

# Faunistic and taxonomic notes on the Central Asian species of *Stenelmis* DUFOUR, 1835 (Coleoptera: Elmidae)

M.A. JÄCH, M. BROJER, B. BRUVO MAĐARIĆ, S.V. LITOVKIN,  
A.V. KOVALEV, A.A. PROKIN & A.S. SAZHNEV

## Abstract

The Central Asian taxa of *Stenelmis* DUFOUR, 1835 (Coleoptera: Elmidae) are reviewed faunistically and taxonomically. *Stenelmis aria* JANSSENS, 1961 **syn.n.** is synonymized with *S. fursovi* ZAITZEV, 1951, and *S. nematodes* JANSSENS, 1959 **syn.n.** is synonymized with *S. peropaca* REITTER, 1907 **stat.rev.**, which is elevated to species rank due to the distinctive structure of the elytral surface. A lectotype is designated for *S. subtilis* ZAITZEV, 1951. New confirmed country records: *S. subtilis* (Kazakhstan, Uzbekistan); *S. koreana* SATÔ, 1978 (China, Xinjiang, based on a sequence stored in BOLD). The true positions of the type localities of two species, which had been erroneously mislocated in the original descriptions, are clarified: *S. fursovi* (corrected from Tajikistan to Uzbekistan) and *S. subtilis* (corrected from Kazakhstan to Kyrgyzstan). Morphological characters, the allopatric distribution, as well as sequences of the standard DNA-barcoding COI gene region corroborate the specific distinctness of *S. puberula* REITTER, 1887 and *S. subtilis*. Habitus photographs of *S. fursovi*, *S. peropaca* and *S. subtilis* (including that of a living specimen), and illustrations of the ventrite VI, the aedeagus and the ovipositor of *S. fursovi* and the aedeagus of *S. subtilis* are provided for the first time. All known localities of the species of *Stenelmis* in Central Asia are shown on a map.

**Key words:** Coleoptera, Elmidae, *Stenelmis*, taxonomy, lectotype designation, new synonymies, distribution, new country records, Central Asia, DNA-barcoding.

## Introduction

According to JÄCH et al. (2016) and LITOVKIN et al. (2019), the following eight taxa of *Stenelmis* DUFOUR, 1835 have been recorded from Central Asia (incl. Afghanistan): *S. aria* JANSSENS, 1961, *S. consobrina consobrina* DUFOUR, 1835, *S. consobrina peropaca* REITTER, 1907, *S. fursovi* ZAITZEV, 1951, *S. koreana* SATÔ, 1978, *S. nematodes* JANSSENS, 1959, *S. puberula* REITTER, 1887, and *S. subtilis* ZAITZEV, 1951. Most of these taxa have never been thoroughly revised taxonomically, and four of them (*S. aria*, *S. fursovi*, *S. nematodes*, *S. subtilis*) were known only from their type localities, and they have never been treated in any taxonomic publication since their original descriptions.

After studying type material (of all taxa described from Central Asia), as well as a large number of historical and newly collected specimens, and after successfully sequencing fresh material from Uzbekistan, we are now able to provide new taxonomic and faunistic data on these interesting species of running water beetles. In this paper, we designate a lectotype, propose two new synonymies and raise one subspecies to species level.

## Material and methods

A total of 117 specimens (including type material) of *Stenelmis* from Central Asia, deposited in the collections listed below, was examined.

DNA extraction, amplification and sequencing of the standard COI barcoding region (HEBERT et al. 2003) were performed as described in JÄCH et al. (2023). Specimens sequenced during the

present study are deposited in the NMW; details about the vouchers are listed in the public BOLD dataset DS-NMWSTECA. Newly obtained sequences were deposited in the BOLD and GenBank databases (acc. nrs. PQ351963–PQ351973). The available public COI sequences of the conspecific *Stenelmis* specimens, as well as two outgroups (*Elmis* spp.), were withdrawn from BOLD and used in subsequent analyses. Multiple sequence alignment, phylogenetic and species-delimitation analyses were performed as described in JÄCH et al (2023).

#### Abbreviations:

CLS	Coll. S.V. Litovkin, Samara, Russia
NMW	Naturhistorisches Museum Wien, Vienna, Austria
ZISP	Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia
ZMMU	Zoological Museum, M.V. Lomonosov Moscow State University, Moscow, Russia
ZMUC	Zoological Museum, University of Copenhagen, Denmark
ZMUL	Zoologiska Museet, Lund, Sweden

The label data of type specimens and some historical specimens are quoted verbatim; a backslash (\) indicates a line break.

## Results

### Updated checklist of the Central Asian species of *Stenelmis* DUFOUR, 1835

*Stenelmis consobrina* DUFOUR, 1835

*Stenelmis fursovi* ZAITZEV, 1951

*Stenelmis aria* JANSSENS, 1961 **syn.n.**

*Stenelmis koreana* SATÔ, 1978

*Stenelmis peropaca* REITTER, 1907 **stat.rev.**

*Stenelmis nematodes* JANSSENS, 1959 **syn.n.**

*Stenelmis puberula* REITTER, 1887

*Stenelmis subtilis* ZAITZEV, 1951

### *Stenelmis consobrina* DUFOUR, 1835

*Stenelmis consobrina* DUFOUR 1835: 161.

#### MATERIAL EXAMINED (from Central Asia):

T U R K M E N I S T A N : 2 ♂♂, 2 ♀♀ (ZISP): Western Kopet Dag, Sumbar River [right tributary of Etrek (= Atrek) River], 1894, leg. O. Hertz, det. M.A. Jäch 1986; 10 exs. (ZISP), 3 exs. (ZMMU): Western Kopet Dag, Aydere [ca. 38.400°N 56.748°E], V.1986, leg. A.L. Lobanov, specimens deposited in ZISP det. by M.A. Jäch 1986.

IDENTIFICATION: Habitus as in Figs. 1–2. In *Stenelmis consobrina* the lateral margin of the pronotum is quite distinctly constricted in the anterior third, and the male middle and hind tibiae are not denticulate. This species is very similar and most closely related to *S. peropaca* (see below). Line drawings of the aedeagus were published by BERTHÉLEMY (1979: figs. 24–28).

DISTRIBUTION: *Stenelmis consobrina* is a rare but widely distributed species occurring from NW Africa and France eastwards to the Caucasus Region, Iran and SW Turkmenistan (Fig. 17), and southwards to Israel.

### *Stenelmis fursovi* ZAITZEV, 1951

*Stenelmis fursovi* ZAITZEV 1951: 73.

*Stenelmis aria* JANSSENS 1961: 5 **syn.n.**

**TYPE LOCALITY:** Southern Uzbekistan, Surxondaryo Region, Khurvatan, western Hissar Mountain Range, Tupalang River Valley. The type locality has been erroneously attributed to Tajikistan in the original description.

