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## Definition of the *Elachista puplesisi* Sruoga complex (Lepidoptera, Gelechioidea, Elachistidae), with description of a new species

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### Abstract

The *Elachista puplesisi* group is defined. Its characterization is based on two species, *E. puplesisi* Sruoga, 2000, known from the holotype collected in Turkmenistan and *E. helia* sp. nov., from Rhodos, Greece. The group is assigned to the subgenus *Atachia* of *Elachista*, but its affinities within *Atachia* remain unknown.

**Key words:** Elachistinae, *Elachista*, *Atachia*

### Introduction

*Elachista puplesisi* Sruoga, 2000 was described on the basis of a single male specimen collected from the Karakum desert in Turkmenistan. The species appeared bizarre in its morphology, and its systematic position was left unresolved in the original description, with the remark that it likely represents a separate species group within *Elachista*, or even a new genus (Sruoga 2000). The species indeed possesses features rare among *Elachista*, as well as an unusual combination of characters, which did not make it straightforward to place this species in the phylogenetic concept of Elachistinae of Kaila (1999). Recently, a series of another species with similar morphology was discovered in the collection of ZSM. A closer scrutiny of this species, along a detailed comparison of structural details of *E. puplesisi* appears to give a reasonably likely position for these species within the revised phylogenetic classification of Elachistinae of Kaila & Sugisima (2011). We place these species in the subgenus *Atachia* of *Elachista*, as delineated by Kaila & Sugisima (2011). We propose the informal *E. puplesisi* group for these species, merited by their unique combination of morphological traits as detailed below.

### Material

Specimens examined are from the following collections:

MZH	Finnish Museum of Natural History, Zoology Unit, University of Helsinki, Finland (L. Kaila).
ZSM	Zoologische Staatssammlung, München, Germany (A. Segerer).
ZIN	Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia (S. Sinev).
ZMUC	Zoological Museum, Natural History Museum of Denmark, Copenhagen, Denmark (O. Karsholt).

### Systematics

Currently, four genera are recognized in Elachistinae (Kaila *et al.* 2011; Kaila & Sugisima 2011). There is a

possibility that the genera of some species, now with unclear status, will be clarified and validated in the future (Sruoga & De Prins 2009). Here we give a hierarchical account, based on Kaila & Sugisima (2011), of the synapomorphies at different levels of *Elachista* on which we base our conclusions about the placement of the *E. puplesisi* group.

### Synapomorphies of *Elachista*

The characters listed here are in part illustrated in Figs 1–12; others are depicted in Traugott-Olsen & Nielsen (1977), Kaila (1999) and Kaila & Sugisima (2011). The valval process is formed as a sclerotised hook. This is a nearly universal character in *Elachista* and is secondarily reduced in only a few species; it is present in the *E. puplesisi* group. The distal part of the valva, i.e. the area beyond the valval process, is strongly enlarged; this is characteristic of all *Elachista* species except *E. sinevi* (Sruoga 1992, in Sruoga & Puplesis 1992); it is present in *E. puplesisi* group. The median plate of the juxta is shaped as a concave plate with folded margins (64:3 character state in Kaila & Sugisima 2011); it is universal in *Elachista*, including *E. puplesisi* group. This character is further modified in several lineages of *Elachista*. A tongue-shaped, distally setose digitate process is present between the juxta and valva; this may be homologous with a similar structure in several gelechioid lineages but is absent in other elachistine genera (Traugott-Olsen & Nielsen 1977; Nielsen & Traugott-Olsen 1978; Kaila 1999, 2004, 2009; De Prins & Sruoga 2012; Heikkilä *et al.* 2014); it is sometimes secondarily lost in *Elachista*, and is absent also in *E. puplesisi* group. The exposed pupa of many *Elachista* species is supported by a silken girdle attached to the surface and surrounding the pupa between abdominal segments 4 and 5, with some exceptions (Kaila 2011); the immature stages of the constituent species of the *E. puplesisi* group are unknown.

