






Walckenaeria stylifrons and *Spiracme mongolica* (Araneae, Linyphiidae, Thomisidae), two new species to Slovakia

Pavol Purgat^{1,2*}, Peter Gajdoš¹, Adrián Purkart³, Natália Hurajtová^{1,2}, Ľubomír Volnár³, Katarína Krajčovičová³

1 Institute of Landscape Ecology, Slovak Academy of Sciences, Branch Nitra, Nitra, Slovakia • PG: nrukajd@savba.sk  <https://orcid.org/0000-0003-2055-461X> • PP: nrukpapu@savba.sk  <https://orcid.org/0000-0002-1504-7659> • NH: n.hurajtova@savba.sk  <https://orcid.org/0000-0002-9296-4944>

2 Faculty of Natural Sciences, Constantine the Philosopher University in Nitra, Nitra, Slovakia

3 Department of Zoology, Faculty of Natural Sciences, Comenius University in Bratislava, Bratislava, Slovakia • AP: purkart.adrian@gmail.com  <https://orcid.org/0000-0002-8471-5083> • KK: krajcovic.katarina@gmail.com  <https://orcid.org/0000-0003-1303-2434> • LV: lubomir.volnar@gmail.com

* Corresponding author

Abstract

The spiders *Walckenaeria stylifrons* (O. Pickard-Cambridge, 1875) and *Spiracme mongolica* (Schenkel, 1963) are reported from Slovakia for the first time. These new records are based on adult males found in Western Slovakia in xerothermic habitats. The occurrence of *W. stylifrons* in Slovakia fills the gap in its distribution in Pannonian Basin and between Austria and Ukraine. *Spiracme mongolica* has been known only from the Balkans and south-eastern part of Europe to central Asia, this is the first record for Central Europe. We suggest *Spiracme mongolica* (Schenkel, 1963) **new combination** for *Xysticus mongolicus* Schenkel, 1963. Characteristic features, photographs of habitus and copulatory organs, and habitats of the new records are presented.

Keywords

Aeolian sand dunes, Aranei, Central Europe, faunistics, first record, Panonian Basin, xenomorphic habitats

Academic editor: Yuri Marusik | Received 23 June 2021 | Accepted 5 October 2021 | Published 22 November 2021

Citation: Purgat P, Gajdoš P, Purkart A, Hurajtová N, Volnár L, Krajčovičová K (2021) *Walckenaeria stylifrons* and *Spiracme mongolica* (Araneae, Linyphiidae, Thomisidae), two new species to Slovakia. Check List 17 (6): 1601–1608. <https://doi.org/10.15560/17.6.1601>

Introduction

Central Europe is one of the best-studied areas in the world in respect of spiders, from both a faunistic and a taxonomic point of view. Slovakia, with over 958 recorded species, is among the best-studied countries of Central Europe (cf. Hungary 809, Poland 847, and Czech Republic 902) (Gajdoš et al. 2018; Nentwig et al. 2021). Despite of this fact, the spider fauna of Slovakia is still not completely studied. Our research of spider

assemblages in xeromorphic habitats in Western Slovakia has revealed two species new to the country. During 2018–2019 we discovered *Walckenaeria stylifrons* (O. Pickard-Cambridge, 1875) and *Spiracme mongolica* (Schenkel, 1963).

The family Linyphiidae, with over 4695 species in 624 genera (WSC 2021), is the second largest spider family on Earth and the most diverse family in Europe. The

dwarf spider *W. stylifrons* is considerably widespread in Europe, but within Central Europe the species has so far been recorded only from Austria, Germany, and Switzerland. Until now, no records of this species have been known from the Pannonian Basin. Thomisidae is a large spider family comprising over 2100 species in 169 genera worldwide (WSC 2021). The crab spider *S. mongolica* is distributed mainly in Asia but with part of its geographic distribution extending to southeastern Europe and the Balkans. Within Europe, this species has so far been recorded only from Southern European Russia, namely the Middle Volga region, Ulyanovsk Area (Krasnobaev 2002), northeastern Ukraine (Polchaninova and Prokopenko 2013, 2019), and Serbia (Grbić et al. 2019).

We provide information on the first records of *W. stylifrons* and *S. mongolica* in Slovakia and improve the knowledge of their distribution in Central Europe. We also suggest *Spiracme mongolica* (Schenkel, 1963) new combination for *Xysticus mongolicus* Schenkel, 1963, in consideration of this species' male copulatory organs, which are typical of the genus *Spiracme*.

Methods

We carried out our research on aeolian sand dunes located in Záhorie Protected Landscape Area, Borská nížina, during 2018 and 2019 (Fig. 1, 2A). The study area serves as a military complex used by the Slovak army. Additionally, three males of *W. stylifrons* were collected in a viticultural landscape near the town of Modra (Fig. 2B). The material was obtained using pitfall traps.