**TYPE MATERIAL:** **Holotype** ♀, by monotypy (ZISP) (Fig. 6): “Гиссар. хр. [Гиссарский хребет] \ д. р. [долина реки] Тупаланга \ киш. [кишлак] Хурватан \ 15. VIII.47” [Hissar Mt. Range, Tupalang (= Tupalangdarya) river valley, village of Khurvatan, 15.VIII.1947], “*Stenelmis* \ hurvatana \ m[ihi]. sp.n.” [in the original description, ZAITZEV (1951) attributed his new species to “*St. hurvatana* Fursov. i. litt.”]. The specimen has been collected by N.I. Fursov.

**SYNONYMY:** *Stenelmis aria* was described after a single female from Ishkashim (Badakhshan Province, northeastern Afghanistan). JANSSENS (1961) had obviously not been aware of the description of *S. fursovi* as he did not mention the latter at all.

Examination of the holotype revealed that the specimen very well agrees in all general morphological aspects with the holotype of *S. fursovi*. We therefore regard *S. aria* as a subjective junior synonym of *S. fursovi*. Photographs of the holotype and its labels are available at: <https://www.flickr.com/photos/tags/mzlutype00944>.

#### ADDITIONAL MATERIAL EXAMINED:

U Z B E K I S T A N: 1 ♂, 1 ♀ (ZMMU): Hissar Mt. Range, Khurvatan Village, 15.VIII.1947, [leg.] N. Fursov [in Cyrillic], *Stenelmis hurvatana* Furs. N. Fursov det. The label data of these two specimens agree very well with the label data of the holotype, and they were most probably collected together with the latter. However, they cannot be regarded as syntypes, because the original description of *Stenelmis fursovi* was explicitly based on one specimen.

**IDENTIFICATION:** Habitus as in Figs. 5–6. In *Stenelmis fursovi* the lateral margin of the pronotum is not distinctly constricted in the anterior third. This species is very well recognized by the wide, well demarcated, oval median pronotal fovea, and by the hind tibia being sinuously curved in both sexes (Fig. 7).

The middle and hind tibiae of the male are provided with distinct denticles on the inner margin (Fig. 5). The last abdominal sternite (Fig. 8) is widely truncate in both sexes.

The aedeagus (Fig. 9) differs significantly from the other five Central Asian species of *Stenelmis*. The median lobe is medially strongly widened but apically distinctly acuminate; the fibula is rather short and confined to the central part of the median lobe; the corona is situated at the distal 0.4; the parameres are distinctly shorter than the median lobe and apically acuminate in ventral and lateral view.

The ovipositor is depicted in Fig. 10.

**DISTRIBUTION** (Fig. 17): This species is regarded as endemic to Central Asia. It is so far known only from the two type localities in Afghanistan and Uzbekistan. Both localities are very close to the border of Tajikistan, and therefore this species most probably occurs in this country as well.

### *Stenelmis koreana* SATÔ, 1978

*Stenelmis koreana* SATÔ 1978: 147 (incorrect original spelling: “*koreamus*”).

#### MATERIAL EXAMINED (from Central Asia):

K Y R G Y Z S T A N: JALAL-ABAD REGION: 1 ♂, 2 ♀♀ (CLS): 5 km E Shekaftar, S Karyn-Kur, 41°13'28.2"N 71°23'25.4"E, 990 m a.s.l., foothill desert, at light, 26.–27.VI.2017, leg. S.V. Litovkin; 2 ♂♂, 4 ♀♀ (CLS), 2 ♀♀ (NMW): 5 km W Tash-Kumyr (or Tashkômür), 41°20'7.8"N 72°7'6.6"E, 775 m a.s.l., foothills, dry riverbed, at light, 16.–17.VII.2017, leg. S.V. Litovkin.

IDENTIFICATION: *Stenelmis koreana* can be easily distinguished from the other five Central Asian species of *Stenelmis* by the dust-like elytral plastron, by the distinct tooth on the male middle tibia and by the aedeagus (see LITOVKIN et al. 2019: figs. 1, 3).

DISTRIBUTION: This species was only recently recorded from Central Asia (Fig. 17) for the first time (see LITOVKIN et al. 2019). It is very wide-spread from Kyrgyzstan, Russia (Siberia, Far East) to the Korean Peninsula (type locality). *Stenelmis koreana* is here recorded for the first time from China (Xinjiang), based on a sequence deposited in BOLD (XJDQD298-18). It must also occur in Kazakhstan, because the sequenced specimen from Xinjiang (48.1517°N 85.5667°E) was collected from a stream that forms the border between Kazakhstan and China.

### *Stenelmis peropaca* REITTER, 1907 stat.rev.

*Stenelmis peropaca* REITTER 1907: 483.

*Stenelmis consobrina* ssp. *peropaca*: BERTHÉLEMY 1979: 15.

*Stenelmis nematodes* JANSSENS 1959: 6 **syn.n.**

TYPE LOCALITY: REITTER (1907) described *Stenelmis peropaca* from two localities: 1) “Thian-Schan: Naryn-Kol.” [probably referring to Narynkol (42°43'26"N 80°10'22"E), Almaty Region, southeastern Kazakhstan]; 2) “Afghanistan: Kuschke. (F. Hauser)” [obviously referring to the Kushk River or Kushk District, Herat Province, northwestern Afghanistan]. No holotype has been designated, and the number of syntypes has not been recorded. According to ICZN (1999: Art. 76.1), the type locality of *S. peropaca* encompasses both of the localities listed in the original description.