### Position of *E. puplesisi* group in *Elachista*

The placement of the *E. puplesisi* group in subg. *Atachia* is supported by a number of characters, yet some are in conflict with those of most other constituent species. The shape of the male valva with the structure of costa and the narrow, longitudinal membranous window without dorsal reinforcement is typical of *Atachia*. The structure of the gnathos, with the basal arms mesially not fused, precludes the placement of *E. puplesisi* group to sg. *Aphelosetia*. Presence of a well-developed, bilobed uncus suggests that *puplesisi* group does not belong to subgenera *Dibrachia* or *Hemiprosopa*, which both also possess other characteristic features that the *E. puplesisi* group lacks (cf. Sinev 1998; Sinev & Sruoga 1992; Kaila 2005, Kaila *et al.* 2003). Lack of the twist formed by the distal fold of the valval costa and cucullus, as well as the lack of sclerotised reinforcement along the valval window preclude the placement to subg. *Elachista*. Even if not a ‘real character’, the general facies of the male genitalia, much dictated by a similar shape of the juxtal lobes, and similarly erect and straight basal arms of the gnathos, are different from other *Elachista*, but closely similar to other species of subg. *Atachia*, notably the Palearctic *E. pigerella* (Herrich-Schäffer, 1854), *E. olgae* (Sinev, 1992), and many Australian species (Kaila 2011).

There is a narrow and spinose zone laterad of the ostium bursae in the female genitalia that characterizes the subg. *Atachia*. Unfortunately the female of neither species of the *E. puplesisi* group is known. When discovered, the female genital morphology could shed further light on the position of this group.

Characteristic features of the *E. puplesisi* group include the short and broad wing shape (Figs 1, 2) the lack of the digitate process (Figs 11, 12), and setae on the ventral surface of the uncus lobes instead of scales (Figs 10, 11). Within *Atachia* uncus setae occur also in the Palearctic *E. regificella* group and in the Australian *E. melanthes* complex of the *E. gerasmia* group (Kaila & Sugisima 2011). Also the indistinctly fading distal portion of the costal lobe, with no twist with the cucullus, is similar to the latter complex. The valval process is weakly developed, with no sclerotised connection to juxta lobes. The valva is generally short and broad (Figs 11, 12). In conclusion, the combination of characters supports the placement of *E. puplesisi* group in *Elachista* subg. *Atachia*, but no likely candidate for closest relative within the subgenus can at present be suggested.



PLATE 1. External appearance of *Elachista* spp. Fig. 1: *E. puplesisi* (holotype); Fig. 2: *E. helia* sp. nov. (holotype).

