

***Catapterix tianshanica* sp. n. – the second species of the genus from the Palaearctic Region (Lepidoptera, Acanthopteroctetidae)**

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Abstract. Based on a single adult male collected in Central Asia (Kyrgyzstan) the new species *Catapterix tianshanica* sp. n. is described and illustrated. The new species differs from related species by details of the male genitalia, especially by the reduction of the medial process of the transtilla and by the structure of the uncus. It is the second species of the genus and family found in the Palaearctic Region so far. The record significantly expands the distribution of *Catapterix* from Europe to Asia.

Introduction

In the 1980s the Russian lepidopterists A. K. Zagulaev and S. Y. Sinev collected an unusual micro moth on the Crimean peninsula. The species could not be assigned readily to any of the known families in Europe. As a result of a detailed study of the adult morphology (head, abdomen, wing venation, male genitalia) the collectors were convinced of having discovered a representative of a hitherto unknown evolutionary lineage within the homoneuran Glossata. It was described as *Catapterix crimaeva* spec. nov. and gen. nov. and assigned to the simultaneously established family Catapterigidae (Zagulaev and Sinev 1988). The new family was placed in the then suborder Dacnonypha (outdated term for non-aglossatan, non-neolepidopteran families) and diagnosed as sister-group of Acanthopteroctetidae, a small family of five species in one genus restricted to western North America at that time (Davis 1978, 1984).

The concept of Catapterigidae did not gain much acceptance. Nye and Fletcher (1991: p.xiv) included the family in Acanthopteroctetidae (without providing a formal synonymization however) and this view was followed by most subsequent authors (Nielsen and Kristensen 1996; Kristensen 1998; Kristensen et al. 2007; Kristensen et al. 2013).

The morphological differences between the two families involve head morphology, wing venation, wing coupling and abdominal sternites – strong characters which are usually of significant weight in other lepidopteran taxa, but in light of the shared, unique genital morphology of the males, these characters appear to be homoplasious and of less importance, and thus, are of little value for separating the two families. In this evolutionary lineage even the presence or absence of a frenulum or jugum is obviously of low phylogenetic significance in comparison with other superfamilies. In addition to the male genitalia the corresponding peculiar vestiture of the antennal

segments also point to a close relationship of *Catapterix* Zagulajev & Sinev, 1988 with *Acanthopteroctetes* Braun, 1921. The two genera make up the family Acanthopteroctetidae Davis, 1978, with Catapterigidae as its junior synonym (following Nye and Fletcher 1991).

Acanthopteroctetes was long thought to be an endemic genus in western North America. Recent discoveries in South America (Kristensen et al. 2013) and South Africa (Mey 2011) demonstrated that the genus and family have a much larger distribution on the globe, which is in agreement with the antiquity of the group that is certainly of Mesozoic age (Grimaldi and Engel 2005).

Since 2002 Oleksiy Bidzilia from the Zoological Museum in Kiev has been a regular visitor to the Lepidoptera/Trichoptera collection of the Museum für Naturkunde in Berlin. He has always brought and donated Trichoptera material, which he and the second author collected during field trips in Asia. Among a number of pinned microcaddisflies from Kyrgyzstan, a single, tiny micromoth was found, which in its un-spread state indeed resembled a caddisfly from the family Hydroptilidae. Since the individual did not have eye-caps or other external characters that provided a family identification, the abdomen was removed and the genitalia examined. The specimen turned out to be a second species of the hitherto monotypic genus *Catapterix*. The surprising finding was immediately communicated to lepidopterists, who have since been collecting in Central Asia in the hope of obtaining further material of this interesting, primitive micromoth species. This hope has remained unsatisfied, and after six years of waiting we have decided to publish the description of the species at this time.

Taxonomy

Catapterix tianshanica sp. n.

<http://zoobank.org/20BDD944-51DA-49A4-8578-4F8C6F0D45FE>

Material. Holotype ♂, labeled: “Kyrgyzstan/ Tian-Shan/ prov. Dzhalaal-Abad/ distr.:Kotshkor-Ata/ prope pag. Toskool/ fauc. Alash-Saj/alt. 1100M, 16–17.v.2003/E. Rutjan leg. Lum.[at light]”. Genitalia slide Mey 34/16, Museum für Naturkunde Berlin.