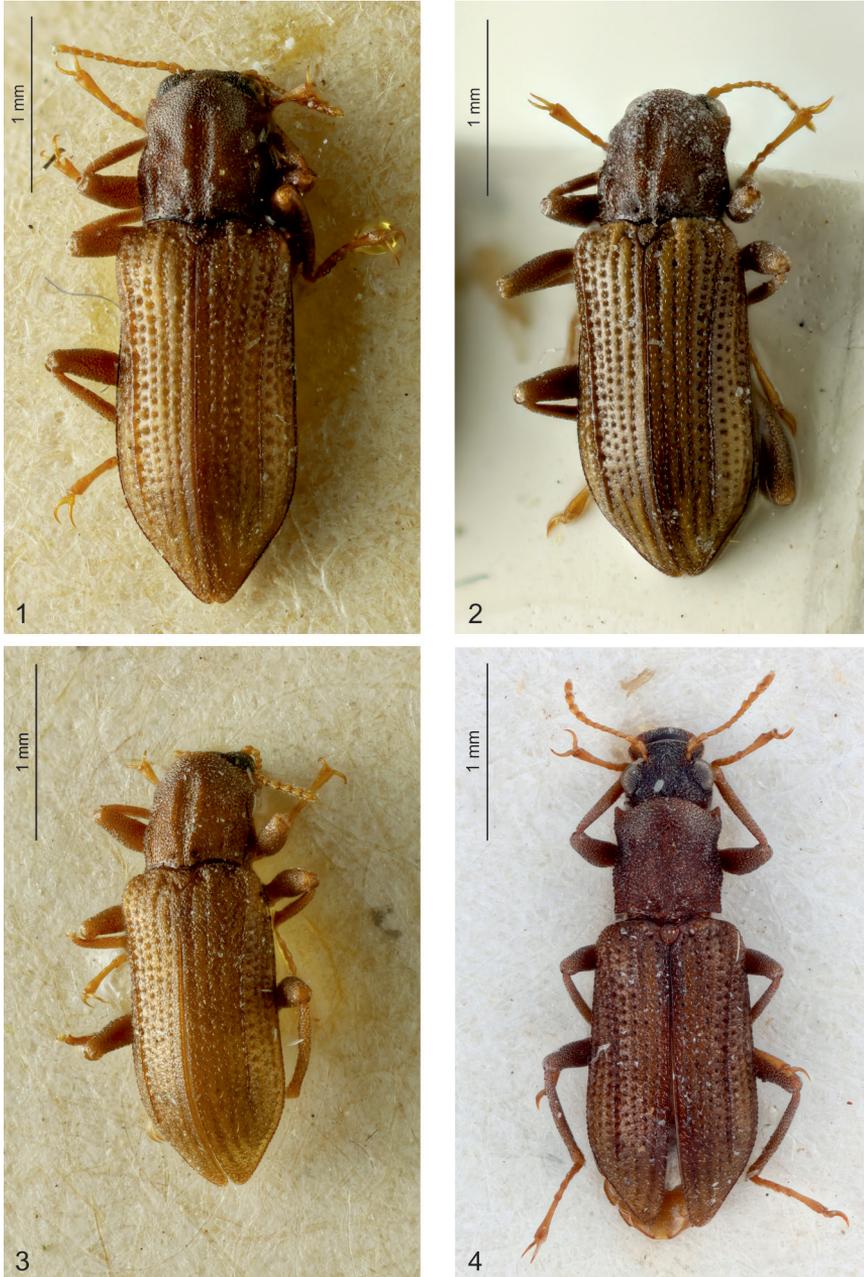
TYPE MATERIAL: BOLLOW (1941: 55) designated a lectotype by using the term “Typus” based on a specimen from Afghanistan (“Kuschke, 1896, leg. Hauser”) deposited in the “Coll. Leonhard im Deutschen Entomologischen Institut, Berlin-Dahlem” [now: Senckenberg Deutsches Entomologisches Institut, Berlin, Germany]. However, according to ICZN (1999: Art. 74.1), “a lectotype may be designated from syntypes”, but BOLLOW (1941) provided no evidence that the specimen designated is really part of the syntype series that has been examined by REITTER (1907). Furthermore, according to ICZN (1999: Art. 74.5 “Lectotype designations before 2000”), the “designation” by BOLLOW (1941: 55) cannot be regarded as valid, because “when the original work [REITTER 1907] reveals that the taxon had been based on more than one specimen, a subsequent use of the term “holotype” [or “type”] does not constitute a valid lectotype designation unless the author, when wrongly using that term, explicitly indicated that he or she was selecting from the type series that particular specimen to serve as the name-bearing type”.

Specimens of *Stenelmis peropaca* collected by Friedrich Hauser (1853–1932) in Afghanistan (Kushk) are deposited in several European museums (incl. the NMW); there is, however, no evidence that all these specimens can be regarded as syntypes. Eligible specimens for a lectotype designation are most probably found in the Hungarian Natural History Museum (Budapest, Hungary).

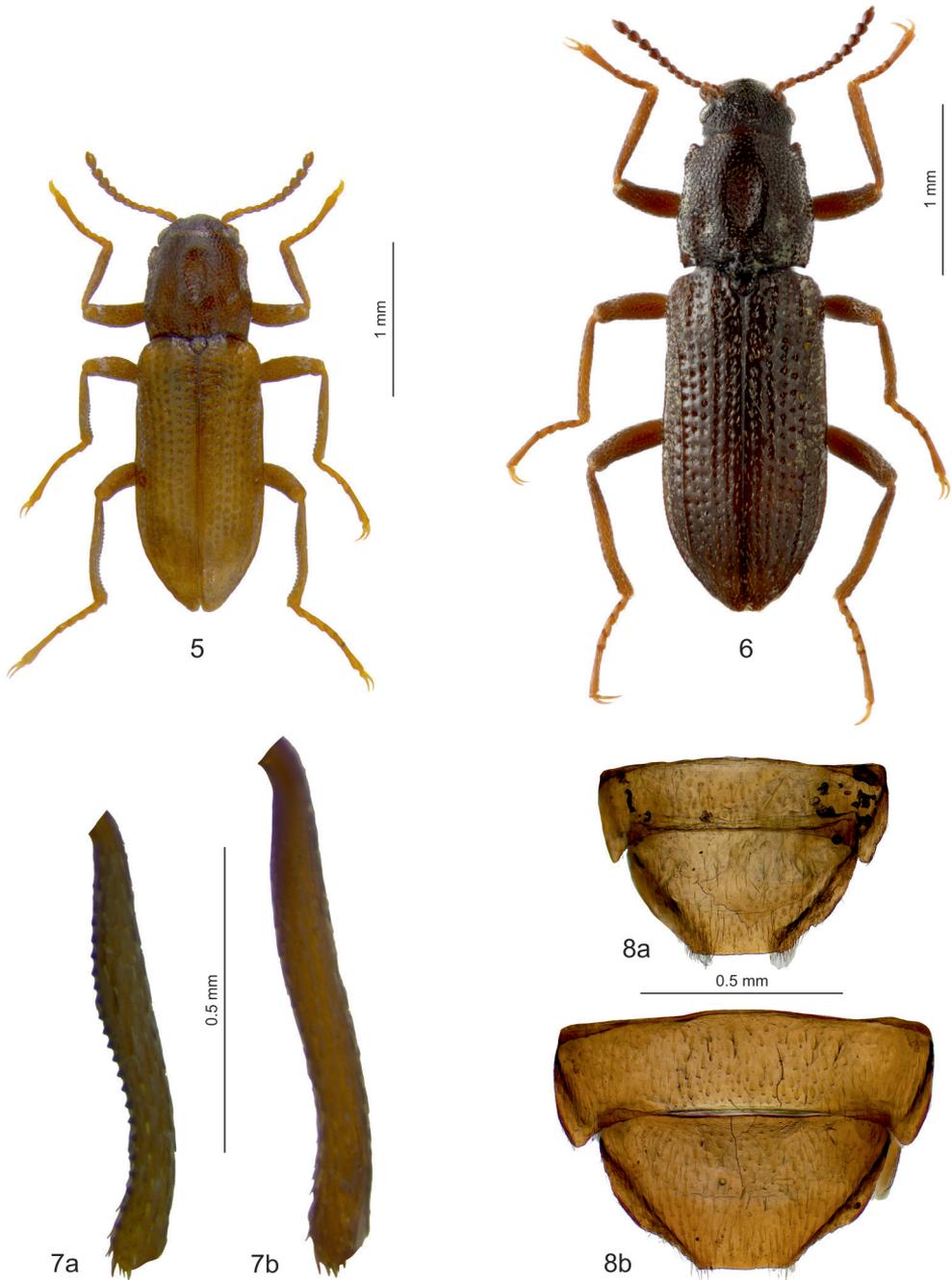
SYNONYMY: *Stenelmis nematodes* was described after a single female from “Tchachméh Cher” [= ? Cheshmeh-ye Shir, 36°43'N 68°35'21"E, north of Puli Khumrī (or Pol-e Khomri), Baghlan Province] in northern Afghanistan.

