtain additional material. Unfortunately, this has failed so far. Therefore, to stimulate further investigations in the field and on possibly already existing material of *A. antoniovivesi* in collections, we have decided to describe this new species now.

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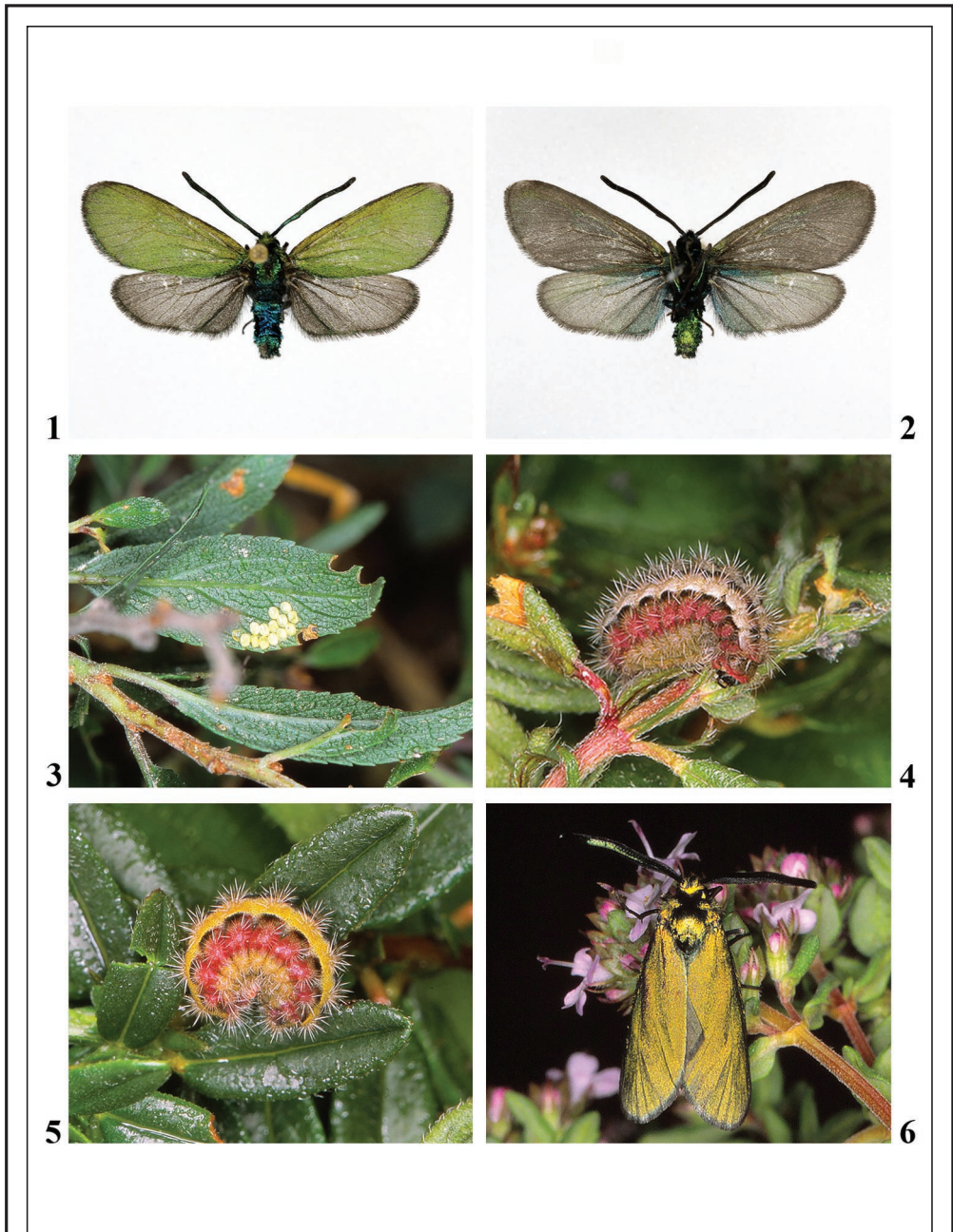
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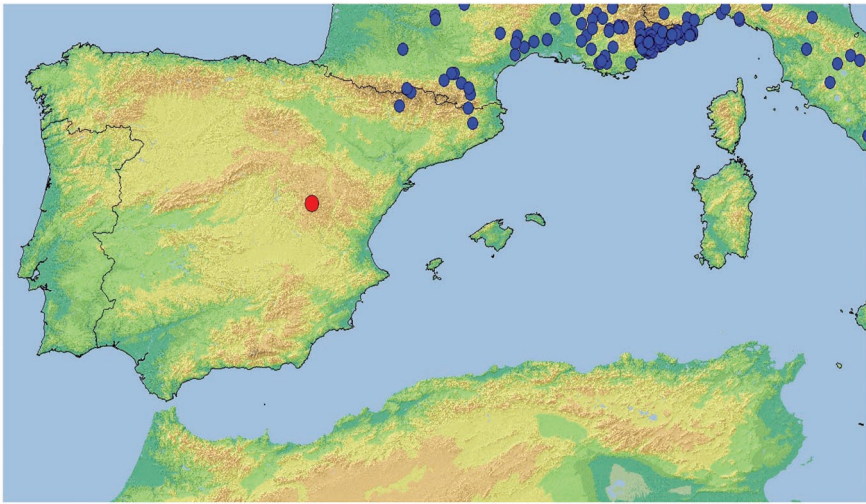
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Figures 1-6. *Adscita (Tarmannita) antonioivesi* Efetov & Tarmann, sp. nov. **1.** Holotype male, dorsal view. **2.** Holotype male, ventral view. **3.** Eggs on the leaf of *Prunus ramburii*. **4, 5.** Variability of adult larvae coloration. **6.** Male on flowers.

