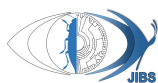


Original Article 

The genus *Pseudosinella* Schäffer, 1897 (Collembola, Entomobryidae) in Hungary

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Corresponding author: ✉ winklerdanielandras@gmail.com<https://zoobank.org/urn:lsid:zoobank.org:824CE881-9D99-4F1C-9E47-A3FB6DF513CD>**Academic Editor**Mahmood Mehrafrooz
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ABSTRACT. A checklist with distribution data of the collembolan genus *Pseudosinella* of Hungary is presented in this paper. In addition to available relevant references, unpublished data from newly collected material is also included. To date, the occurrence of 23 species of this genus has been confirmed in Hungary, for which a dichotomous key is also provided. Since the publication date of the Hungarian Collembola checklist, a total of nine additional *Pseudosinella* species have been recorded in the country. In this study, *P. edax* Gisin, 1967, *P. noseki* Rusek, 1985, and *P. thibaudi* Stomp, 1977 are cited for the first time. Up to now, three species of *Pseudosinella*, namely *P. argentea* Loksa, 1960 nec Folsom, *P. csafordensis* Winkler & Mateos, 2018, and *P. dungeri* Winkler & Mateos, 2018, are recognized as endemic to Hungary.

KEYWORDS: Distribution, Endemism, Fauna, Springtails, Taxonomy**Citation:** Winkler, D. (2026) The genus *Pseudosinella* Schäffer, 1897 (Collembola, Entomobryidae) in Hungary. *Journal of Insect Biodiversity and Systematics*, 12 (01), 81–95.

INTRODUCTION

Pseudosinella Schäffer, 1897 is one of the largest and most widespread collembolan genera of the family Entomobryidae Tömösváry, 1882, represented by 351 described species worldwide and by around 200 species in Europe (Bellinger et al. 1996–2025). It can be separated from its ancestor genus, *Lepidocyrtus*, by the number of eyes: 8+8 in *Lepidocyrtus* and fewer (0–6+0–6) in *Pseudosinella* (Ponge 2000). The species of this genus inhabit a wide range of habitats from caves (e.g., Gisin & Gama 1969; Arbea 2013; Cipola et al. 2020; Kováč et al. 2023) through diverse forests (e.g., Jordana & Baquero, 2005; Sławska et al. 2017) to open grassland habitats (e.g., Arbea & Jordana 1990; Traser et al. 2006; Winkler & Mateos 2018). Hungary, situated in the Carpathian Basin, is remarkably rich in diverse habitats and, thus, also in fauna diversity, including a high number of endemic species (Varga 1995). Nevertheless, the Collembola checklist of Hungary only lists 14 *Pseudosinella* species from the country (Dányi & Traser, 2007).

This paper aims to present an updated checklist of *Pseudosinella* species by providing newly discovered data from earlier references and material published since the checklist by Dányi & Traser (2007) was issued. Unpublished data, including new records and species new to the Hungarian *Pseudosinella* fauna, are also included. A dichotomous key is also provided for the *Pseudosinella* species of Hungary. Alongside earlier works (e.g., Fiera 2013; Kováč et al. 2023), the present study aims to contribute to the exploration of the apparently rich *Pseudosinella* fauna of the Central European region.

MATERIAL AND METHODS

For the present work, all available relevant references on the Collembola genus *Pseudosinella* from Hungary were considered. Unpublished data from newly collected material are also presented here. The newly collected specimens of *Pseudosinella* were cleared using Nesbitt's fluid and mounted on slides in Hoyer as a medium (Jordana 2012). The slides were examined under a Leica® DM2500 LED microscope

with conventional bright light and phase contrast. The studied material is preserved at the Institute of Wildlife Biology and Management, University of Sopron, in the author's collection.

Identifications were carried out with the help of the computer-assisted Delta identification key using the combination of chaetotaxic and other characters, originally designed by Christiansen et al. (1990) and regularly updated by Jordana et al. (2024). Figure 1 illustrates the general habitus of *Pseudosinella* and highlights the key taxonomic characters used in the dichotomous key for the Hungarian species.

For each species, the following is reported: a) the scientific name, the name of the author, and the year of description; b. the original name with its bibliographic quotation, and type locality; c. world distribution; d. distribution in Europe; e. localities where the species was recorded in Hungary (Fig. 2); and f. ecological comment based on the collected literature.

Abbreviations. Names of the European countries: Albania—AL; Andorra—AD; Austria—AT; Azores (Portugal)—AZ; Belarus—BY; Belgium—BE; Bosnia and Herzegovina—BA; Great Britain—GB; Bulgaria—BG; Canary Islands (Spain)—IC; Corsica (France)—CO; Crete (Greece)—CT; Croatia—HR; Cyprus—CY; Czech Republic—CZ; Denmark—DK; Estonia—EE; Finland—FI; France—FR; Germany—DE; Greece—GR; Hungary—HU; Iceland—IS; Ireland—IE; Italy—IT; Latvia—LV; Lithuania—LT; Luxembourg—LU; Macedonia—MK; Malta—MT; Moldova—MD; Montenegro—ME; Norway—NO; Poland—PL; Portugal—PT; Romania—RO; Serbia—RS; Slovakia—SK; Slovenia—SL; Spain—ES; Sweden—SE; Switzerland—CH; The Netherlands—NL; Ukraine—UA. Symbols: a.s.l.—above sea level, Th—thoracic tergite, Abd—abdominal tergite, I–VI—segment numbers, pse—pseudoporus.