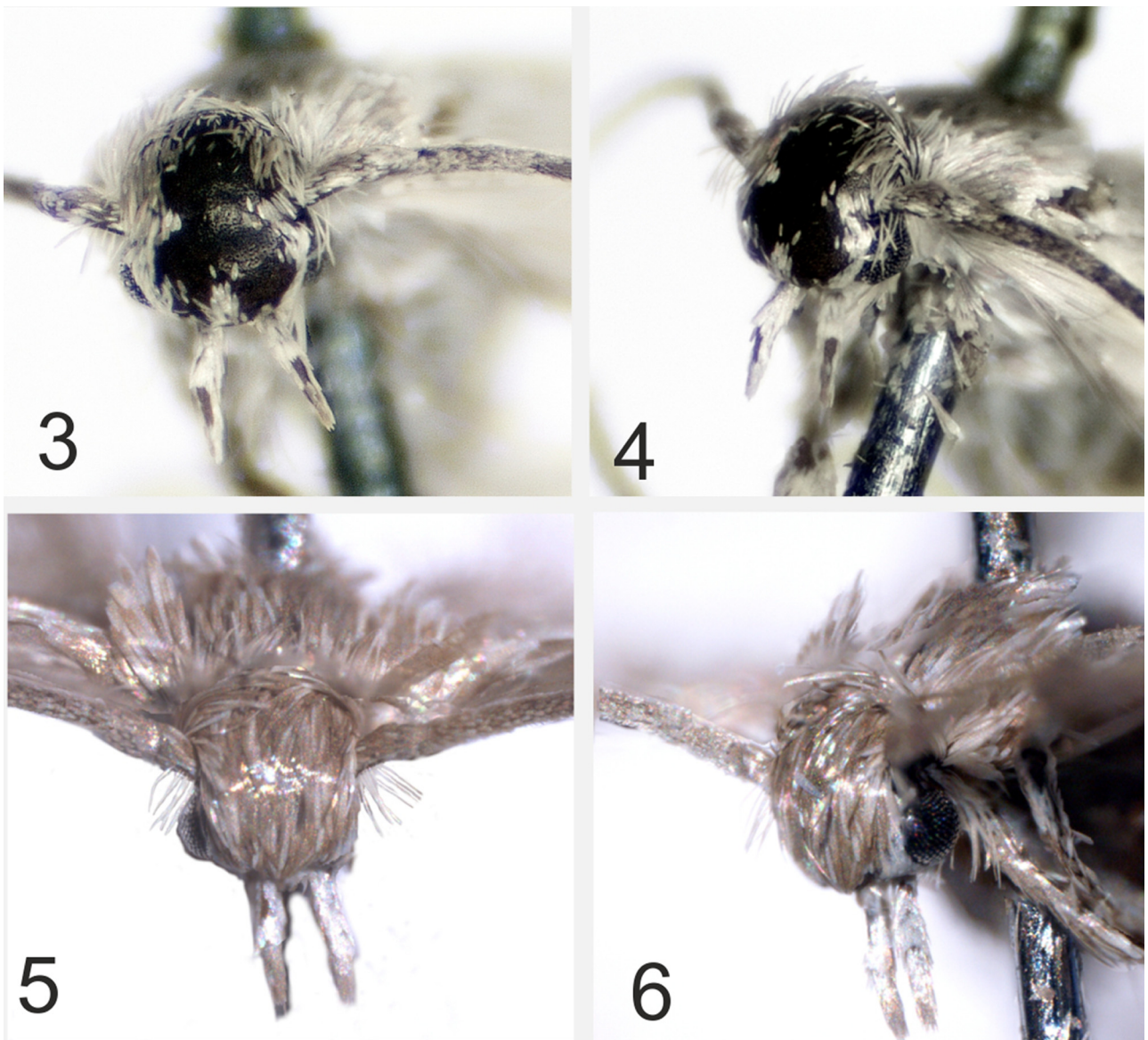


PLATE 2. Head of *Elachista* spp. Fig. 3: *E. puplesisi*, frontal view; Fig. 4: *E. puplesisi*, lateral view; Fig. 5: *E. helia*, frontal view; Fig. 6: *E. helia*, lateral view.