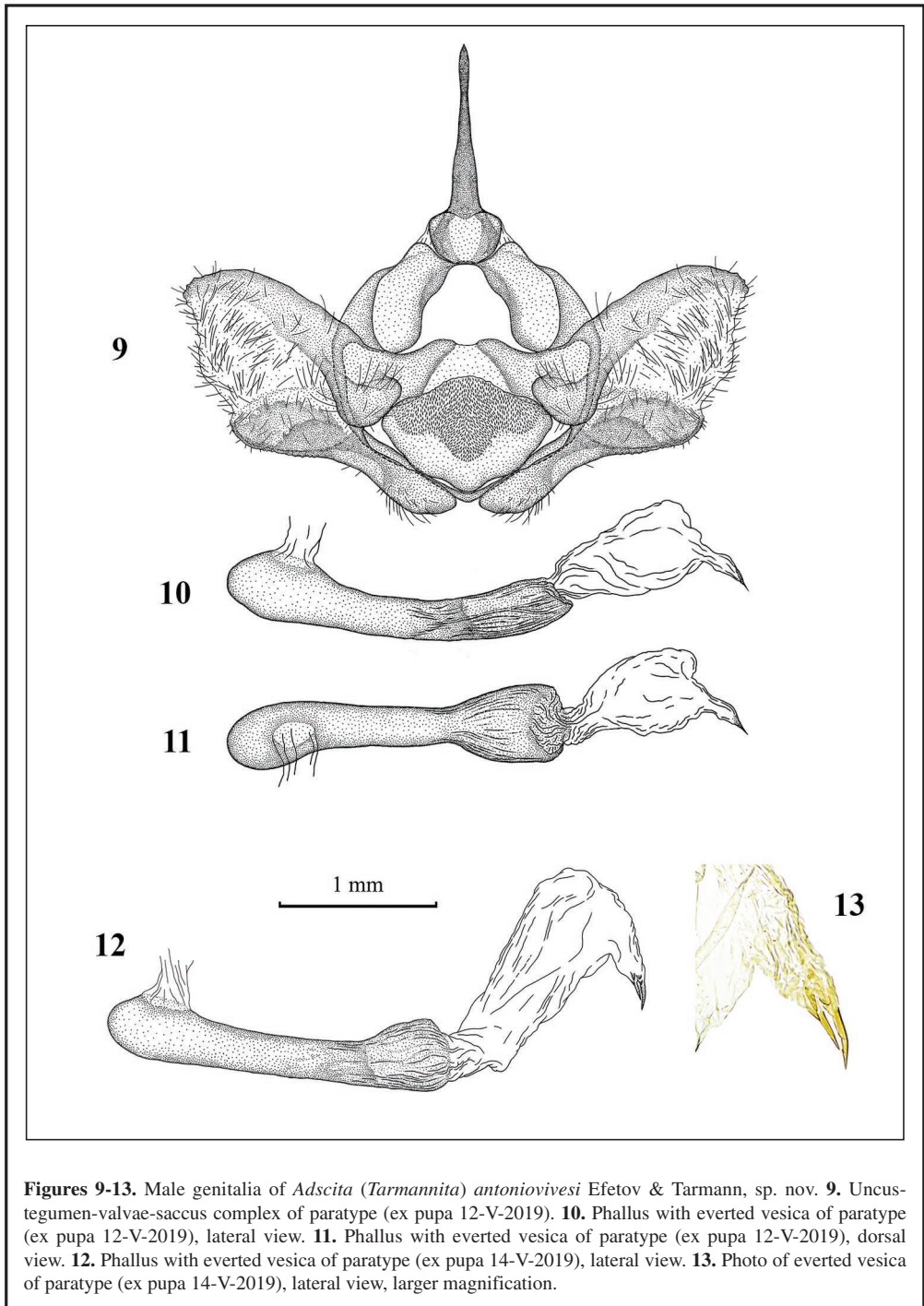


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