

**An uninvited guest: the fifth species of silverfish in Hungary  
(Zygentoma: Lepismatidae)**

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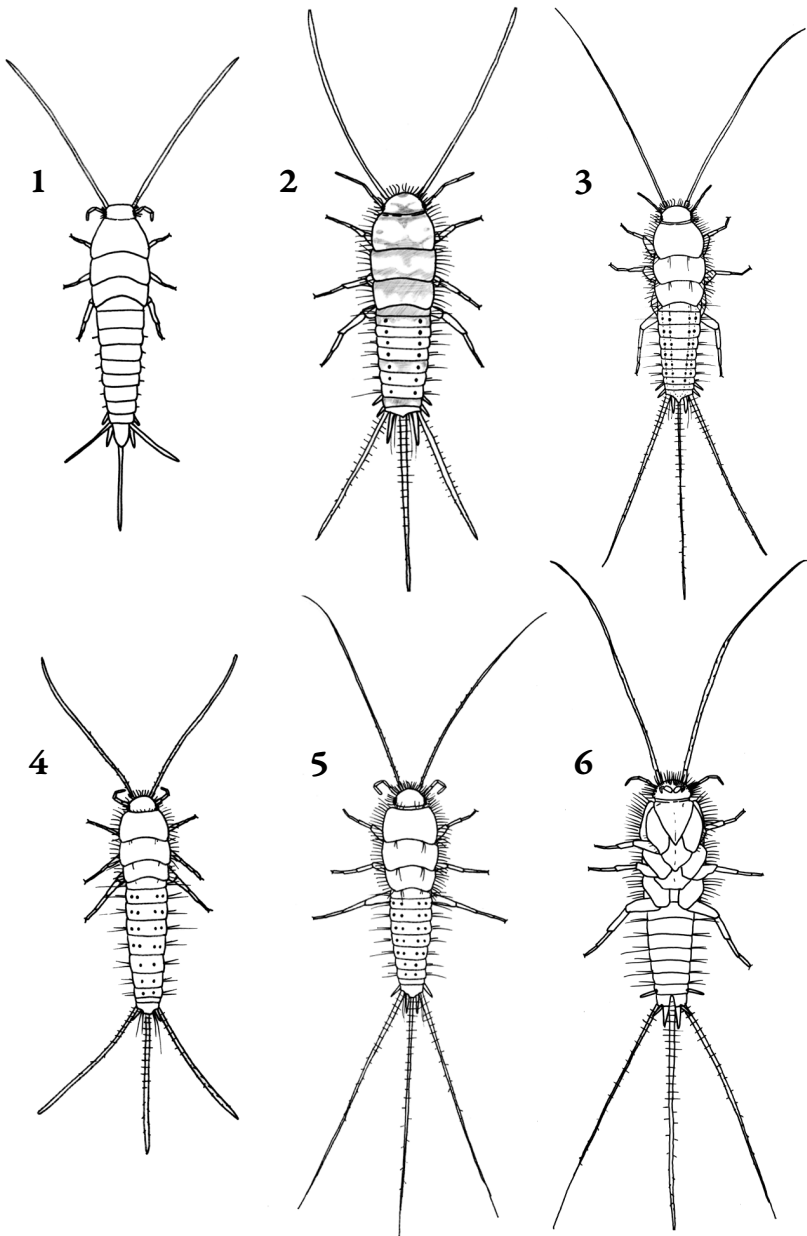
**Abstract** – *Ctenolepisma longicaudatum* (Escherich, 1905) (Zygentoma: Lepismatidae) is reported for the first time from Hungary. An identification key is provided to the five species of the family known from Hungary.

**Key words** – invasive species, museum pest, new country record, faunistics, non-native insects

## INTRODUCTION

Order Zygentoma, which includes silverfish and firebrats, consists of five families: Lepismatidae, Nicoletiidae, Ateluridae, Lepidothrichidae, and Maindroniidae (STURM 2009), comprising approximately 650 species worldwide (BEDNÁR *et al.* 2023). Most of these insects live outdoors; however, there are a few synanthropic species that easily become pests in households, warehouses, libraries, archives, and museums (HAGE 2020) due to their ability to feed on materials consisting of cellulose and starch, such as paper.

Till now four species of Lepismatidae, have been reported from Hungary. These species are poorly known from a faunistic point of view, most of the published data refer to old records. The first Hungarian record of a zygentoman species, simply under the generic name “*Lepisma*” (GROSSINGER 1794), likely pertains to the common synanthropic *Lepisma saccharinum* (Linnaeus, 1758) (Figs 1, 10, 14, 19); the author mentioned that it may damage books. An explicit record of this species from Sátoraljaújhely was presented by TÖMÖSVÁRY (1882). The first record of the firebrat, *Thermobia domestica* (Packard, 1873) (Figs 2, 12, 17), was based on specimens collected in Budapest by Sándor Pongrácz and identified by Endre Dudich (STACH 1929).