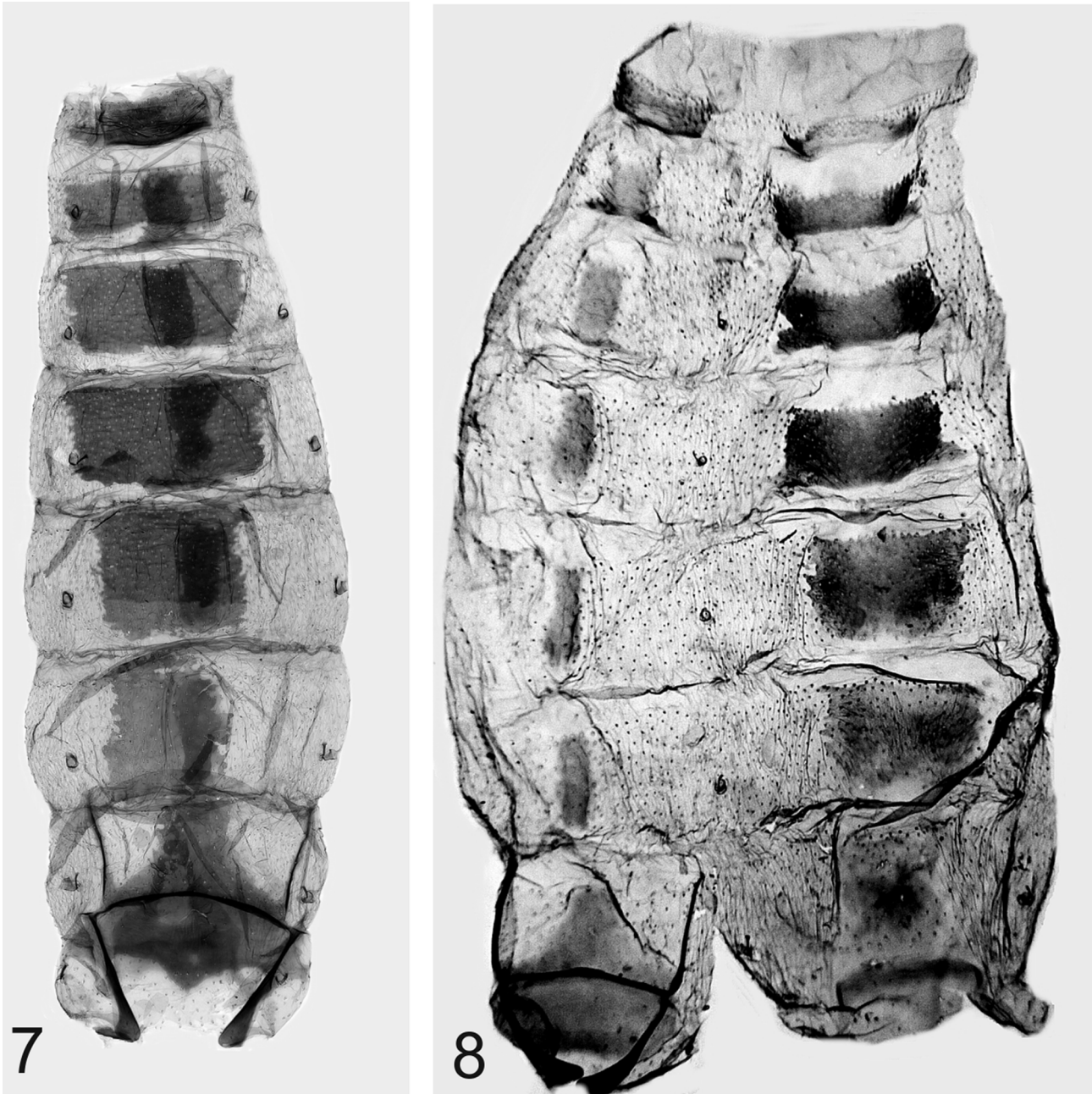


PLATE 3. Pregenital abdomen of *Elachista* spp. Fig. 7: *E. puplesisi*, Fig. 8: *E. helia* (L. Kaila prep. 5754).

### Description of the *E. puplesisi* group

*Head.* Smooth-scaled, neck tuft weakly raised. Labial palpus shorter than diameter of head, porrect; third segment as long as second segment. Scape of antenna with pecten consisting of a row of elongate, stiff, hair-like scales; flagellum without visible ciliation.

*Wing venation.* Forewing: four costally directed R-veins; cell closed; chorda absent; medial stem distally present; two M- and two CuA- veins present, directed to termen; CuP present as fold that is distally visible as a vein. Hindwing: Rs apparently with two branches, one directed to apex and another towards dorsal margin: Rs and M<sub>1</sub> stalked; cell open; M<sub>2</sub> absent; two Cu veins present. Homology of venation is, however, uncertain, and vein identity here follows the convention used in *Elachista* (cf. Traugott-Olsen & Nielsen 1977).