TYPE MATERIAL: **Holotype** ♀, by monotypy (ZMUL) (Fig. 4): “Afghanistan \ Knut Lindberg” [printed], “Tchachméh Cher \ 10-x-1957. Etang \ formé par la source.” [handwritten], plus label referring to micropreparate of the ovipositor (n°2511584), plus red type label: “TYPE” [framed], plus identification label of E. Janssens and two inventory labels. Photographs of the labels of the holotype are available at: <https://www.flickr.com/photos/tags/mzlotype00943>.

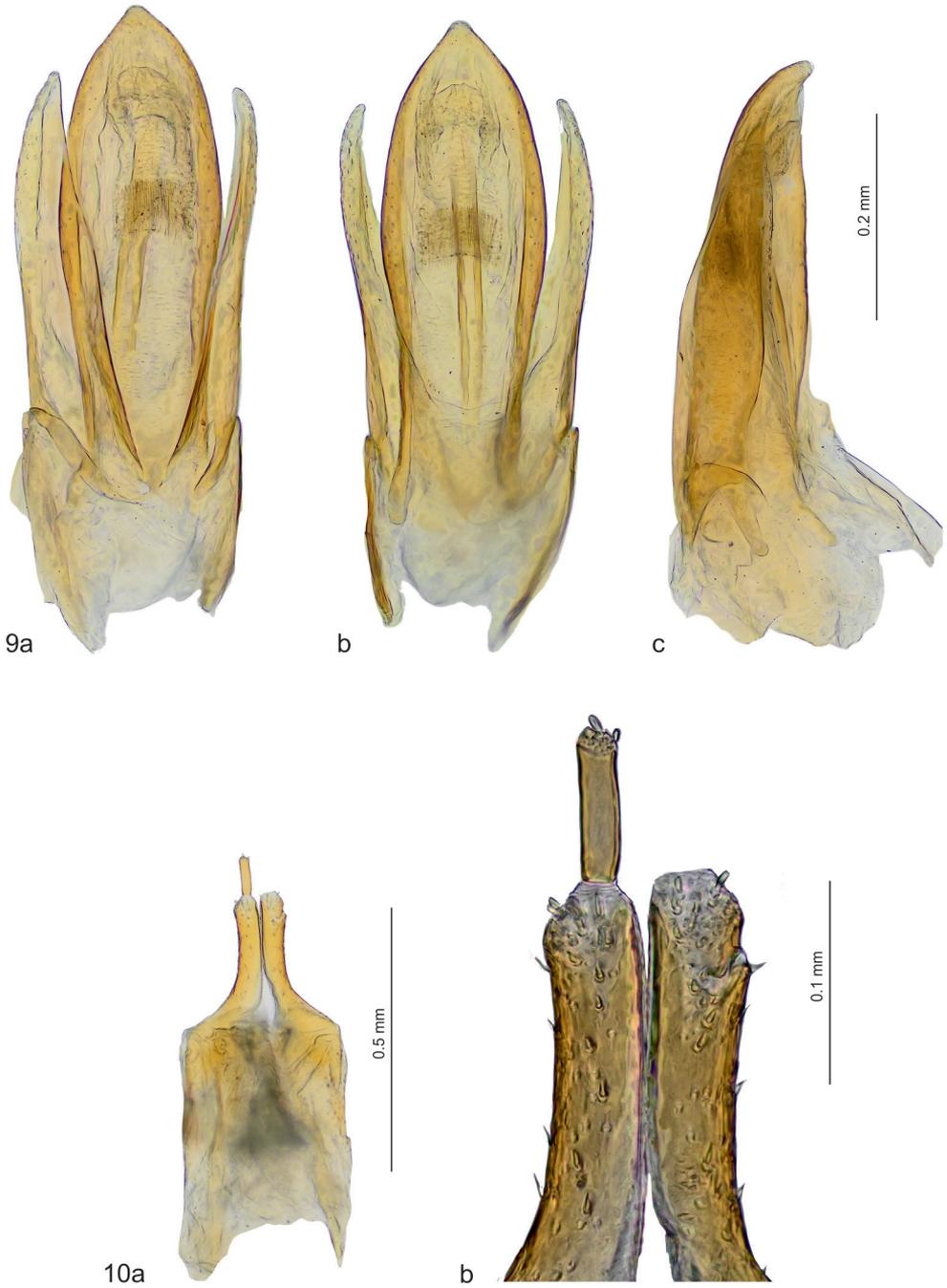
Examination of the holotype revealed that the specimen very well agrees in all general morphological characters, including the presence of numerous tiny granules on the elytra, with the specimens of *S. peropaca* from one of the type localities (Afghanistan, “Kuschke Coll.Hauser 1896”) deposited in the NMW. There is no doubt, that *S. nematodes* is a junior synonym of *S. peropaca*.