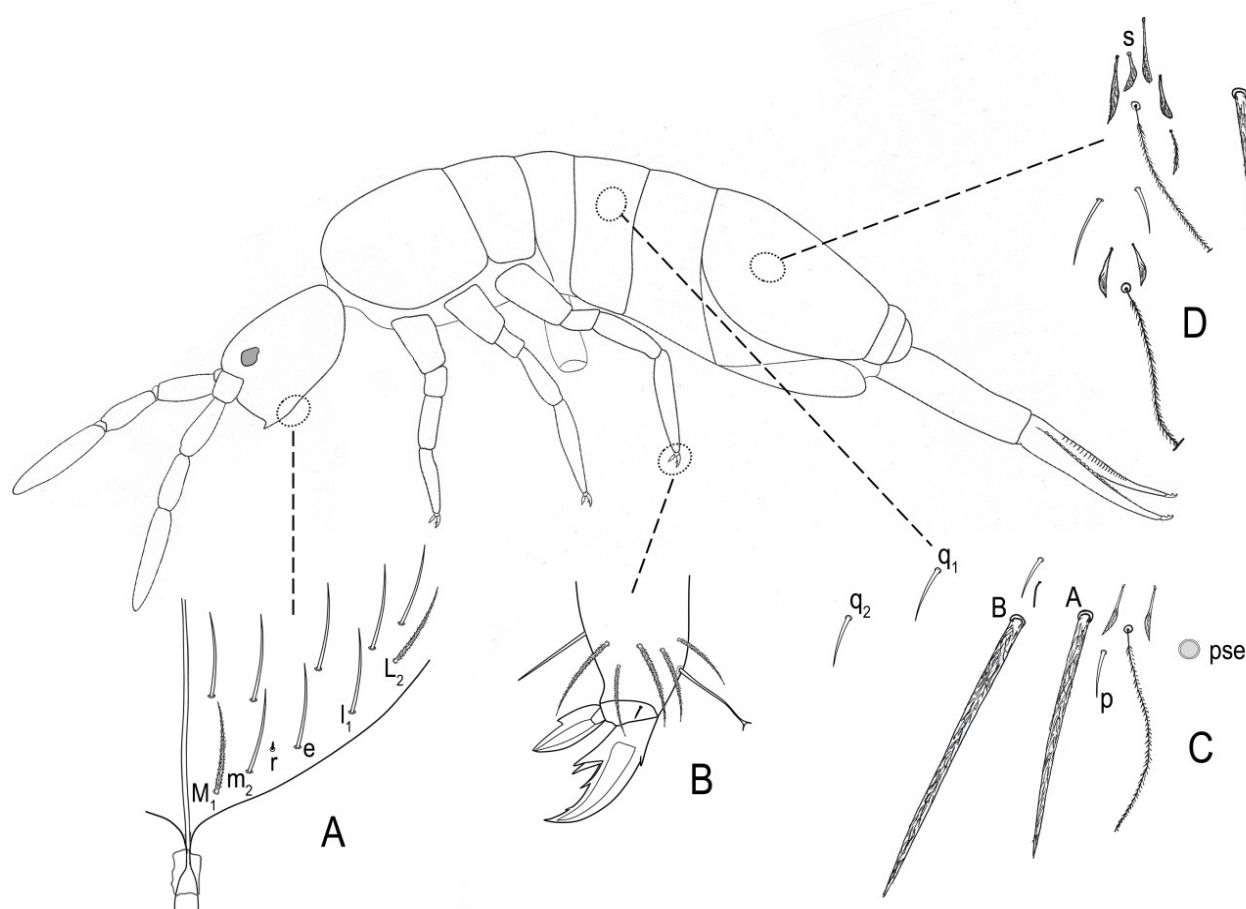


Figure 1. General habitus of *Pseudosinella* sp., showing taxonomically important features used in the key to the Hungarian species. A. Labial triangle; B. Detail of foot complex and distal part of tibiotarsus; C. Abd II dorsolateral chaetotaxy; D. Abd IV trichobothrial complex with accessory chaeta s. (Original drawing).



Figure 2. Geographical map of Hungary with localities used in the description of the distribution of *Pseudosinella* species, with sampling points for species new to the Hungarian fauna. The map was generated using the topographic map by Tschubby (2025) as background.

RESULTS

Class Collembola Lubbock, 1870

Order Entomobryomorpha Börner, 1913

Superfamily Entomobryoidea Womersley, 1934

Family Entomobryidae Tömösváry, 1882

Subfamily Lepidocyrtinae Wahlgren, 1906

Genus *Pseudosinella* Schäffer, 1897

Type species. *Tullbergia immaculata* Lie-Pettersen, 1896.