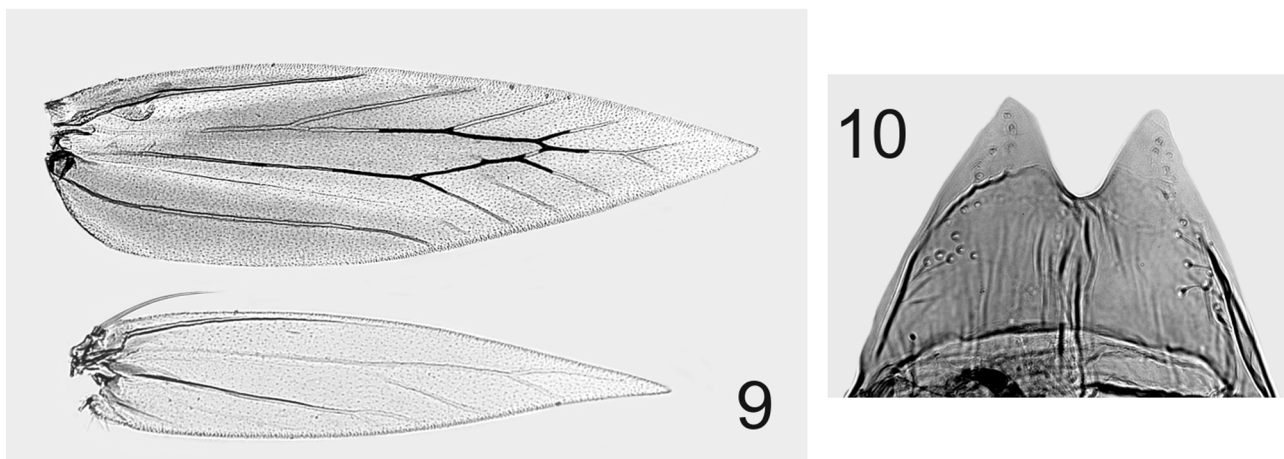
*Skeletal structures of thorax.* Not studied.

*Pregenital abdomen.* Anterolateral process of sternum 2 present; rods of sternum 2 absent; lateral ridges of

tergum 2 separate, running parallel to each other; sternal and tergal sclerites distinctly sclerotised; tergum 7 and 8 with anterior margin distinctly reinforced.

**Male genitalia.** Uncus lobes distolaterally with row or undifferentiated area of setae arising from flat pinacula. Basal arms of gnathos erect, separate from each other; spinose knob of gnathos entirely fused to form a single knob. Transtilla formed of medially projected hook-like appendages of valval costa. Valva with weakly developed process on ventral surface; basal fold of costa vestigial, distal fold long, distally fading. Narrow, longitudinal membranous window without dorsal sclerotisation along costa. Cucullus rounded, indistinctly delimited. Digitate process absent. Median plate of juxta without lateral or posterior extensions. Juxta lobes laterally produced, distal margin with row of stout setae arising from erect pinacula. Caecum of phallus small or absent. Phallus without cornuti.

**Female genitalia.** Unknown.



**PLATE 4.** Anatomic structures of *Elachista* spp. Fig. 9: wing venation of *E. puplesisi*; Fig. 10: uncus of *E. helia* sp. nov. (E. Traugott-Olsen prep. 6596).