Description. Adult (Fig. 1). Head (Figs 2, 3): Frons, vertex and occipital area fuscous; vestiture consisting of bundles of erect, grey, hairlike scales on frons, vertex and occipital margin; vertex convex and extended dorsad, becoming flat toward the eyes; head capsule around compound eyes with grey, appressed scales; interocular index 0.6 (vertical eye diameter/interocular distance); ocelli absent. Antennae with 29 intact flagellomeres (apical ones broken off); scape covered by grey-brown scales; proximal part of pedicellus and flagellomeres with complete ring of 12–14 elongate, piliform scales, as long as antennal segment and notched at apex; cilia absent. Maxillary and labial palpi rough-scaled. Proboscis pale brown. **Thorax:** Pronotum with erect, hairlike scales; tegulae small; mesothorax with lamellar, grey-brown scales; metascutellum with few scales. Venter pale grey. Legs light fuscous to grey; epiphysis absent; spur formula 0.1.4.; tibial segments with pairs of apical, short spines. Length of forewing 3 mm; wingspan 7 mm; wings very slender with acute tips; forewings light brown, with bronzy iridescence, but without spots or fascia; some darker scales randomly scattered over apical half; fringe grey. Hindwings paler than forewings, less iridescent, uniformly grey-brown; a long frenular bristle present at costal base; jugum on both wings absent. Venation as in *Catapterix crimaeva*. **Abdomen:** Uniformly grey-brown; third