**Figs 1–6.** Lepismatidae of Hungary, 1 = *Lepisma saccharinum* (Linnaeus, 1758), dorsal view, 2 = *Thermobia domestica* (Packard, 1873), dorsal view, 3 = *Ctenolepisma lineatum* (Fabricius, 1775), dorsal view, 4 = *Ctenolepisma calvum* (Reitter, 1910), dorsal view, 5 = *Ctenolepisma longicaudatum* (Escherich, 1905), dorsal view, 6 = *Ctenolepisma longicaudatum* (Escherich, 1905), ventral view. Figures not to scale (drawings by Judit Fiam).

The first record of the four-lined silverfish, *Ctenolepisma lineatum* (Fabricius, 1775) (Figs 3, 13), was published (as “*Lepisma annuliseta* var. *lineata* Fabricius”) by VELLAY (1899). The latest addition to the Hungarian fauna of the order was the ghost silverfish, *Ctenolepisma calvum* (Reitter, 1910) (Figs 4, 16); its first report from Europe was based on specimens observed in Sátoraljaújhely, Hungary, in 2003 (HEGYESSY 2021, QUERNER *et al.* 2022).

In this paper, the long-tailed silverfish, *Ctenolepisma longicaudatum* (Escherich, 1905) (Figs 5–9, 11, 15, 18), is reported for the first time from Hungary, representing the fifth species of the family known in the country.

## MATERIAL AND METHODS

In the Museum Conservation and Storage Centre, Budapest, (OMRRK, Museum of Fine Arts) sticky insect traps are used in quarantine and storage rooms to detect pests and prevent damage. Specimens of *Ctenolepisma longicaudatum* were found in these traps.

Photos were taken with a Toupcam SPCMOS5000KPA 5.0 MP camera attached to a Lacerta ST-M45b stereomicroscope and with an Olympus Tough TG-5 camera, and Raynox DCR 250 lens attached to Fuji Finepix HS25 EXR camera. Images were combined with the Zerene Stacker software.

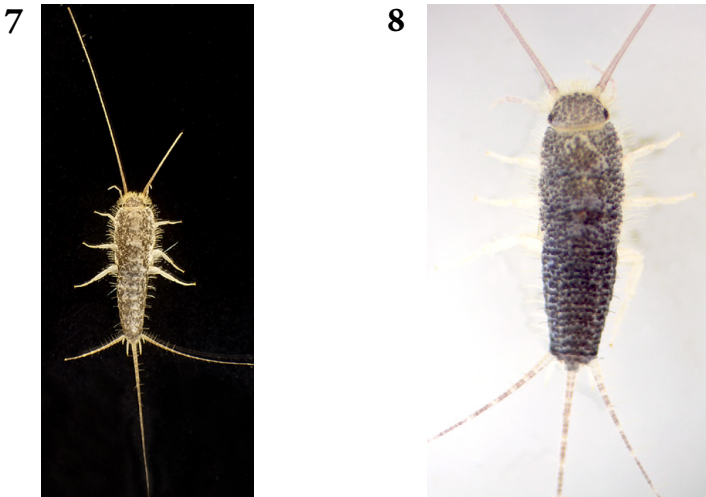
## RESULTS

### *Ctenolepisma longicaudatum* (Escherich, 1905) (Figs 5–9, 11, 15, 18)

*Material examined* – Hungary, Budapest, Distr. XIII, Museum of Fine Arts, Museum Conservation and Storage Centre, 4.XII.2023, 19.I.2024, 30.I.2024, 9.II.2024, 21.III.2024, leg. J. Fiam; altogether 14 specimens. Voucher specimens are deposited in the private collection of the first author (8 specimens) and in the Soil Zoological Collection of the Hungarian Natural History Museum, Budapest (HNHM) (6 specimens).

*Distribution* – First record from Hungary. *Ctenolepisma longicaudatum* presumably originates from Central America (ZETTEL 2010). It was described based on specimens from South Africa (ESCHERICH 1905), and was subsequently reported from Australia (SILVESTRI 1908a). The first specimen captured in Europe is apparently the one originating from a shipment from Mexico caught in Hamburg, Germany on 25.V.1906, published by PACLT (1966). It was reported in 1908 from Sicily, Italy, as *Ctenolepisma ciliata* var. *dives* (SILVESTRI 1908b, MOLERO-BALTANÁS *et al.* 2000). This synanthropic, cosmopolitan invasive species has a high tolerance to low temperature and humidity, which has allowed

it to spread throughout most of Europe. It has been recorded from the following European countries and territories (first records in brackets): France (1967), Spain (mainland, Balearic Islands and Canary Islands) (1978), Greece (mainland and islands) (1980), Netherlands (1989), Sweden (1994), Italy (mainland, Sardinia, Sicily and small islands) (1995), Belgium (1998), Austria (2002), Germany (2007), Finland (2007), United Kingdom (2014), Norway (2014), Faroe Islands (2017), Denmark (2017), Czech Republic (2017), Estonia (2018), Ireland (2019), Poland (2019), Luxembourg (2020), and Slovakia (KULMA *et al.* 2021, BEDNÁR *et al.* 2023).