***Elachista helia* sp. nov.**

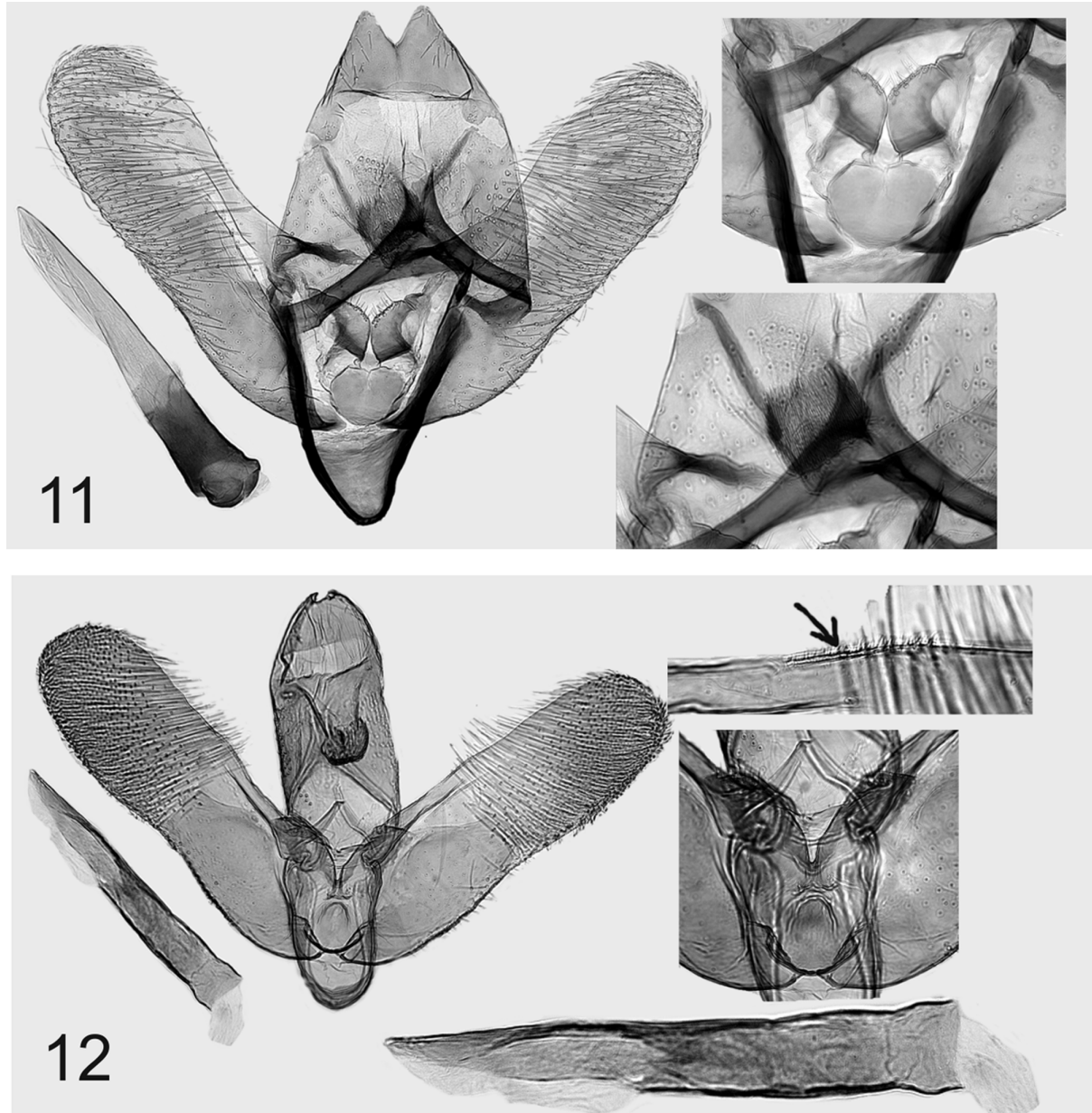
Figs 2, 5, 6, 8, 10, 12

**Type material.** Holotype ♂: Greece, Rhodos, Koskinou 16.IV.1986 J. Klimesch leg., L. Kaila prep. 5754 (ZSM). Paratypes: (5 ♂) Greece, Rhodos, Faliraki, 15.IV.1985 1 ♂, 16.IV.1985 1 ♂, L. Kaila prep. 5825, 18.IV.1985 1 ♂, E. Traugott-Olsen prep. 6596, 23.-26.IV.1987 3 ♂, all. J. Klimesch leg. (ZSM, 1 ♂ in MZH, 1 ♂ in Coll. Traugott-Olsen, now in ZMUC).