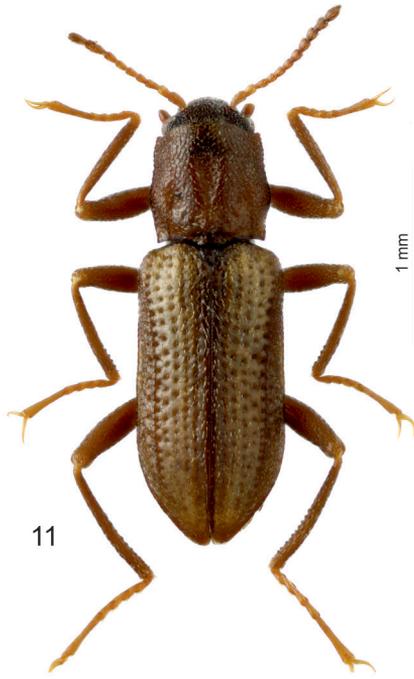
Figs. 1–4: Habitus of 1–2) *Stenelmis consobrina* from Turkmenistan, western Kopet Dag: 1) Sumbar River (ZISP), 2) Aydere (ZISP); 3–4) *S. peropaca* from 3) Turkmenistan, Repetek (ZISP), 4) Afghanistan (holotype of *S. nematodes*, ZMUL). Photos: A.V. Kovalev (1–3), C. Fägerström (4).



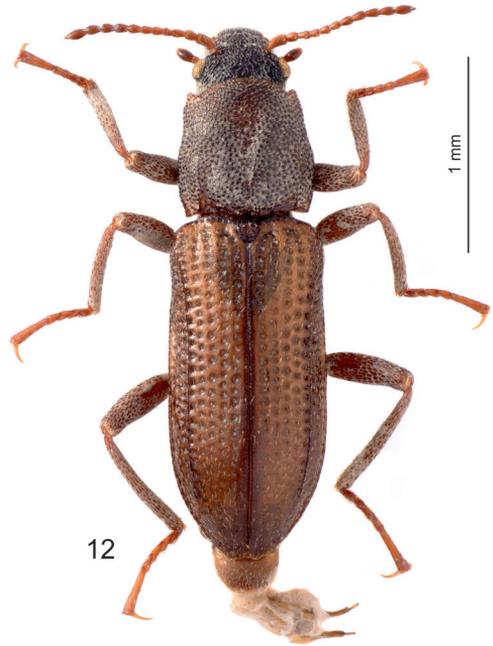
Figs. 5–8: *Stenelmis fursovi*: 5) habitus, male (Uzbekistan, type locality, ZMMU), 6) holotype, female (Uzbekistan, type locality, ZISP), 7) metatibia of a) male, b) female, 8) ventrites V–VI, ventral view, a) male, b) female. Photos: A.S. Sazhnev (5, 7–8), A.V. Kovalev (6).



Figs. 9–10: *Stenelmis fursovi*, genitalia: 9) aedeagus in a) ventral, b) dorsal, and c) lateral view, 10) ovipositor, a) total view, b) apical part, enlarged. Photos: A.S. Sazhnev (9–10).



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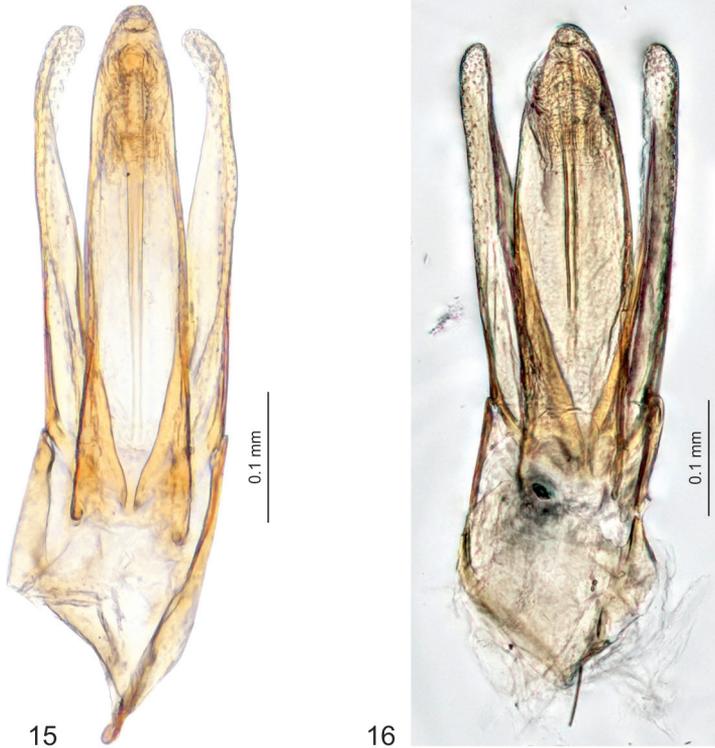


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Figs. 11–14: Habitus of 11–13) *Stenelmis subtilis*: 11) lectotype, male (Kyrgyzstan, ZISP), 12) female (Kazakhstan, Karatau Mts., CLS), 13) male (Uzbekistan, Kugitang Mts., NMW); 14) *S. puberula*: male (Georgia, Bagdati, NMW). Photos: A.V. Kovalev (11), S.V. Litovkin (12), M. Brojer (13–14).



Figs. 15–16: *Stenelmis subtilis*, aedeagus, ventral view: 15) Kazakhstan, Karatau Mts. (CLS), 16) Uzbekistan, Kugitang Mts. (NMW). Photos: S.V. Litovkin (15), M. Brojer (16).

The ovipositor of the holotype is stored separately on a microscopic slide. It should be mentioned that the ovipositor has been crushed by Janssens under a coverglass, and its shape is therefore somewhat deformed.

In the original description, JANSSENS (1959) did not mention *Stenelmis peropaca* at all and had obviously overlooked this taxon, which has been originally described from Afghanistan and Kazakhstan (see above) half a century before. This is even more remarkable since *S. peropaca* has been treated in a comprehensive revision of the Palearctic species of *Stenelmis* by BOLLOW (1941). In fact, JANSSENS (1959) compared his new species only (!) with *Stenelmis trachys* JANSSENS, 1959, which actually is a member of the genus *Heterlimnius* HINTON, 1935 (!) and is therefore not at all related to the genus *Stenelmis*. In total, three of the four elmid species described by JANSSENS (1959) are currently regarded as junior synonyms.

#### ADDITIONAL MATERIAL EXAMINED:

A F G H A N I S T A N : 5 exs. (NMW): “AFGHANISTAN \ Kuschke [Kushk] \ coll.Hauser 1896.”

T U R K M E N I S T A N : 4 exs. (NMW): Tejen; 13 exs. (NMW): Merw [two of the specimens have been erroneously labelled as “*Stenelmis puberulus* [sic] Rt. [Reitter] Type.”]; 2 exs. (NMW), 1 ♂ (ZISP): Repetek.