Pseudosinella aelleni da Gama, 1973

Pseudosinella aelleni da Gama, 1973:52. Type locality: Germany.

World distribution. Europe.

Distribution in Europe. AT, DE, HU.

Distribution in Hungary. Moson Plain (Winkler & Traser 2012a), Sopron Mts. (Traser 2008).

Ecological note. Silvicolous, troglophilous (Kampmann 1987; Deharveng & Thibaud 1989).

Pseudosinella aggtelekiensis (Stach, 1929)

Lepidocyrtus (*Pseudosinella*) *aggtelekiensis* Stach, 1929:296. Type locality: Hungary.

World distribution. Europe.

Distribution in Europe. HU, SK, RO.

Distribution in Hungary. Aggtelek Karst (Stach 1929; Dudich 1930, 1932; Kovács 1953, 1954; Loksa 1961; Traser 1999).

Ecological note. Cavernicolous (Dudich 1932; Kovács 1954).

***Pseudosinella alba* (Packard, 1873)**

Lepidocyrtus albus Packard, 1873:37. Type locality: USA.

World distribution. Cosmopolitan.

Distribution in Europe. AL, AT, BA, BE, BG, CH, CO, CZ, DE, DK, EE, ES, FI, FR, GB, HR, HU, IE, IS, IT, LV, MD, ME, MT, NL, NO, PL, PT, RO, RS, SK, SE, UA.

Distribution in Hungary. Aggtelek Karst (Loksa 1966; Traser 1999), Bakony Mts. (Loksa 1966; Loksa & Rubio 1966; Traser 2010), Balatonfelvidék (Loksa 1960, 1966), Börzsöny Mts. (Loksa 1966; Dunger 1975), Buda Mts. (Loksa 1956b, 1966), Bükk Mts. (Loksa 1956a, 1962, 1966, 1977), Cserhát (Loksa 1978b), Fertő-Hanság (Traser 2002a, 2003; Traser et al. 2006; Winkler & Tóth, 2012), Gerecse Mts. (Loksa 1966; Traser 2006), Gödöllő Hills (Harta et al. 2018, 2021), Keszthely Mts. (Loksa 1966), Kiskunság (Traser & Horváth-Szováti 2004, 2006; Palkó et al. 2020), Kőszeg Mts. (Szent-Ivány 1940), Mezőföld (Traser et al. 2011; Gergócs et al. 2022), Moson Plain (Winkler & Traser 2012a; Szigeti et al. 2022), Mt. Somló (Loksa 1966), Nyírség (Loksa 1991), Őrség (Traser 1995), Pilis Mts. (Loksa 1966), Sopron Mts. (Traser 1981, 2002a), Szigetköz (Traser 1997), Tétény Plateau (Loksa & Loksa 1996a), Vas-Sopron Plain (Traser 1981), Veszprém-Devecser Graben (Winkler 2014; Winkler et al. 2018), Vértes Mts. (Loksa 1966), Visegrád Mts. (Loksa 1966).

Ecological note. Eurytopic, edaphic species, occurring in a wide range of habitats: forest litter and moss, meadows, seashores, cultivated soils, and caves (Dallai & Malatesta 1982; Fjellberg 2007).

***Pseudosinella argentea* Loksa, 1960 nec Folsom**

Pseudosinella argentea Loksa, 1960:262. Type locality: Hungary.

World distribution. Europe.

Distribution in Europe. HU.

Distribution in Hungary. Balatonfelvidék (Loksa 1960).

Ecological note. Caverniculous (Loksa 1960).

***Pseudosinella binoculara* Kseneman, 1935**

Pseudosinella binoculara Kseneman, 1935:6. Type locality: Czech Republic.

World distribution. Europe.

Distribution in Europe. AT, BE, CH, CZ, DE, ES, HU, PL, SK, UA.

Distribution in Hungary. Börzsöny Mts. (Dunger 1975), Dráva Plain (Loksa 1978a).

Ecological note. In caves, forests (Kseneman 1935; Vedovini 1968; Dunger 1975).

***Pseudosinella bohémica* Rusek, 1979**

Pseudosinella bohémica Rusek, 1979: 255. Type locality: Czech Republic.

World distribution. Europe.

Distribution in Europe. AT, BG, CZ, HU.

Distribution in Hungary. Veszprém-Devecser Graben (Winkler et al. 2012; Winkler 2014), Bakony Mts. (Traser 2010).

Ecological note. Silviculous (Rusek 1979; Traser 2010).

***Pseudosinella csafordensis* Winkler & Mateos, 2018**

Pseudosinella csafordi Winkler & Mateos, 2018:348. Type locality: Hungary.

World distribution. Europe.

Distribution in Europe. HU.

Distribution in Hungary. Vas-Sopron Plain (Winkler & Mateos 2018).

Ecological note. Silviculous, hygrophilous (Winkler & Mateos 2018).

***Pseudosinella decipiens* Denis, 1924**

Pseudosinella decipiens Denis, 1924:198. Type locality: France.

World distribution. Palearctic.