Measurements of *W. stylifrons* were obtained using an Olympus SC 100 attached to an Olympus SZx16 stereomicroscope and edited with Olympus Stream basic. Measurements of *S. mongolica* were taken from digital images using the AxioVision 40LE application. Digital photographs were taken using a Canon EOS 5D Mark II camera attached to a Zeiss Axio Zoom V16 stereomicroscope. Image stacks were produced manually, combined using Zerene Stacker software and subsequently edited in Adobe Photoshop CC. Nomenclature follows World Spider Catalog (2021).

The specimens are preserved in 70% ethanol and deposited in the collections of Institute Landscape Ecology SAS in Nitra (ILE SAS, curator: P. Purgat).

Results

Linyphiidae Blackwall, 1859

The genus *Walckenaeria* Blackwall, 1833 includes 197 species described worldwide (WSC 2021), of which 62 species occur in Europe. In Slovakia, this genus is represented by 21 known species (Gajdoš et al. 2018; Nentwig et al. 2021). These are spiders with varied ecological preferences, ranging from shaded and humid habitats to sun-exposed and dry habitats (Nentwig et al. 2021).

Walckenaeria stylifrons (O. Pickard-Cambridge, 1875)

Figures 1–3

Horcotes niger—Wiehle 1965: 17–19, figs. 5–12 (♂).

Walckenaeria stylifrons—Wunderlich 1972: 401, figs. 76, 80, 84, 91, 98 (♂♀); Nentwig 2021: figs. (♂♀).

For the complete list of taxonomic references, see WSC (2021).

Material examined: SLOVAKIA – Western Slovakia

• Plavecký Mikuláš (Fig. 1); 48°32'06"N, 017°15'28"E, 215 m elev.; 4.XI.–5.XII.2018; A. Purkart leg.; young pine stand on aeolian sand dunes (Fig. 2A); pitfall trap; 1 ♂, ILE SAS-1405. • Modra (Fig. 1); 48°20'45"N, 017°18'04"E, 251 m elev.; 4.II.–4.III.2019; P. Purgat, P. Gajdoš leg.; ruderalized soil–stone terrace between two vineyard parcels (Fig. 2B); pitfall trap; 2 ♂, ILE SAS-843 (Fig. 3). • Same locality; 16.I.–9.III.2020; P. Purgat, P. Gajdoš leg.; pitfall trap; 1 ♂, ILE SAS-1360.

Distribution. This species is recorded from 15 European countries, and it is known from eastern England to eastern Germany in the north, and from the Iberian Peninsula to the Crimea and Cyprus in the south. Within Central Europe, this species has so far been known from Austria, Germany, and Switzerland (Nentwig et al. 2021; Fig. 1).

Identification. Our specimens match the descriptions and illustrations given in literature. Body length of one of our specimens is greater than maximal body length published by Nentwig et al. (2021).

Measurements of the Slovak specimens in mm (♂)

(Fig. 3). Body length 1.67–1.84; carapace 0.73–0.81 long, 0.52–0.58 wide; opisthosoma 0.94–1.03 long, 0.57–0.77 wide.

Thomisidae Sundevall, 1833

The genus *Spiracme* Menge, 1876 includes nine described species worldwide (WSC 2021), of which only one species, *Spiracme striatipes* (L. Koch, 1870), is known in Europe.

Spiracme mongolica (Schenkel, 1963) comb. nov.

Figures 4–6

Xysticus mongolicus Schenkel 1963: 226–228, fig. 127a–c (♂); Song and Zhu 1997: 95, figs. 62c–d (♂); Marusik and Logunov 1990: 62 figs. 48, 49 (♂); Formichev 2015: 94, figs. 13–15 (♂); Nentwig et al. 2021: figs. (♂♀).

For the complete list of taxonomic references, see WSC (2021).

Material examined. SLOVAKIA – Western Slovakia •

Plavecký Mikuláš (Fig. 4); 48°31'55"N, 017°15'44"E; 208 m elev.; 4.XI.2018–5.XII.2018; A. Purkart leg.; 2-years old afforested pine stand, after clearcutting, on aeolian sand dunes (Fig. 5); pitfall trap; 1 ♂, ILE SAS-1407 (Fig. 6).