IDENTIFICATION: Habitus as in Figs. 3–4. *Stenelmis peropaca* has been originally described as a valid species. BERTHÉLEMY (1979) changed its status to a subspecies of *S. consobrina*. All specimens of *S. peropaca* differ from *S. consobrina* in the elytral interstices being densely covered by tiny granules, providing them with a rough, rasp-like appearance, while in the latter the elytra are glabrous or more or less strongly wrinkled; in some specimens of *S. consobrina* a

few tiny granules are found on the scutellum and the anterior part of the elytra, especially near the shoulders, but they never cover the entire elytra. The elytral punctures of *S. peropaca* are smaller and less strongly impressed than in *S. consobrina*. The aedeagi of both species were illustrated by BERTHÉLEMY (1979: figs. 24–29).

On average, specimens of *S. peropaca* are smaller than those of *S. consobrina*. However, the body size in most elmid species is very variable and seems to depend on water temperature. Therefore, the body length in these two species overlaps and cannot be used as a significant distinguishing character; in the NMW the smallest specimen of *S. consobrina* (Dead Sea Area, Israel) measures 2.43 mm (pronotum + elytra), the largest specimen (Viterbo, Italy) is 3.13 mm long. The specimens of *S. peropaca* in the NMW are between 2.30 mm (Merw, Turkmenistan) and 2.99 mm (type locality, Afghanistan) long.

The curvature of the tibiae was mentioned by REITTER (1907), BOLLOW (1941) and BERTHÉLEMY (1979) as a good distinguishing character. But in our opinion, the curvature of the tibiae is too variable and taxonomically not significant.

Based on the constant differences in the structure of the elytra and based on the obviously allopatric distribution (see also *S. puberula/subtilis*), we assume that *S. peropaca* actually represents a valid species rather than a subspecies of *S. consobrina*.

Although we have sequenced several specimens of *S. consobrina*, we do not have any molecular data or any fresh material of *S. peropaca* and therefore cannot confirm the taxonomic status of *S. peropaca* based on molecular data. We hope that sooner or later sequencable specimens from Central Asia will become available for a final clarification of the status of *S. peropaca*.

DISTRIBUTION (Fig. 17): *Stenelmis peropaca* is regarded as endemic to Central Asia. It is currently confirmed for eastern Turkmenistan, Afghanistan and Kazakhstan (the occurrence in Kazakhstan has been verified by BERTHÉLEMY 1979: 15).

*Stenelmis peropaca* was recorded from Kyrgyzstan by KIREJTSHUK (2001: 800), but we do not know any confirmed detailed records, although the occurrence in this country is most probable. We are also not aware of any confirmed records from Uzbekistan and Tajikistan, although this species most certainly occurs there as well. The records from China (Xinjiang) by WU (1933, 1937) and HUA (2002) could not be confirmed by us, but it can be assumed that this taxon actually does exist in Xinjiang as well (Narynkol lies only 4 km west of the Chinese border).

TEMRESHEV & ESENBKOVA (2013: 135) listed *Stenelmis consobrina peropaca* from three localities in southern Kazakhstan (Turkistan and Jambyl regions); however, these records may actually also refer to *S. subtilis*, which has been recently confirmed to occur in this area.

### *Stenelmis puberula* REITTER, 1887

*Stenelmis puberula* REITTER 1887: 259.

*Stenelmis apfelbeki* KUWERT 1890: 52.

*Stenelmis damascena* REITTER 1907: 484.

TYPE LOCALITY: Georgia, Kvemo Kartli Region, Manglisi (see BERTHÉLEMY 1979: 16).

IDENTIFICATION: Habitus as in Fig. 14. In *Stenelmis puberula* the lateral margin of the pronotum is not distinctly constricted in the anterior third, and the male middle and hind tibiae are denticulate at the mesal margin. The aedeagus was illustrated by BERTHÉLEMY (1979: figs. 30–33). This species is very similar and most closely related to *S. subtilis* (see below).

It should be noted that *S. puberula* is very rare in the western part of its distribution, where it is so far known only from Bosnia and Herzegovina (type locality of *S. apfelbeki* KUWERT, 1890), easternmost Slovakia, the westernmost tip of the Ukraine, and northern Bulgaria. The specimens

from these four countries usually differ from typical Asian/Caucasian specimens of *S. puberula* in the paler (brownish) elytra, the small and shallow pronotal median groove, and by the margins of this groove being less bulky and always regularly granulate.

DNA-sequencing of the COI barcoding region revealed two subclades, one with samples from Asia (Georgia, Turkey) and the other one with samples from Central Europe (Slovakia), with ca. 1% p-distance.

**DISTRIBUTION:** *Stenelmis puberula* is distributed from Slovakia and Bosnia and Herzegovina eastwards to the Caucasus Region, Iran and (possibly) SW Turkmenistan, and southwards to Israel.

STAROSTIN (1992: 199) recorded *Stenelmis puberula* from the Atrek River (forming the border between Iran and southwestern Turkmenistan), and ZAITZEV (1951: 71) recorded the same species from Lake Maloye Delili (1 ex.) (Balkan Region, southwestern Turkmenistan). Both localities are lying in the southwestern corner of Turkmenistan, very close resp. at the border to Iran. These are obviously the easternmost records of *S. puberula*. We were not able to locate these specimens in ZISP or ZMMU, but we assume that they belong to *S. puberula* rather than to *S. subtilis* because of the proximity of these localities to Mazandaran Province (northern Iran), where *S. puberula* was collected near Baladeh (2 exs. in NMW: 36°12'15"N 51°50'40.5"E, 1.VI.2008, leg. Nasserzadeh, Serri & Pütz).

The record from Afghanistan by HUA (2002: 98) might refer to *Stenelmis peropaca*, *S. fursovi*, or *S. subtilis* rather than to *S. puberula*. The record from Xinjiang (WU 1933, 1937, HUA 2002) is obviously based on a mistake.

### *Stenelmis subtilis* ZAITZEV 1951

*Stenelmis subtilis* ZAITZEV 1951: 72.

**TYPE LOCALITY:** There has been some confusion concerning the type locality of *Stenelmis subtilis*, which had been attributed to Kazakhstan in the original description. But according to our knowledge, the type locality (Kenkol River) lies actually in Kyrgyzstan (Talas Region), very close to the Kazakh border.

In fact, the Kenkol River (coordinates at its mouth: 42°30'51.5"N 72°21'55.8"E) is a right tributary of the Talas River. In the vicinity there is a famous archaeological site, the "Kenkol burial ground".

**TYPE MATERIAL:** **Lectotype** ♂ (ZISP) (Fig. 11), by present designation: "p.[ека] Кенкол, прит.[ок] \ Таласа. Туркм.[енистан] \ Л. Бианки. 16.VII.[19]30" [Kenkol River, tributary of Talas River, Turkmenistan, L. Bianchi, 16.VII.1930]. **Paralectotypes:** 1 ♂, 5 ♀♀ (ZISP): same label data as lectotype.