**Figs 7–8.** *Ctenolepisma longicaudatum* (Escherich, 1905), 7 = adult male from Budapest (photo by Tamás Németh), 8 = nymph from Budapest (photo by Judit Fiam). Images not to scale.

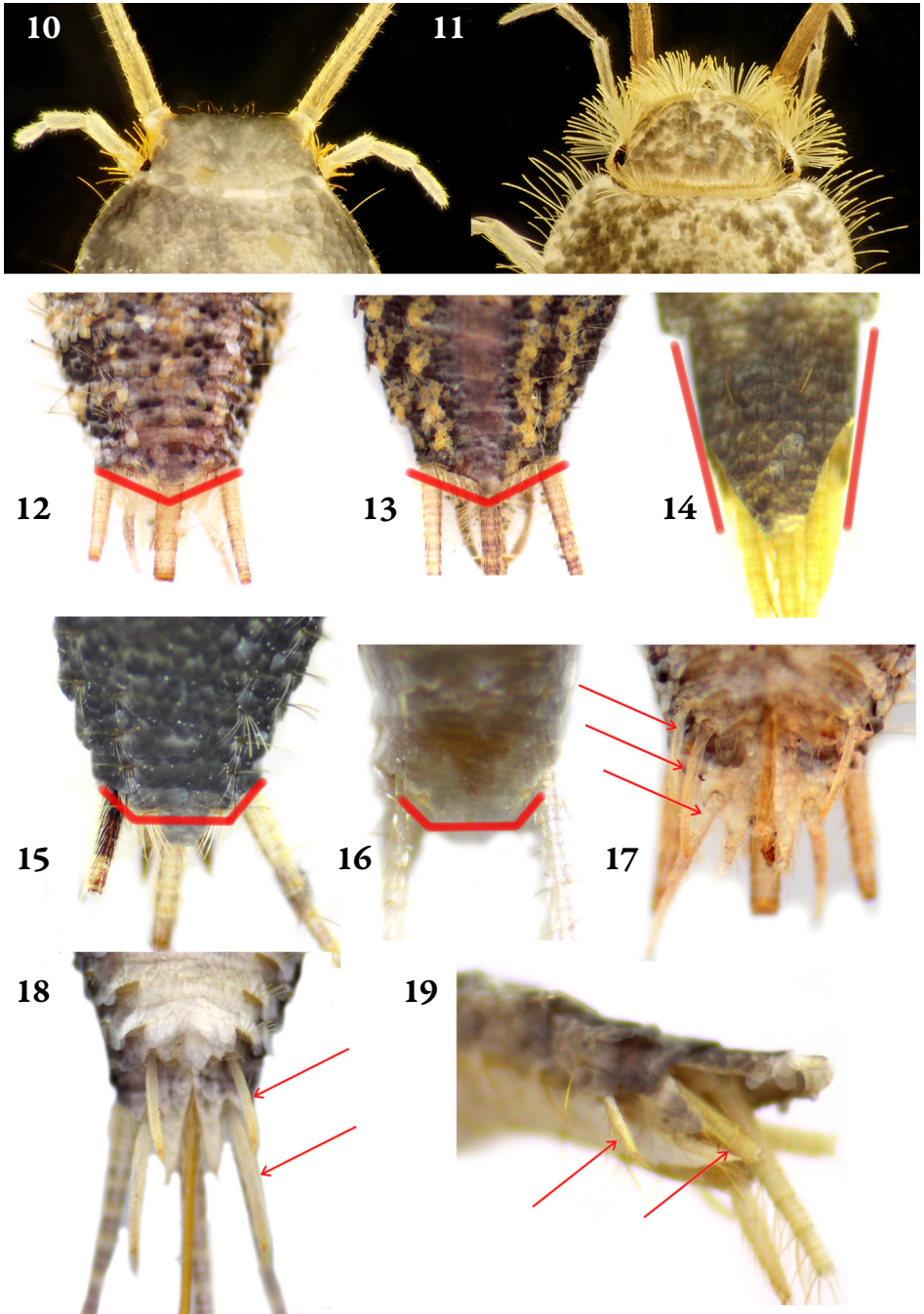


**Fig 9.** Collecting locality (quarantine room of Museum of Fine Arts, Museum Conservation and Storage Centre, Budapest) of *Ctenolepisma longicaudatum* (Escherich, 1905). (photo by Judit Fiam)

*Proposed Hungarian name* – “Szürkés pikkelyke”, in allusion to the colouration of the species.