**Diagnosis.** *Elachista helia* is a fairly small and broad-winged species of *Elachista* (Fig. 2). The broad wings, stout body shape, and relatively short and porrect labial palpi give it an appearance reminiscent more of *Perittia* than *Elachista*, perhaps most similar to *P. ravidata* Kaila, 2009 and *P. minitaurella* Kaila, 2009. However, the male genitalia readily place the species into the genus *Elachista* (see above). Within *Elachista* this species cannot be mixed with any other known species. The forewing is mottled grey with a faint, pale line along fold. The short and broad valva, combined with pointed, triangular uncus lobes and the lack of the digitate process will confirm its identity (Figs 10, 12). The only similar species, *E. puplesisi* Sruoga, is white with a faint yellowish hue. Their genitalia differ by the broader and shorter valva and the larger uncus of *E. puplesisi* as compared to that of *E. helia* (cf. Figs 11, 12). *E. helia* has no caecum in the phallus, so the basal opening is posteriorly directed; the phallus of *E. puplesisi* has a caecum, and the basal opening is dorsolaterally oriented. It should be noted that the shape of the uncus lobes will look different in different genital slides depending on the amount of pressure applied during the spreading process of slide preparation. In the dissection of the holotype only a slight pressure was applied. If the genitalia are squeezed more strongly, the shape of the uncus appears similar to that of *E. puplesisi* (cf. Fig. 10), yet it is smaller.

**Description.** Forewing length 3–3.5 mm. Labial palpus porrect, length half the diameter of head; second and third segment of equal length; second segment leaden grey above, palpi otherwise fuscous brownish grey. Head

smooth-scaled, scales long and narrow, shiny brown, with single pale grey scales. Neck tuft leaden grey. Antenna thick, dark grey, flagellum with faint paler annulation in basal third. Legs leaden grey. Forewing shape broad, lanceolate; ground colour consisting of basally pale and distally grey scales forming a mottled appearance; along fold pale grey, indistinctly delineated longitudinal streak that extends to 2/3 wing length; fringe grey. Underside grey, fringe basally narrowly creamy white, distally grey. Both upper and underside of hindwing grey with concolorous fringe.



**PLATE 5.** Male genitalia of *Elachista* spp. Fig. 11: *E. puplesisi* holotype. Left: general view of genitalia, phallus severed, at same scale. Right top: juxta. Right bottom: gnathos. Fig. 12: *E. helia* holotype, general view of genitalia, phallus severed, at same scale. Right top: middle part of valval costa showing the row of minute spines. Right middle: juxta. Right bottom: phallus, enlarged.

*Male genitalia.* Uncus lobes small, rounded, distolaterally with row or undifferentiated area of setae arising from flat pinacula. Basal arms of gnathos erect, separate from each other; spinose knob of gnathos rounded. Transtilla formed of medially projected hook-like appendages of valval costa. Valva 1.5 times as long as tegumen + uncus, 3.5 times as broad as wide, parallel-sided; valval process weakly developed; basal fold of costa vestigial, distal fold long, distally fading; narrow, longitudinal membranous window without dorsal sclerotisation along costa; costa with row of minute spines along 1/3 length of costa; cucullus rounded, indistinctly delimited. Digitate

process absent. Median plate of juxta rounded, without lateral or posterior extensions, medially somewhat convex to ventral direction. Juxta lobes laterally produced, near distal margin row of stout setae arising from erect pinacula. Phallus 0.8 times as long as valva, parallel-sided at basal half; distal opening extended to half the length of phallus; apex pointed; without cornuti; caecum absent.