Distribution in Europe. AT, BA, BE, CH, CT, DE, ES, FI, FR, GB, HU, HR, IE, ME, RO, RS, SE.

Distribution in Hungary. Bakony Mts. (Loksa & Rubio, 1966), Buda Mts. (Loksa 1966), Gerecse Mts. (Loksa 1966), Kiskunság (Traser 2002b), Moson Plain (Traser 2002a).

Ecological note. In caves, and forest soils (Gruia 1970; Fjellberg 2007; Shayanmehr et al. 2024).

***Pseudosinella dungeri* Winkler & Mateos, 2018**

Pseudosinella dungeri Winkler & Mateos, 2018:357. Type locality: Hungary.

World distribution. Europe.

Distribution in Europe. HU.

Distribution in Hungary. Börzsöny Mts. (Winkler & Mateos 2018).

Ecological note. Xerothermophilic, in open habitats (Winkler & Mateos 2018).

***Pseudosinella duodecimpunctata* Denis, 1931**

Pseudosinella duodecimpunctata Denis, 1931:82. Type locality: Italy.

World distribution. Europe, South Asia.

Distribution in Europe. AT, BG, CH, DE, ES, FR, IT, HU, RS, UA.

Distribution in Hungary. Dráva Plain (Loksa 1978a).

Ecological note. In caves, forests, and meadows (Denis 1931; Koledin et al. 1988; Kopeszki & Trockner 1994).

***Pseudosinella edax* Gisin, 1967 (Fig. 3A)**

Pseudosinella edax Gisin, 1967:15. Type locality: Austria.

Material examined. 4 specimens, Zala Hills. Kiskapornak, 214 m a.s.l. 46°50'35"N, 16°58'26"E, from beech forest soil and moss, hand collecting, 01.ix.2018, leg. D. Winkler & Á. Csiszár.

Distribution in Europe. AT, HU (new record, Fig. 2), FR, IT, RO.

World distribution. Europe.

Distribution in Hungary. Zala Hills.

Ecological note. Silvicolous (Gisin 1967).

***Pseudosinella* cf. *fallax* (Börner, 1903)**

Lepidocyrtus (*Pseudosinella*) *fallax* Börner, 1903:153. Type locality: Italy.

World distribution. Europe.

Distribution in Europe. AL, BG, CH, CT, ES, FR, GB, GR, HU, IE, IT, PT, RO, SL, SK, UA.

Distribution in Hungary. Aggtelek Karst (Traser 1999).

Ecological note. In open habitats, cultivated soils, and forests (Börner 1903; Kühnelt 1963; Fratello et al. 1989).

***Pseudosinella hartnerae* Winkler & Fiera, 2021**

Pseudosinella hartnerae Winkler & Fiera [in Winkler et al.], 2021:123. Type locality: Hungary.

World distribution. Europe.

Distribution in Europe. HU, RO.

Distribution in Hungary. Nyírség (Winkler et al. 2021).

Ecological note. Phytodetriticolous, bryophilous, and hygrophilous (Winkler et al. 2021).