*Identification* – Species-level determination of silverfish is often problematic. These insects are very fragile, are also difficult to store, as they quickly dry out and shrink, or lose their colouration if stored in ethanol. Appendages, scales (which give the characteristic colour of the species) and the bristles can easily break off, making identification difficult. An identification key is given below to the species of Lepismatidae known from Hungary, based on BEDNÁR *et al.* (2023) and PASCAL *et al.* (2022). Supporting characteristics are given in parentheses.

- 1 (2) Head without tufts of macrosetae (Fig. 10), few frontal setae arranged in irregular rows; antennae two-thirds as long as body length; terminal filaments and cerci half as long as body length (body 10–12 mm long, silvery grey; forehead flattened; abdominal and dorsal plates without bristle combs (Fig. 1); with 2+2 styli (Fig. 19); urotergite X much longer than wide (Fig. 14)) ..... *Lepisma saccharinum* (Linnaeus, 1758)
- 2 (1) Head with dense tufts of macrosetae (Fig. 11); antennae longer than body, length of terminal filaments and cerci as long as or longer than body
- 3 (4) Urotergites with at most 2+2 bristle combs of macrosetae (body 12 mm long, covered with dark grey, brown and pale yellowish scales, often with a dark blackish transverse band running along some segments; with 3+3 styli (Fig. 17); urotergites with the following comb-pattern: I: 1+1, II: 2+2, III: 2+2, IV: 2+2, V: 2+2, VI: 2+2, VII: 2+2, VIII: 2+2, IX: 0, X: 1+1 (Fig. 2); urotergite X broad, subtriangular (Fig. 12)) .....  
..... *Thermobia domestica* (Packard, 1873)
- 4 (3) At least urotergites II–V with 3+3 bristle combs of macrosetae
- 5 (6) Urotergite VI with 2+2 bristle combs of macrosetae (body 8–10 mm long, whitish; with 1+1 styli; urotergites with the following comb-pattern: I: 1+1, II: 3+3, III: 3+3, IV: 3+3, V: 3+3, VI: 2+2, VII: 2+2, VIII: 2+2, IX: 0, X: 1+1 (Fig. 4); urotergite X trapezoidal (Fig. 16)) ..... *Ctenolepisma calvum* (Reitter, 1910)
- 6 (5) Urotergite VI with 3+3 bristle combs of macrosetae
- 7 (8) Urotergite VII with 3+3 bristle combs of macrosetae (body 15 mm long, dark brownish or greyish with four yellowish-brown longitudinal stripes; with 3+3 styli; urotergites with the following comb-pattern: I: 1+1, II: 3+3, III: 3+3, IV: 3+3, V: 3+3, VI: 3+3, VII: 3+3, VIII: 2+2, IX: 0, X: 1+1 (Fig. 3); urotergite X broad, subtriangular (Fig. 13)) .....  
..... *Ctenolepisma lineatum* (Fabricius, 1775)
- 8 (7) Urotergite VII with 2+2 bristle combs of macrosetae (body up to 18–19 mm length, dull grey; with 2+2 styli (Fig. 18); urotergites with the following comb-pattern: I: 1+1, II: 3+3, III: 3+3, IV: 3+3, V: 3+3, VI: 3+3, VII: 2+2, VIII: 2+2, IX: 0, X: 1+1 (Fig. 5); urotergite X trapezoidal (Fig. 15)) ..... *Ctenolepisma longicaudatum* (Escherich, 1905)



**Figs 10–19.** Diagnostic characters of lepismatid species occurring in Hungary, 10–11: macrosetae of head, 10 = *Lepisma saccharinum* (Linnaeus, 1758), 11 = *Ctenolepisma longicaudatum* (Escherich, 1905), 12–16: urotergites, red lines indicate the shape of uritergite X, 12 = *Thermobia domestica* (Packard, 1873), urotergite X broad, subtriangular, 13 = *Ctenolepisma lineatum* (Fabricius, 1775), urotergite X broad, subtriangular, 14 = *Lepisma saccharinum* (Linnaeus, 1758), urotergite X much longer than wide, 15 = *Ctenolepisma longicaudatum* (Escherich, 1905), urotergite X trapezoidal, 16 = *Ctenolepisma calvum* (Reitter, 1910), urotergite X trapezoidal, 17–19: styli, shown by red arrows, 17 = *Thermobia domestica* (Packard, 1873), 3+3 styli, 18 = *Ctenolepisma longicaudatum* (Escherich, 1905), 2+2 styli, 19 = *Lepisma saccharinum* (Linnaeus, 1758), 2+2 styli. Images not to scale (photos by Judit Fiam (Figs 8–9, 12–19) and Tamás Németh (Figs 7, 10–11))

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