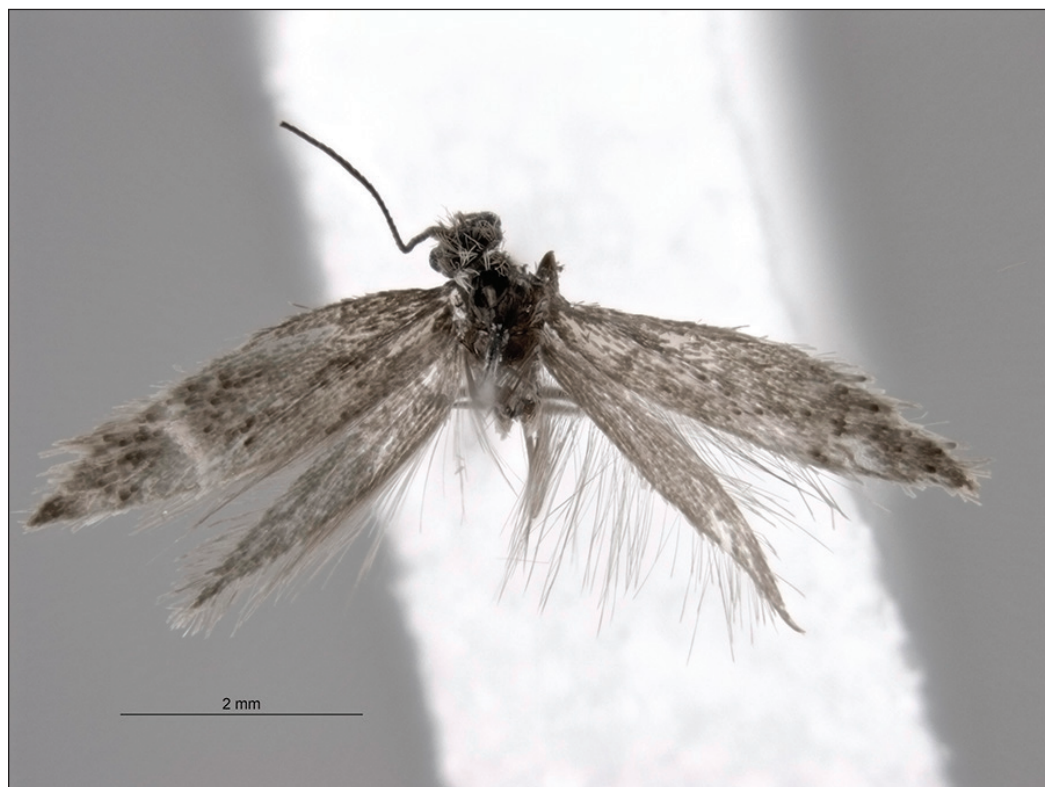
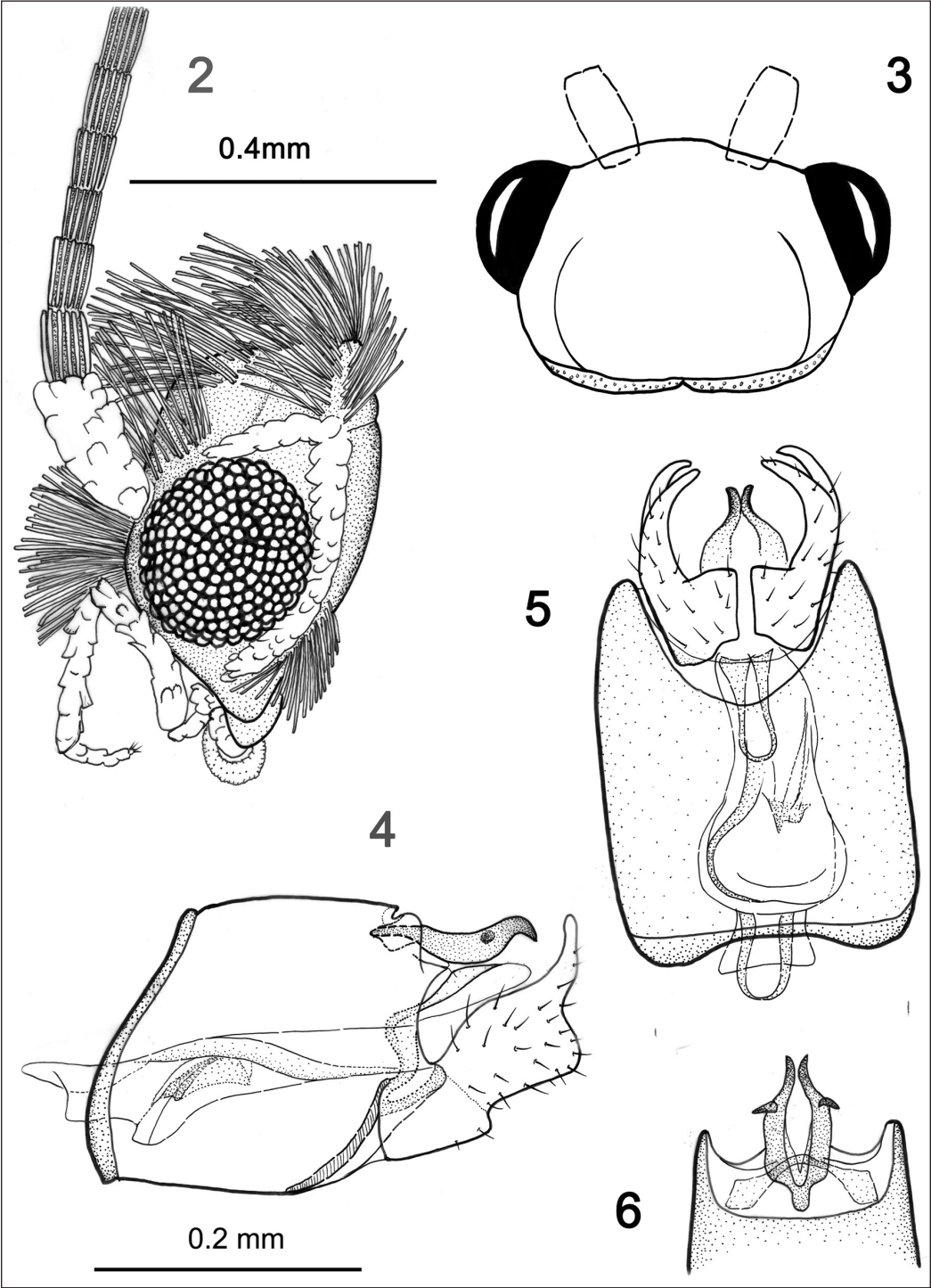


Figure 1. *Catapterix tianshanica* sp. n., holotype in dorsal view.

segment without filamentous sensilla. **Male genitalia** (Figs 4–6): Segment IX clearly longer than valvae, forming a well-sclerotized, ringlike structure, not dissociated into vinculum and tegumen, but with a separated, dark ribbon on proximal margin; on ventral side proximal margin slightly excavated. Uncus in horizontal position, deeply bilobed, with ventrad curved, acute apices and one small, triangular process on each lateral side. Gnathos absent. Transtilla nearly membranous; medial process indistinct, without teeth or serrations on ventral side. Juxta incorporated into segment IX and situated in proximal position before bases of valvae, elongate, plate-like, with sclerotized margin and rounded base. Valva with somewhat rectangular base, but without sclerotized basal apophysis; broad sacculus present, bent mediad; costal margin sinuslike, terminating in a digitate process, curved dorso-mediad. Phallus tubular, as long as the entire genitalia apparatus, connected with juxta at distal opening; interior walls with folds and indistinct sclerotizations; cornuti apparently absent. **Female:** unknown.