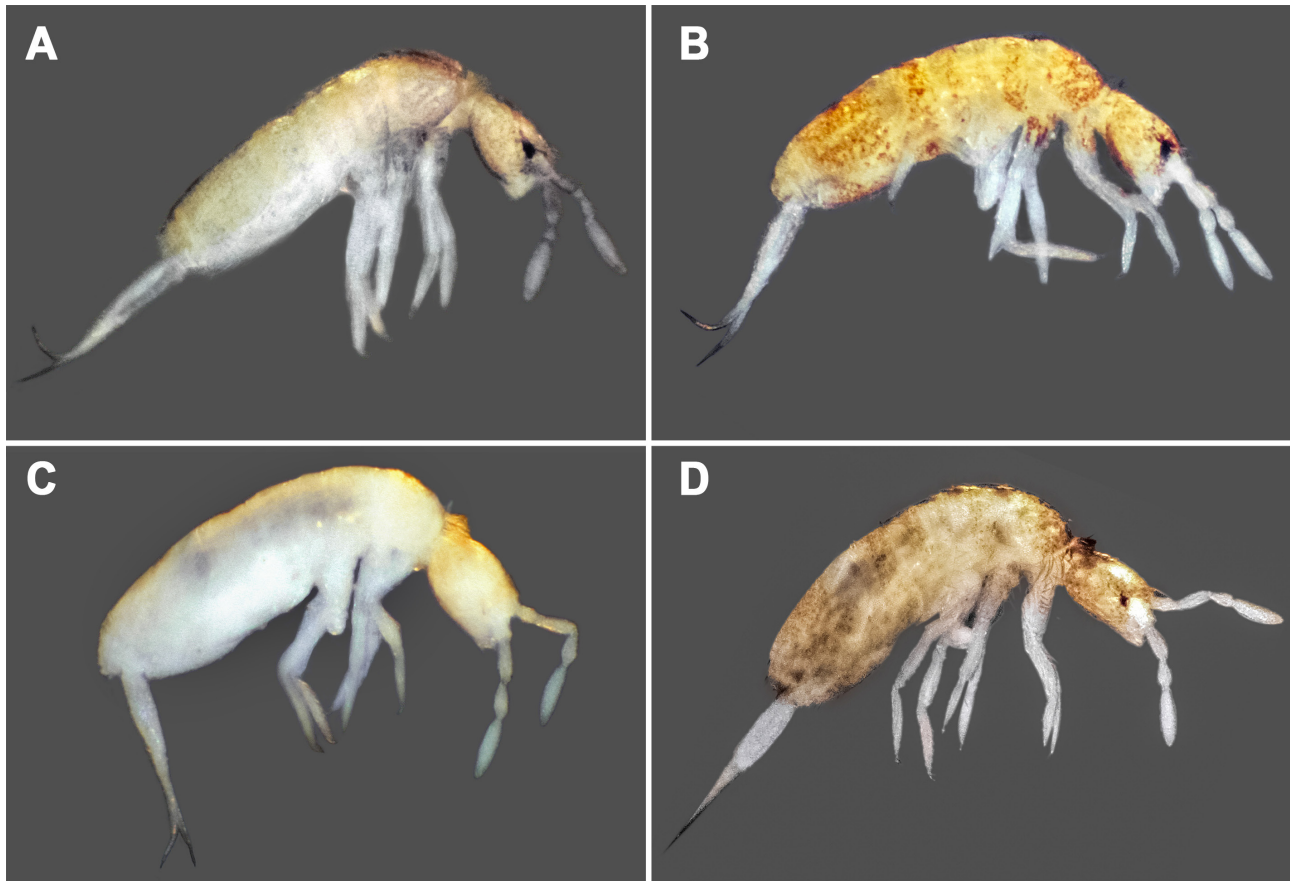


Figure 3. *Pseudosinella* species habitus in alcohol. **A.** *P. edax* Gisin, 1967; **B.** *P. hercynica* Rusek, 1979; **C.** *P. noseki* Rusek, 1985; **D.** *P. thibaudi* Stomp, 1977 (Photos by: D. Winkler).

***Pseudosinella hercynica* Rusek, 1979 (Fig. 3B)**

Pseudosinella hercynica Rusek, 1979:258. Type locality: Czech Republic.

Material examined. 8 specimens, Bakony Mts. Bakonybél, 365 m a.s.l. 47°17'33"N, 17°43'12"E, from soil of beech forest, hand collecting, 16.vii.2016, leg. D. Winkler & Á. Csiszár).

World distribution. Europe.

Distribution in Europe. AT, CZ, HU.

Distribution in Hungary. Bakony Mts. (**new record**); Sopron Mts. (Winkler 2019).

Ecological note. Silvicolous (Rusek 1979; Winkler 2019).

***Pseudosinella horaki* Rusek, 1985**

Pseudosinella horaki Rusek, 1985:142. Type locality: Czech Republic.

World distribution. Europe.

Distribution in Europe. CZ, HU, MD, PL, RO, SK, UA.

Distribution in Hungary. Aggtelek Karst (Traser 1999), Fertő-Hanság (Winkler & Tóth 2012), Gödöllő Hills (Harta et al. 2021), Kemeneshát (Winkler & Traser 2012b), Moson Plain (Traser 2002a), Sopron Mts. (Traser 2002a).

Ecological note. In forest soils (Rusek 1985; Traser 1999).

***Pseudosinella immaculata* (Lie-Pettersen, 1896)**

Tullbergia immaculata Lie-Pettersen, 1896:16. Type locality: Norway.

World distribution. Palearctic.

Distribution in Europe. AT, CZ, DE, ES, FR, GB, HR, HU, IE, IT, LV, NL, NO, PL, PT, SE, SK, UA.

Distribution in Hungary. Aggtelek Karst (Loksa 1966; Traser 1999), around the Lake Balaton (Farkas, 1995), Bükk Mts. (Loksa 1956a), Fertő-Hanság (Traser 2002a), Mecsek Mts. (Loksa 1966), Mezőföld (Gergócs et al. 2022).

Ecological note. In forests, meadows, and caves (Loksa 1956a; Christian 1997; Fjellberg 2007).

***Pseudosinella noseki* Rusek, 1985 (Fig. 3C)**

Pseudosinella noseki Rusek, 1985:140. Type locality: Czech Republic.

Material examined. 3 specimens, Middle-Tisza Region. Tiszavárkony, 92 m a.s.l. 47°3'18"N, 20°11'39"E, from soil of alluvial poplar forest, hand collecting, 14.vi.2018, leg. D. Winkler & G. Ónodi).

World distribution. Europe.

Distribution in Europe. CZ, HU (new record, Fig. 2), MD.

Distribution in Hungary. Middle-Tisza Region.

Ecological note. Silvicolous, hygromesophilous (Rusek 1985; Buşmachi 2021).

***Pseudosinella octopunctata* Börner, 1901**

Pseudosinella octopunctata Börner, 1901:705. Type locality: Germany.

World distribution. Cosmopolitan.

Distribution in Europe. AT, AZ, BA, BE, BG, CH, CZ, DE, ES, FI, FR, GB, HR, HU, IC, IE, IT, LV, MD, NO, PL, PT, RO, RS, SK, SL, SE, UA.