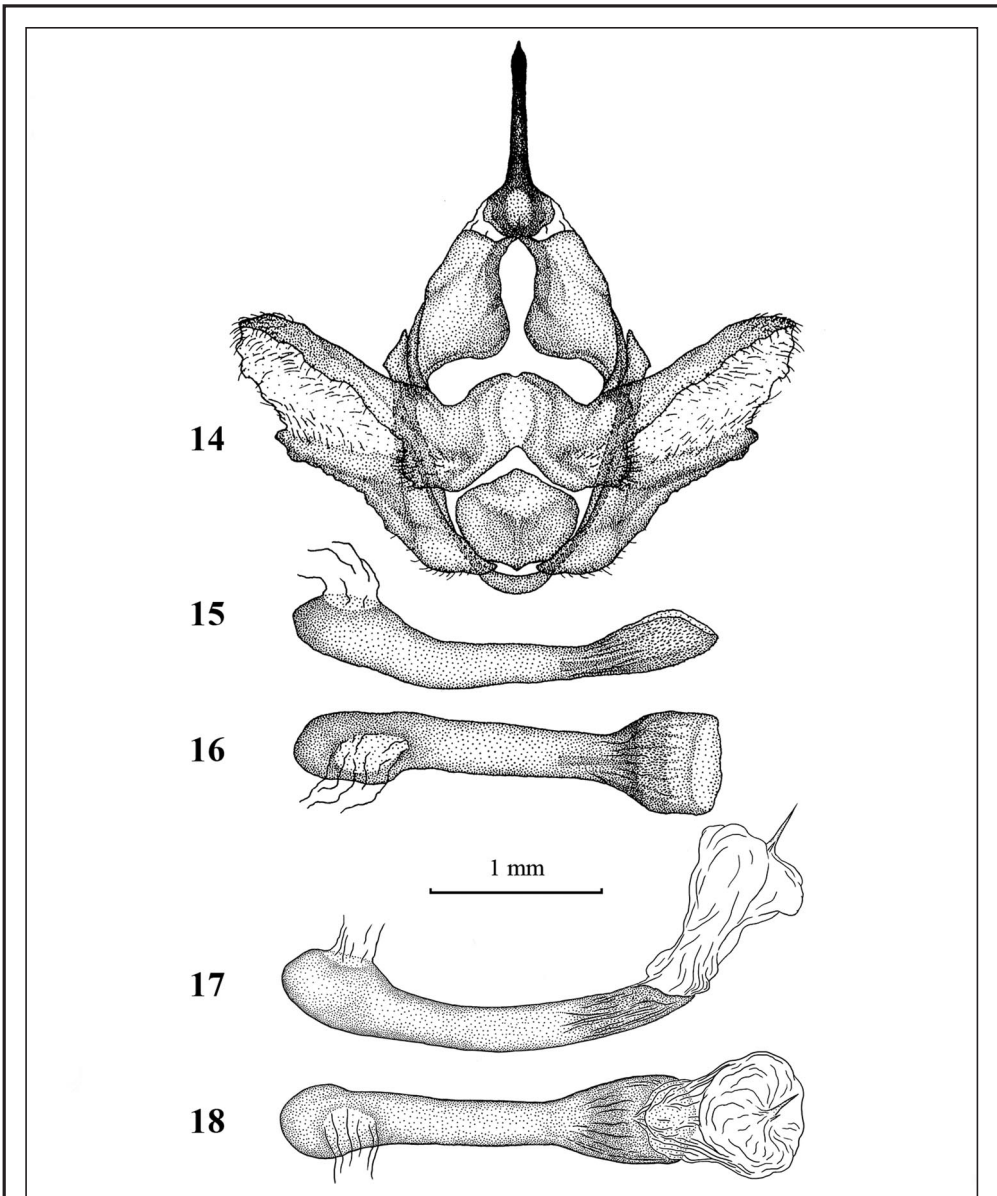