#### ADDITIONAL MATERIAL EXAMINED:

**K A Z A K H S T A N:** TURKISTAN REGION [formerly South Kazakhstan Region]: 2 ♀♀ (CLS): Karatau Mts., NE Turlan, ca. 740 m a.s.l., 43.53544°N 68.91669°E, 31.V.2017, leg. S.V. Litovkin; 2 ♂♂, 26 ♀♀ (CLS: 1 ♂, 25 ♀♀, NMW: 1 ♂, 1 ♀): same area, further upstream, ca. 4 km NE Turlan, ca. 840–845 m a.s.l., 43.55799°N 68.93885°E → 43.55852°N 68.94078°E, 12.VI.2015, 5.VI.2023, leg. S.V. Litovkin (Fig. 18); 4 ♀♀ (CLS): Karatau Mts., N slope, 7 km SW Abay, ca. 890 m a.s.l., 43.77653°N 68.81671°E, 15–16.V.2015, leg. S.V. Litovkin (Fig. 20).

**K Y R G Y Z S T A N:** BATKEN REGION: 1 ex. (ZMMU): Madygen Area, ca. 40.0572°N 70.2393°E, 25.IX.1961, leg. A. Попомаренко. JALAL-ABAD REGION: 1 ♀ (ZISP): "Кетмень-Тюбе \ Наманг. у. [Наманганского уезда] \ Бианки 8.VIII 930" [Ketmen'-Tyube \ Namangan Uezd [former administrative unit] \ leg. L.V. Bianchi 8.VIII.1930], "Stenelmis \ puberula Reitter \ det. M.A. Jäch [XII.1986]" – "Ketmen'-Tyube" may refer to Ketmen-Töbö, administratively part of the city of Kara-Köl (41°37'52"N 72°40'53"E) SW of the Toktogul Reservoir, or it may refer to the Ketmen'-Tyube Valley flooded by the nearby Toktogul Reservoir, created in the 1970s; 2 exs. (ZMMU): West Tien Shan, Baubash-Ata Ridge, vicinity of Arslanbob, 6.V.1996, leg. A. Petrov.



Fig. 17: Distribution of the species of *Stenelmis* in Central Asia. Sequenced material marked with asterisk. Unconfirmed localities of *S. puberula* from Turkmenistan are based on STAROSTIN (1992) and ZAITZEV (1951).

UZBEKISTAN: TASHKENT REGION: 1 ♀ (ZISP): “Приток пр. теч. р. [правого течения реки] Угам \ близ Хумсана \ 31 VIII 1954. Сибирцева” [right tributary of Ugam [= Ugom, Ugham] River \ near Khumsan [= Humson, Humsan] [ca. 41.67°N 69.95°E] \ 31.VIII.1954, leg. [L.K.] Sibirtseva]; “*Stenelmis* \ *puberula* Reitter \ det. M.A. Jäch [XII.1986]”; NAVOIY REGION: 1 ♀ [sequenced] (NMW): Nuratau Mts., SSW of Sintob, 40.54724°N 66.61279°E, 1570 m a.s.l., 15.V.2023, leg. A.K. Hansen, L. Geisler & A. Solodovnikov (NHMD-UZ06a) (Fig. 21); SURXONDARYO REGION: 1 ♂, 3 ♀♀ [1 ♀ sequenced] (NMW), 2 ♀♀ (ZMUC): Kugitang Mts., 37.85749°N 66.62454°E, 1750 m a.s.l., 30.V.2023, leg. A.K. Hansen & A. Solodovnikov (NHMD-UZ19c).

IDENTIFICATION: Habitus as in Figs. 11–13, 19. *Stenelmis subtilis* is very similar and most closely related to *S. puberula*. It is on average smaller and slimmer than the latter, but some overlap can be encountered. The length (pronotum + elytra) of *S. puberula* varies from 2.41 mm (Pazarić, Bosnia and Herzegovina) to 3.10 mm (Rize, Turkey), and the elytral index (length/width) varies from 1.94 (Ordu, Turkey) to 2.17 (Ukraine), based on about 80 specimens from numerous localities deposited in the NMW. The Uzbek specimens of *S. subtilis* are 2.49–2.69 mm long (elytral index: 2.01–2.21).

The elytra are on average paler; they are usually yellowish or brown between the first stria and the sublateral carina, while they are usually entirely dark brown or black in the Asian/Caucasian specimens of *S. puberula*.



Figs. 18–19: Habitat (18) and living specimen (19) of *Stenelmis subtilis*: Karatau Mts., NE Turlan, ca. 740 m a.s.l., Turkistan Region, Kazakhstan. Photo: S.V. Litovkin.



Fig. 20: Habitat of *Stenelmis subtilis*: Karatau Mts., N slope, 7 km SW Abay, ca. 890 m a.s.l., Turkistan Region, Kazakhstan. Photo: S.V. Litovkin.



Fig. 21: Habitat of *Stenelmis subtilis*: Nuratau Mts., 1,570 m a.s.l., Navoiy Region, Uzbekistan. Photo: A. Solodovnikov.

The margins of the median pronotal fovea are usually less bulky, and the middle of the pronotum is usually more evenly granulate than in the Asian/Caucasian specimens of *S. puberula*.

As in *S. puberula*, the last sternite of the male is slightly pushed in at the apex. In only male available from Uzbekistan, this part is distinctly wider than in the males from Kazakhstan.

So far, we found no significant differences in the aedeagi of these two species, probably because of the limited number of males of *S. subtilis* available; remarkably, there are 38 females but only five males of *S. subtilis* known so far. The aedeagi of two specimens from Kazakhstan and Uzbekistan are depicted in Figs. 15–16.

The results of phylogenetic and species-delimitation analyses are presented in Fig. 22. All species clades are highly supported, with low intra-specific p-distances (0–1%). *Stenelmis puberula* and *S. subtilis* are clearly separated into two distinct clades, with approximately 3.5% p-distance between them.

Based on the morphological and molecular differences, and based on their disjunct areas we regard *S. subtilis* as a valid species.

**HABITAT:** All recently collected specimens were found in small clean unshaded mountain streams (Figs. 18, 20–21), in association with *Grouvellinus rioloides* (REITTER, 1887) and *Elmis quadricollis* (REITTER, 1887) (Elmidae).