Distribution in Hungary. Bakony Mts. (Traser 1980), Balatonfelvidék (Paclt, 1960), Börzsöny Mts. (Dunger 1975), Buda Mts. (Loksa 1956b), Bükk Mts. (Loksa 1977), Dráva Plain (Loksa 1978a), Fertő-Hanság (Traser et al. 2006), Mezőföld (Stach 1929; Traser et al. 2011), Moson Plain (Winkler & Traser 2012a; Szigeti et al. 2022).

Ecological note. Open habitats, grasslands, patchy vegetation in gravel or sand slopes, and cultivated soils (Dunger 1975; Loksa 1978a; Fjellberg 2007; Winkler & Traser 2012a; Mehrafroz Mayvan et al. 2022).

***Pseudosinella petterseni* Börner, 1901**

Pseudosinella Petterseni Börner, 1901:707. Type locality: Germany.

World distribution. Palearctic.

Distribution in Europe. AT, BE, DK, CH, CZ, DE, ES, FR, HU, IE, IT, PT, RS, SK.

Distribution in Hungary. Börzsöny Mts. (Dunger 1975), Bükk Mts. (Loksa 1977), Cserhát (Loksa 1978b), Gödöllő Hills (Harta et al. 2018, 2021), Hárosi-sziget (Loksa & Loksa 1996b), Mecsek Mts. (Loksa 1966), Moson Plain (Winkler & Traser 2012a), Veszprém-Devecser Graben (Winkler et al. 2018), Villány Mts. (Loksa 1966).

Ecological note. In forests, meadows, and cultivated soils (Gisin 1955; Fjellberg 2007; Winkler et al. 2018).

***Pseudosinella sexoculata* Schött, 1902**

Pseudosinella sexoculata Schött, 1902:34. Type locality: Sweden.

World distribution. Cosmopolitan.

Distribution in Europe. AT, BA, BG, CH, CZ, DE, EE, ES, FI, FR, GB, HR, HU, IT, MD, NL, NO, ME, PL, PT, RO, RS, SK, SE, UA.

Distribution in Hungary. Fertő-Hanság (Traser 2002a), Kiskunság (Traser & Horváth-Szováti 2006; Traser 2002b; Flórián et al. 2019; Palkó et al. 2020), Gödöllő Hills (Harta et al. 2021), Mecsek Mts. (Loksa 1966), Mezőföld (Traser et al. 2011; Gergócs et al. 2022), Moson Plain (Winkler & Traser 2012a), Veszprém-Devecser Graben (Winkler et al. 2018), Villány Mts. (Loksa 1966).

Ecological note. Eurytopic species, occurring e.g. in forests, meadows, cultivated soils, organic deposits, and caves (Vedovini 1968; Bogojević 1971; Fjellberg 2007; Winkler & Traser 2012a).

***Pseudosinella thibaudi* Stomp, 1977 (Fig. 3D)**

Pseudosinella thibaudi Stomp, 1977:231. Type locality: Germany.

Material examined. 17 specimens, Mátra Mts., beech forest, 47°53'8.70"N, 19°56'37.53"E; 662 m a.s.l., 27.x.2016, leg. D. Winkler & Á. Erdő, hand collecting.

World distribution. Europe.

Distribution in Europe. CZ, DE, HU (new record, Fig. 2), SK.

Distribution in Hungary. Mátra Mts.

Ecological note. Cavernicolous, eutroglophilous (Stomp 1977; Kováč 2000; Mock et al. 2015).

***Pseudosinella wahlgreni* (Börner, 1907)**

Lepidocyrtus Wahlgreni Börner, 1907:176. Type locality: Egypt.

World distribution. Europe, North Africa.

Distribution in Europe. AT, BA, BE, BG, CH, CZ, DE, ES, FR, HU, IT, LT, MD, PL, RO, SK, UA.

Distribution in Hungary. around the Lake Balaton (Farkas, 1995), Bakony Mts. (Traser 1980, 2010; Loksa & Rubio 1966), Börzsöny Mts. (Loksa 1966; Dunger 1975), Buda Mts. (Loksa 1966), Bükk Mts. (Loksa 1966, 1977), Cserhát (Loksa 1978b), Dráva Plain (Loksa 1978a), Gerecse Mts. (Loksa 1966), Gödöllő Hills (Harta et al. 2021), Keszthely Mts. (Loksa 1966), Kiskunság (Palkó et al. 2020), Mátra Mts. (Loksa 1980), Mecsek Mts. (Loksa 1966), Nyírség (Loksa 1991), Őrség (Traser 1995), Pilis Mts. (Loksa 1966), Somogy Hills (Farkas et al. 1998), Sopron Mts. (Traser 1981), Vas-Sopron Plain (Traser 1981), Veszprém-Devecser Graben (Winkler et al. 2018), Vértes Mts. (Loksa 1966), Villány Mts. (Loksa 1966), Visegrád Mts. (Loksa 1966).

Ecological note. Mostly in forest soils (Dunger 1975; Traser 1981, 1995; Palkó et al. 2020).