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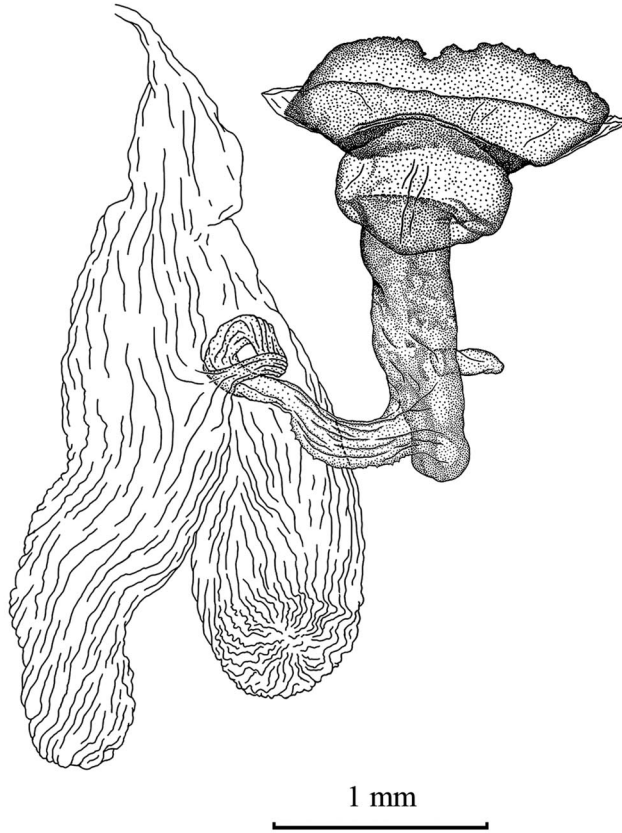
Figures 7-8. 7. Type locality of *Adscita (Tarmannita) antoniovivesi* Efetov & Tarmann, sp. nov. Spain, Castilla-La Mancha, Province Cuenca, 3 km NE Huéllamo, 1225 m. 8. Localities of *Adscita (Tarmannita) antoniovivesi* (red, type locality) and *Adscita (Tarmannita) mannii* (Lederer, 1853) (blue).



Figures 9-13. Male genitalia of *Adscita (Tarmannita) antoniiovivesi* Efetov & Tarmann, sp. nov. **9.** Uncus-tegumen-valvae-saccus complex of paratype (ex pupa 12-V-2019). **10.** Phallus with everted vesica of paratype (ex pupa 12-V-2019), lateral view. **11.** Phallus with everted vesica of paratype (ex pupa 12-V-2019), dorsal view. **12.** Phallus with everted vesica of paratype (ex pupa 14-V-2019), lateral view. **13.** Photo of everted vesica of paratype (ex pupa 14-V-2019), lateral view, larger magnification.



Figures 14-18. Male genitalia of *Adscita (Tarmannita) mannii* (Lederer, 1853). **14.** Uncus-tegumen-valvae-saccus complex of male with pin-label "Yugoslawien, Insel Krk, Dalmatien Punat, 14-V-1988 - 01-VI-1988, C. & E. Blumenthal" (ex Efetov, 2001b). **15.** Phallus of the same specimen, lateral view (ex Efetov, 2001b). **16.** Phallus of the same specimen, dorsal view (ex Efetov, 2001b). **17.** Phallus with two cornuti on everted vesica of male with pin-label "Italy, [Calabria, La Sila, Mt.] Botte Donato 2, 1670 m, 02-VII-2018, leg. K. A. Efetov", lateral view. **18.** Phallus with two cornuti on everted vesica of male with pin-label "Italy, [Calabria, La Sila, Mt.] Botte Donato 2, 1670 m, 02-VII-2018, leg. K. A. Efetov", dorsal view.



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Figure 19. Female genitalia of paratype of *Adscita (Tarmannita) antonioivivesi* Efetov & Tarmann **sp. nov.** (ex pupa 15-V-2019).