Diagnosis. The external characters and the male genitalia of this new species are similar to *C. crimaee*. There are, however, some remarkable differences. The head capsule of the latter species is evenly rounded on the dorsal side from eyes to top of vertex, whereas in *C. tianshanica* sp. n. the head capsule around the eyes is somewhat protruded laterally to form a flattened area on the dorsal and frontal sides next to the eyes. This area is covered by appressed, lamellar scales, which are absent in *C. crimaee* and replaced by the usual hairlike scales of the head. The male genitalia



Figures 2–6. *Catapterix tianshanica* sp. n. 2. lateral view of head; 3. dorsal view of head capsule without vestiture; male genitalia: 4. lateral, 5. dorsal, 6. ventral.

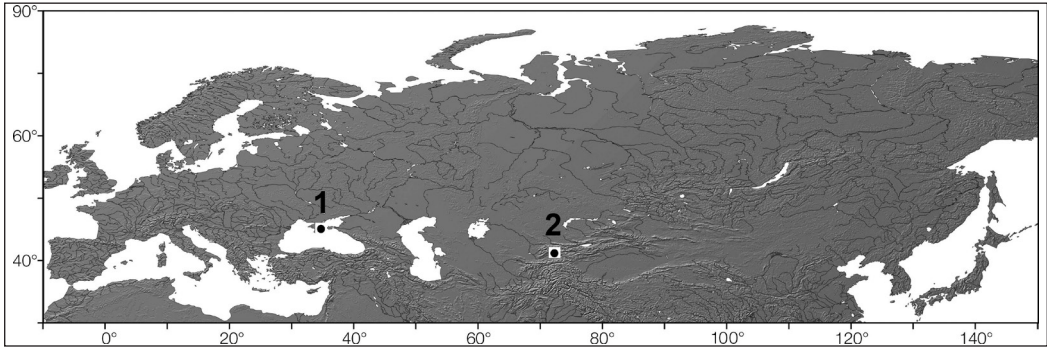


Figure 7. Distribution of *Catapterix* in the Palearctic Region. 1. *C. crimaeva* Zaguljaev & Sinev; 2. *C. tianshanica* sp. n.

of both species exhibit a bifid valva with apex of costal margin and sacculus as elongate processes, curved mediad. This form of valva is diagnostic to *Catapterix*. The valva of *Acanthopteroctetes* is slender, with slightly expanded sacculus. The medial, sclerotized process of the transtilla is a prominent feature of both genera. In *C. tianshanica* sp. n., however, this process is reduced and nearly membranous. Another autapomorphic character of the latter species is the enlarged uncus with subapical, triangular processes or spines on the dorsolateral sides.

Zaguljaev and Sinev (1988) listed a number of differences between the genera. Some of them are not visible in the single individual of *C. tianshanica* sp. n., and are therefore omitted in the following key.

The two genera of Acanthopteroctetidae can be separated as follows:

- | | | |
|---|--|---------------------------|
| 1 | Forewing uniformly coloured, or with fascia or fuscous and yellow spots; interocular index 0.75–0.8; medial process of transtilla serrate on ventral margin and tip upcurved; valva simple | <i>Acanthopteroctetes</i> |
| – | Forewing uniformly coloured; interocular index 0.6; medial process of transtilla without serration and tip straight or down-curved; valva bifid | <i>Catapterix</i> |

Biology. The hostplant of *Catapterix* is unknown. The larva of the North American *Acanthopteroctetes unifascia* Davis, 1975 is a leafminer of *Ceanothus* (Rhamnaceae). Another species was found to be a miner in leaves of *Ribes* (Grossulariaceae) (Regier et al. 2015, Eiseman 2016). In the western Tianshan Mts. several species of *Ziziphus* and *Rhamnus* (Rhamnaceae) are known to occur (Eisenman et al. 2013), which are potential hostplants of the new species

Biogeography. Due to the arid climate Middle Asia is an impoverished refuge of Tertiary forests, which survived only in favorable places in the mountain chains of the Tianshan. This concerns especially the deciduous trees, which are present in large numbers (Breckle and Agachanjanz 1998). The occurrence of *C. tianshanica* as an ancestral species fits quite well into this area of refuge.