***Pseudosinella zygophora* (Schille, 1908)**

Lepidocyrtus zygophorus Schille, 1908:13. Type locality: Poland.

World distribution. Europe.

Distribution in Europe. AT, BG, BY, CZ, HU, PL, SK, UA.

Distribution in Hungary. Aggtelek Karst (Dudich 1932; Traser 1999), Moson Plain (Winkler & Traser 2012a; Szigeti et al. 2022).

Ecological note. In caves and forests (Dudich 1932; Sterzyńska 1995).

Key to the Hungarian species of *Pseudosinella*

Due to inconsistencies and uncertainties regarding the chaetotaxy, *P. wahlgreni* was not included in the identification key

- | | | |
|---|---|---|
| 1 | Head without ocelli. | 2 |
| — | Head with ocelli. | 10 |
| 2 | Unguiculus with large outer tooth. | 3 |
| — | Unguiculus with no large outer tooth. | 4 |
| 3 | Unguis paired basal teeth unequal, with outer one large and wing-like. | <i>P. petterseni</i> Börner, 1901 |
| — | Unguis paired basal teeth equal. | <i>P. argentea</i> Loksa, 1960 nec Folsom |
| 4 | Abd IV with 1+3 dorsomedial macrochaetae. | <i>P. aggtelekiensis</i> (Stach, 1929) |
| — | Abd IV with 1+2 dorsomedial macrochaetae. | 5 |
| 5 | Th II with 4 macrochaetae. | <i>P. decipiens</i> Denis, 1924 |
| — | Th II with less than 4 macrochaetae. | 6 |

6	Th II with 1 macrochaeta.	<i>P. dungeri</i> Winkler & Mateos, 2018	
—	Th II with 3 macrochaetae.		7
7	Labial chaetae L_1 and L_2 smooth.	<i>P. immaculata</i> (Lie-Pettersen, 1896)	
—	Labial chaetae L_1 and L_2 ciliated.		8
8	Abd IV with microchaeta s.	<i>P. csafordensis</i> Winkler & Mateos, 2018	
—	Abd IV without microchaeta s.		9
9	Unguiculus without outer tooth.	<i>P. aelleni</i> da Gama, 1973	
—	Unguiculus with one minute outer tooth.	<i>P. noseki</i> Rusek, 1985	
10	Head with 1+1 Ocelli.	<i>P. binoculara</i> Kseneman, 1935	
—	Head with more than 1+1 Ocelli.		11
11	Labial chaetae m_2 , e , and l_1 smooth.		12
—	Labial chaetae M_2 , E , and L_1 ciliated.		17
12	Abd II without chaeta p		13
—	Abd II with chaeta p		14
13	Head with 2+2 Ocelli.	<i>P. thibaudi</i> Stomp, 1977	
—	Head with 3+3 Ocelli.	<i>P. edax</i> Gisin, 1967	
14	Head with 3+3 Ocelli.		15
—	Head with more than 3+3 Ocelli.		16
15	Two ocelli anterior, one posterior in a separate pigment patch, Abd II with chaeta Q_1 as a macrochaeta.	<i>P. sexoculata</i> Schött, 1902	
—	All three ocelli tightly grouped at the anterior margin of the eye spot, Abd II chaeta q_1 as a microchaeta.	<i>P. fallax</i> (Börner, 1903)	
16	Head with 5+5 Ocelli.	<i>P. hartnerae</i> Winkler & Fiera, 2021	
—	Head with 6+6 Ocelli.	<i>P. duodecimpunctata</i> Denis, 1931	
17	Abd II with chaeta A as a macrochaeta.		18
—	Abd II with chaeta a as a microchaeta.		19
18	Head with 2+2 Ocelli, Abd II with chaeta q_1 as a microchaeta.	<i>P. alba</i> (Packard, 1873)	
—	Head with 4+4 Ocelli, Abd II with chaeta Q_1 as a macrochaeta.	<i>P. octopunctata</i> Börner, 1901	
19	Head with 2+2 Ocelli.		20
—	Head with 5+5 Ocelli.		21
20	Abd IV with 1+2 dorsomedial macrochaetae.	<i>P. bohémica</i> Rusek, 1979	
—	Abd IV with 0+2 dorsomedial macrochaetae.	<i>P. hercynica</i> Rusek, 1979	
21	Labial chaeta r smooth.	<i>P. horaki</i> Rusek, 1985	
—	Labial chaeta R ciliated.	<i>P. zygophora</i> (Schille, 1908)	

DISCUSSION

To date, a total of 23 species of *Pseudosinella* have been recorded in Hungary. The very first *Pseudosinella* species mentioned from the present territory of Hungary is the historic troglobiont springtail *P. aggtelekiensis*, collected by renowned Hungarian zoologists Elemér Bokor and Endre Dudich from the Baradla cave (Aggtelek Karst) and described by the Polish Collembola specialist Jan W. Stach (Stach 1929). The species was also detected later in the Slovak Karst (Kováč 2000), which forms a geographically contiguous unit with the Aggtelek Karst. Most probably, *P. aggtelekiensis* can be considered endemic in this region. Its occurrence in Austria (Strouhal & Vornatscher 1975) was already contested by Christian (1987) and also later by Kováč & Rusek (2012). The Romanian data not related to cave habitats (Fiera 2013) also requires validation based on the detailed redescription of *P. aggtelekiensis* by Kováč & Rusek (2012).