**Female genitalia.** Unknown.

**Life history.** Unknown.

**Distribution.** Greece, Rhodos.

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## References

- De Prins, J. & Sruoga, V. (2012) A review of the taxonomic history and biodiversity of the genus *Urodeta* (Lepidoptera: Elachistidae: Elachistinae), with description of new species. *Zootaxa*, 3488, 41–62.
- Heikkilä, M., Mutanen, M., Kekkonen, M. & Kaila, L. (2014) Morphology reinforces proposed molecular phylogenetic affinities: a revised classification for Gelechioidea (Lepidoptera). *Cladistics*. [e-publication ahead of print] <http://dx.doi.org/10.1111/cla.12064>
- Herrich-Schäffer, G.A.W. (1847–1855) *Systematische Bearbeitung der Schmetterlinge von Europa* 5, Regensburg, 399 pp., 124 pls.
- Kaila, L. (1999) Phylogeny and classification of the Elachistidae s.s. (Lepidoptera: Gelechioidea). *Systematic Entomology*, 24, 139–169. <http://dx.doi.org/10.1046/j.1365-3113.1999.00069.x>
- Kaila, L. (2004) Phylogeny of the superfamily Gelechioidea (Lepidoptera: Ditrysia): and exemplar approach. *Cladistics*, 20, 303–340. <http://dx.doi.org/10.1111/j.1096-0031.2004.00027.x>
- Kaila, L. (2005) A review of *Dibrachia* Sinev & Sruoga, 1992, a subgenus of *Elachista* (Elachistidae: Elachistinae). *Nota lepidopterologica*, 28, 139–155.
- Kaila, L. (2009) Notes on the genus *Perittia* of the West Palearctic region with descriptions of three new species (Lepidoptera: Elachistidae). *Zootaxa*, 2230, 16–28.
- Kaila, L. (2011) *Elachistine moths of Australia (Lepidoptera: Gelechioidea: Elachistidae)*. *Monographs on Australian Lepidoptera*, 11. CSIRO Publishing, Melbourne, x + 443 pp.
- Kaila, L., Mutanen, M. & Nyman, T. (2011) Phylogeny of the mega-diverse Gelechioidea (Lepidoptera): adaptations and determinants of success. *Molecular Phylogenetics and Evolution*, 61, 801–809. <http://dx.doi.org/10.1016/j.ympev.2011.08.016>
- Kaila, L., Nupponen, K., Junnilainen, J., Nupponen, T., Kaitila, J.-P. & Olschwang, V. (2003) Contribution to the fauna of Elachistidae (Lepidoptera) of the Southern Ural Mountains. *Entomologica Fennica*, 14, 65–90.
- Kaila, L. & Sugisima, K. (2011) 1. Phylogeny, subfamily definition and generic classification. In: Kaila, L. (Ed.), *Elachistine moths of Australia (Lepidoptera: Gelechioidea: Elachistidae)*. *Monographs on Australian Lepidoptera*. Vol 11. CSIRO Publishing, Melbourne, pp. 7–22.
- Nielsen, E.S. & Traugott-Olsen, E. (1978) A reassessment of the genus *Stephensia* Stainton, 1858 (Lepidoptera: Elachistidae). *Entomologist's Gazette*, 32, 245–250.
- Sinev, S.Yu. (1992) Two new genera of Elachistid moths (Lepidoptera, Elachistidae) from the USSR Far East. *Zoologicheskii Zhurnal*, 71 (1), 153–157.
- Sinev, S.Yu. (1998) New species and subspecies of the little-known genus *Hemiprosopa* (Lepidoptera, Elachistidae) from Asian Russia. *Zoologicheskii Zhurnal*, 77 (12), 1425–1428.
- Sinev, S.Yu. & Sruoga, V.A. (1992) A new genus of Elachistid moths (Lepidoptera, Elachistidae) in the Palearctic fauna. *Zoologicheskii Zhurnal*, 71 (7), 153–155.
- Sruoga, V. (2000) Three new species of *Elachista* Treitschke (Lepidoptera: Elachistidae) from Central Asia. *Acta Zoologica Lihuanica*, 10 (2), 54–61. <http://dx.doi.org/10.1080/13921657.2000.10512326>
- Sruoga, V. & De Prins, J. (2009) The Elachistinae (Lepidoptera: Elachistidae) of Kenya with descriptions of eight new species. *Zootaxa*, 2172, 1–31.
- Sruoga, V.A. & Puplesis, R.K. (1992) New species of gramineal Elachistid moths (Lepidoptera, Elachistidae) from Middle Asia and Kazakhstan. *Entomologicheskoe Obozrenie*, 71 (2), 428–441.
- Traugott-Olsen, E. & Nielsen, E.S. (1977) *The Elachistidae (Lepidoptera) of Fennoscandia and Denmark*. *Fauna Entomologica Scandinavica* 6. Klampenborg, Denmark, 299 pp.