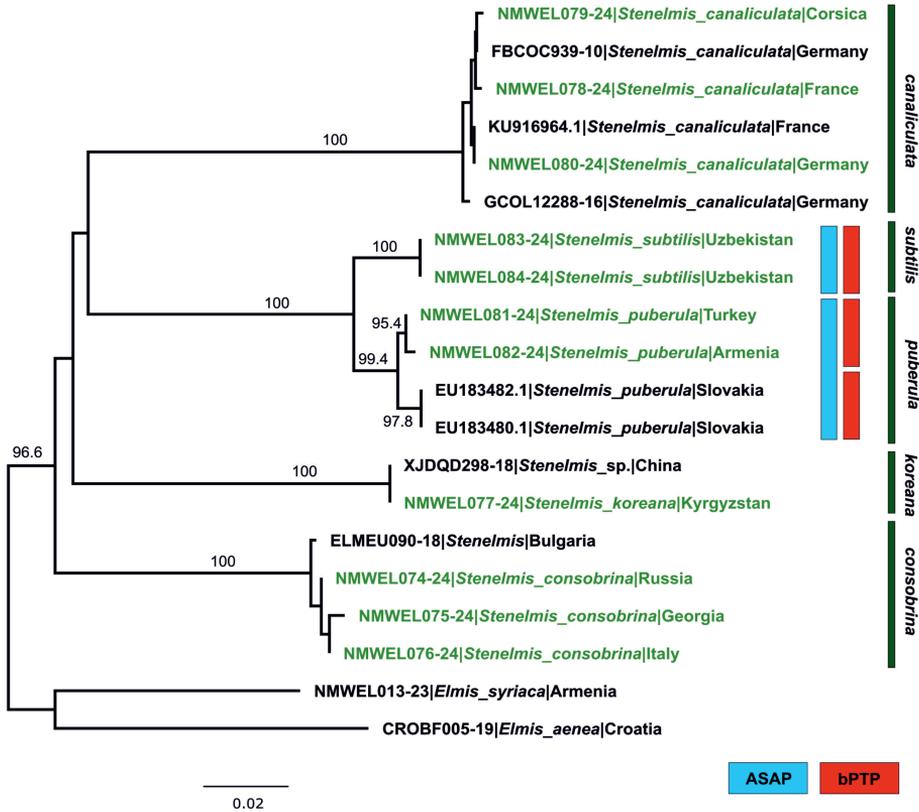


Fig. 22: Maximum likelihood phylogenetic tree for COI data. Specimens sequenced in this study are shown in green font; specimen labels consist of (BOLD-ID or GenBank acc. nr.|species name|provenance). Results of species delimitation analyses for the *S. puberula/subtilis* clade are marked as blue/red vertical bars; species clades are marked with dark green vertical bars. Bootstrap support values over 90% are listed beside the respective nodes.

DISTRIBUTION (Fig. 17): *Stenelmis subtilis* is regarded as endemic to Central Asia. It was so far known only from the type locality in Kyrgyzstan. It is here recorded from Kazakhstan (Karatau Mountains: northern slope, and southern slope southwest of the Turlan Pass) and Uzbekistan (Nuratau Mountains, and Kugitang Mountains) for the first time. It can be expected that this species occurs also in Tajikistan and in SE Turkmenistan (i.e., in the Köýtendag, the western part of the Kugitang Mountains).

## Discussion

Altogether, six species of *Stenelmis* are currently recorded from Central Asia. Two of these, *S. consobrina* and *S. puberula*, are known from Europe; in Central Asia they are only known from the southwestern tip of Turkmenistan. The sister species of *S. consobrina* and *S. puberula*, *S. peropaca* and *S. subtilis*, respectively, are to be regarded as the eastern vicariants of the latter two species; both are endemic to Central Asia. *Stenelmis fursovi* is also regarded as endemic to Central Asia, while the sixth species, *S. koreana*, is very wide-spread in Asia (Kyrgyzstan through northwestern China, Siberia, and the Russian Far East to the Korean Peninsula).

While the sequence data support the separation of *Stenelmis subtilis* and *S. puberula*, the status of the western populations of *S. puberula* (from Bosnia and Herzegovina, Slovakia, Ukraine, and Bulgaria) should be checked with additional molecular data.

### Acknowledgements

We are most grateful to the authorities of the ZMUL for the permission to publish the photograph of the holotype of *Stenelmis nematodes*.

R. Bygebjerg and C. Fägerström (both ZMUL), as well as V.Yu. Savitsky (ZMMU) and S.V. Andreeva (ZISP) are thanked for the loan of valuable material.

A.K. Hansen, L. Geisler & A. Solodovnikov (all ZMUC), G. Katschak (Kleve, Germany), and V. Asatryan (Yerewan, Armenia) kindly provided valuable specimens of *Stenelmis subtilis* resp. *S. puberula* for sequencing. Additional European specimens of *Stenelmis* sequenced during the present study were provided by G. Foster (Ayr, UK), J. Köhler (Koblenz, Germany) and A. Komarek (NMW). We are indebted to H. Nasserzadeh (Tehran, Iran) for sending specimens of *S. puberula* from Iran (Mazandaran).

The work of A.A. Prokin and A.S. Sazhnev has been supported by the Ministry of Education and Science of the Russian Federation (Project No. 124032500016-4).

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Dr. Manfred A. JÄCH & Mag.<sup>a</sup> Michaela BROJER  
*Naturhistorisches Museum Wien, Burgring 7, A – 1010 Wien, Austria* (manfred.jaech@nhm.at,  
 michaela.brojer@nhm.at)

Dr. Branka BRUVO MAĐARIĆ  
*Ruđer Bošković Institute, Bijenička cesta 54, 10 000 Zagreb, Croatia* (branka.bruvo.madjaric@irb.hr)

Stanislav V. LITOVKIN  
*Sredne-Sadovaya 64, 443016 Samara, Russia* (sats.lit@gmail.com)

Dr. Alexey V. KOVALEV  
*All-Russian Institute of Plant Protection of the Russian Academy of Sciences, shosse Podbelskogo 3, 196608 St. Petersburg-Pushkin, Russia* (melasis313@gmail.com)

Dr. Alexander A. PROKIN  
*Papanin Institute for Biology of Inland Waters, Russian Academy of Sciences, 152742, Borok, Yaroslavl Oblast, Russia; Voronezh State University, Universitetskaya pl. 1, 394018 Voronezh, Russia* (prokina@mail.ru)

Dr. Aleksey S. SAZHNEV  
*Papanin Institute for Biology of Inland Waters, Russian Academy of Sciences, 152742, Borok, Yaroslavl Oblast, Russia* (sazh@list.ru)

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Autor(en)/Author(s): Jäch Manfred A., Brojer Michaela, Bruvo Madaric Branka, Litovkin Stanislav V., Kovalev O.V., Prokin Alexander A., Sazhnev Aleksey S.

Artikel/Article: [Faunistic and taxonomic notes on the Central Asian species of \*Stenelmis\* DUFOUR, 1835 \(Coleoptera: Elmidae\) 133-150](#)