Since the publication of the Collembola checklist of Hungary (Dányi & Traser 2007), a total of nine additional *Pseudosinella* species have been recorded, including three species (*P. csafordensis*, *P. dungeri*, and *P. hartnerae*) new to science (Winkler & Mateos 2018; Winkler et al. 2021). Three species (*P. aelleni*, *P. bohémica*, and *P. hercynica*) new to the fauna of Hungary have previously been reported in various papers (Traser 2008, 2010; Winkler & Traser 2012a; Winkler et al. 2012; Winkler 2014, 2019). An interesting remark should be mentioned regarding the species *P. hercynica*. In the original description, Rusek (1985) described the species as white in color, while the specimens collected in Hungary are orange-red marbled, varying in intensity from very light to darker (Fig. 3B) tones. Nevertheless, the Hungarian specimens match the original description in all other characters (including the chaetotaxy), and the habitat (beech forest) was also the same as that of the holotype.

Three additional species (*P. edax*, *P. noseki*, and *P. thibaudi*), new to the Hungarian fauna, are presented here for the first time. *Pseudosinella edax* was collected in an old beech forest of Zala Hills, not far from the Austrian location of the holotype and other material in Gisin's original description (Gisin 1967), also found in beech forest associations. *Pseudosinella noseki* was identified from soil samples taken in an alluvial poplar forest along the Tisza River. Outside Hungary, this species has only been recorded in the Czech Republic (type locality), Moldova, and Ukraine (Rusek 1985; Buşmachi 2010; Kaprus & Goblyk 2015). *Pseudosinella thibaudi* was originally described from a cave in the Franconian Jura in Germany (Stomp 1977), and has been found later in subterranean habitats also in Slovakia (e.g., Kováč 2000; Mock et al. 2015) and in coniferous forests in the Czech Republic (Cuchta & Shrubovych 2015). In Hungary, *P. thibaudi* was collected from rocky slopes in a beech forest. As has been confirmed for most species belonging to the *P. vandeli*-group, the distribution of *P. thibaudi* is also most likely broader (Stomp 1986).

To date, three species of *Pseudosinella*, namely *P. argentea*, *P. csafordensis*, and *P. dungeri*, have been determined as endemic to Hungary. *Pseudosinella argentea* is a troglobiont species, and it is only known from its type locality (Lóczy-cave) near Lake Balaton. In addition to a detailed redescription, Dányi (2011) also urged the necessity of renaming the species, being the junior primary homonym of *P. argentea* Folsom, 1902, a cavernicolous species from North America (Christiansen & Bellinger 1998). The other two endemic species (*P. csafordensis* and *P. dungeri*) have recently been described; the former from an old remnant alluvial forest, while the latter from a xerophilous pannonic steppic grassland patch (Winkler & Mateos 2018).

AUTHOR'S CONTRIBUTION

The author confirms his contribution to the whole processing steps in the research, examination of the specimens, illustrations, and preparation of the manuscript, and He read and approved the final version of the manuscript.

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AVAILABILITY OF DATA AND MATERIAL

The specimens listed in this study are deposited in Institute of Wildlife Biology and Management, University of Sopron and are available from the curator upon request.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study only included arthropod material, and all required ethical guidelines for the treatment and use of animals were strictly adhered to in accordance with international, national, and institutional regulations. No human participants were involved in any studies conducted by the authors for this article.

CONSENT FOR PUBLICATION

Not applicable.

CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest regarding the publication of this paper.

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جنس *Pseudosinella* Schäffer, 1897 (Collembola, Entomobryidae) در مجارستان

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چکیده: در این چک‌لیست، اطلاعات مربوط به انتشار گونه‌های دم‌فتری‌های متعلق به جنس *Pseudosinella* در مجارستان ارائه شد. علاوه بر مراجع مرتبط موجود، داده‌های منتشرنشده از نمونه‌های به تازگی جمع‌آوری شده نیز گنجانده شد. تاکنون، وجود ۲۳ گونه از این جنس در مجارستان تأیید شده است و برای آن یک کلید شناسایی نیز ارائه شد. از زمان انتشار فهرست دم‌فتری‌های مجارستان، مجموعاً نه گونه دیگر *Pseudosinella* در این کشور ثبت شده‌اند. در این مطالعه، گونه‌های *P. edax* Gisin, 1967، *P. thibaudi* Stomp, 1977 و *P. noseki* Rusek, 1985 برای اولین بار گزارش شدند. تاکنون، سه گونه از *Pseudosinella* به نام‌های *P. argentea* Loksa, 1960 nec Folsom، *P. csafordensis* Winkler Mateos, 2018 و *P. dungeri* Winkler Mateos, 2018 به عنوان گونه‌های داخلی مجارستان شناخته شده‌اند.

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