The distance between the known localities of the two *Catapterix* species is about 3000 km (Fig.7). In between of these areas the Caucasus, the Elburz, and the Kopeth Dagh are situated, each representing mountain systems that contain relict species of plants and animals. The Microlepidoptera faunas of all three mountain systems are poorly explored, and thus there is a high probability that further representatives of *Catapterix* could be found there in the future.

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References

- Breckle SW, Agachanjanz O (1998) Ökologie der Erde. Band 3 Spezielle Ökologie der gemäßigten und arktischen Zonen Euro-Nordasiens. 2. Auflage, G. Fischer Verlag, Stuttgart-Jena, 726 pp.
- Davis DD (1978) A revision of the North American moths of the superfamily Eriocranioidea with the proposal of a new family Acanthopteroctetidae (Lepidoptera). *Smithsonian Contributions to Zoology* 251: 131 pp.
- Davis DD (1984) A new *Acanthopteroctetes* from the northwestern United States (Acanthopteroctetidae). *Journal of the Lepidopterists' Society* 38(1): 47–50.
- Eiseman C (2016) Notes on the larval hosts and habits of some North American Eriocraniidae and Acanthopteroctetidae. *Journal of the Lepidopterists' Society* 70(1) 79–81. doi: 10.18473/lepi.70i1.a11
- Eisenman SW, Zurov DE, Struwe L (Eds) (2013) *Medical plants of Central Asia: Uzbekistan and Kyrgyzstan*. Springer Verlag, Heidelberg.
- Grimaldi D, Engel MS (2005) *Evolution of the insects*. Cambridge University Press, 755 pp.
- Kristensen NP (1998) The non-glossatan moths. In: Kristensen NP (Ed.) *Lepidoptera, Moths and Butterflies*, vol. 1 *Evolution, Systematics, and Biogeography*. *Handbuch der Zoologie*, Bd. IV, Teilband 35: 41–49. doi: 10.1515/9783110804744.41
- Kristensen NP, Scoble MJ, Karsholt O (2007) *Lepidoptera phylogeny and systematics: the state of inventorying moth and butterfly diversity*. *Zootaxa* 1668: 699–747.
- Kristensen NP, Rota J, Fischer S (2013) Notable plesiomorphies and notable specializations: Head structure of the primitive "tongue moth" *Acanthopteroctetes unifascia* (Lepidoptera: Acanthopteroctetidae). *Journal of Morphology* 275(2): 153–172. doi: 10.1002/jmor.20205
- Kristensen NP, Hilton DJ, Kallies A, Milla L, Rota J, Wahlberg N, Wilcox SA, Glatz RV, Young DA, Cocking G, Edwards T, Gibbs GW, Halsey M (2014) A new extant family of primitive moths from Kangaroo Island, Australia, and its significance for understanding early Lepidoptera evolution. *Systematic Entomology* 40: 5–16. doi: 10.1111/syen.12115
- Mey W (2011) Basic pattern of Lepidoptera diversity in southwestern Africa. *Esperiana Memoir* 6, 320 pp.
- Nielsen ES, Kristensen NP (1996) The Australian moth family Lophocoronidae and the basal phylogeny of the Lepidoptera-Glossata. *Invertebrate Taxonomy* 10: 1199–1303. doi: 10.1071/IT9961199
- Nye IWB, Fletcher DS (1991) *The Generic Names of Moths of the World*, vol 6, Microlepidoptera. *Natural History Museums Publications*, London.
- Regier JC, Mitter C, Kristensen NP, Davis DR, van Nieukerken E, Rota J, Simonsen T, Mitter KT, Kawahara AY, Yen SH, Cummings MP, Zwick A (2015) A molecular phylogeny for the oldest (nonditrysian) lineages of extant Lepidoptera, with implications for classification, comparative morphology and life-history evolution. *Systematic Entomology*. doi: 10.1111/syen.12129
- Zagulajev AK, Sinev SY (1988) *Catapterigidae* fam.n. – a new family of lower Lepidoptera (Lepidoptera, Dacnonypha). *Entomologiceskoye Obozrenie* 67(3): 593–601.