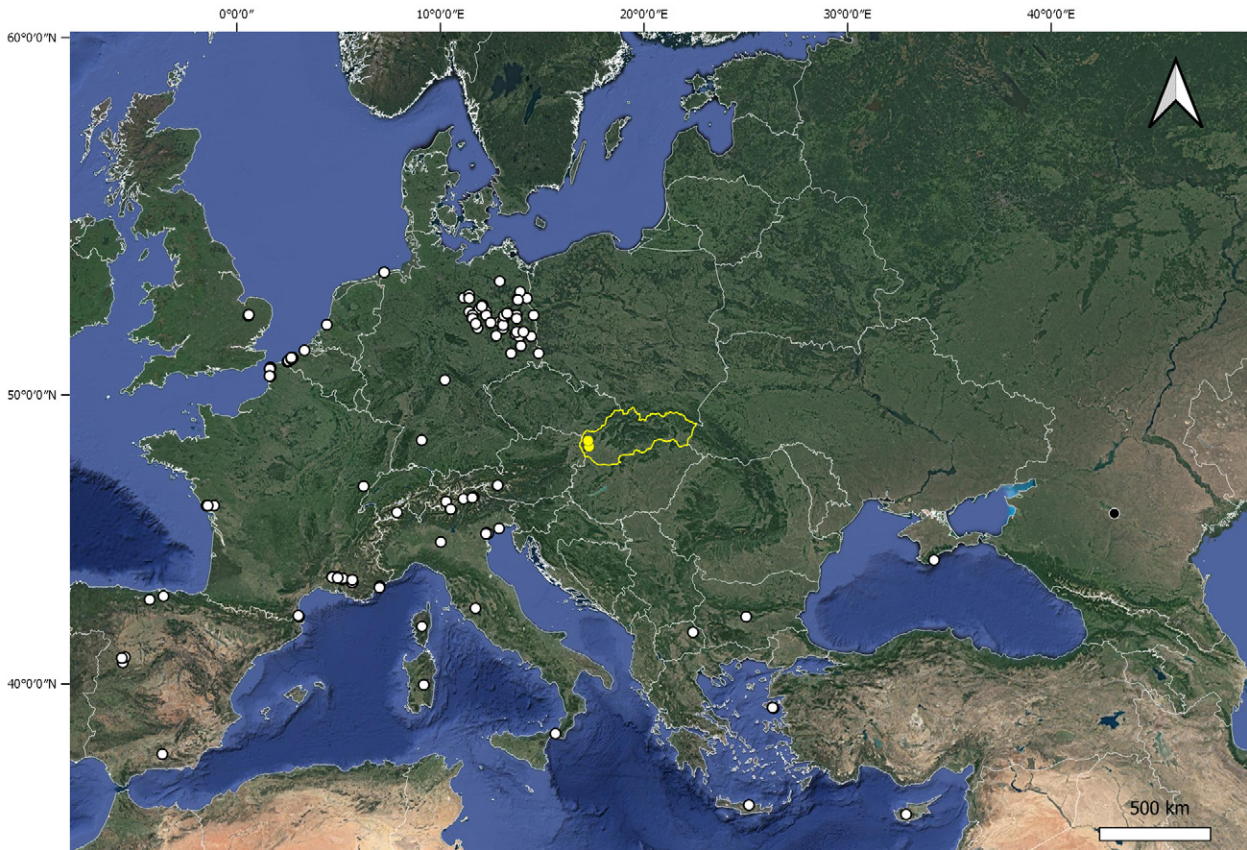


Figure 1. Distribution of *Walckenaeria stylifrons* in Europe; Austria, Belgium, Bulgaria, Cyprus, Germany, Spain, France, France/Corsica, United Kingdom, Greece, Greece/Crete, Switzerland, Italy, Italy/Sardinia, North Macedonia, Netherlands, Southern European Russia, Slovakia, Ukraine; yellow border = Slovak border, white circle = records with high precision, yellow circle = new records, black circle = records with regional precision.



Figure 2. Localities of new records of *Walckenaeria stylifrons* in Slovakia. **A.** Záhorie protected landscape area, young pine stand on aeolian sand dunes. **B.** Modra, ruderalized soil-stone terrace between two vineyard parcels.

Distribution. This species is known from Serbia to the European part of Russia. Its distribution in Asia extends from the Central Asian part of Russia, Azerbaijan, Kazakhstan to Mongolia, and China (Nentwig et al. 2021). In China, it is known only from eastern Inner Mongolia and Xinjiang (Hu and Wu 1989) (Fig. 4). The record from Azerbaijan is probably incorrect because the presence there of this species is not proven by material and also it is not listed in the catalog of Caucasian spiders (Otto 2020).

Identification. Our specimens match the descriptions and illustrations given in literature Nentwig et al. (2021).

Comments. Accounting that this species has no regular apophyses, but a serrated embolus like in *Spiracme striatipes* (L. Koch, 1870), the type species of *Spiracme*, we transfer *X. mongolicus* to this genus and suggest new combination *Spiracme mongolica* (Schenkel, 1963).

Measurements of the Slovak specimen in mm (♂) (Fig. 6). Body length: 5.04; carapace 2.33 long, 2.18 wide; opisthosoma 2.45 long, 2.12 wide.

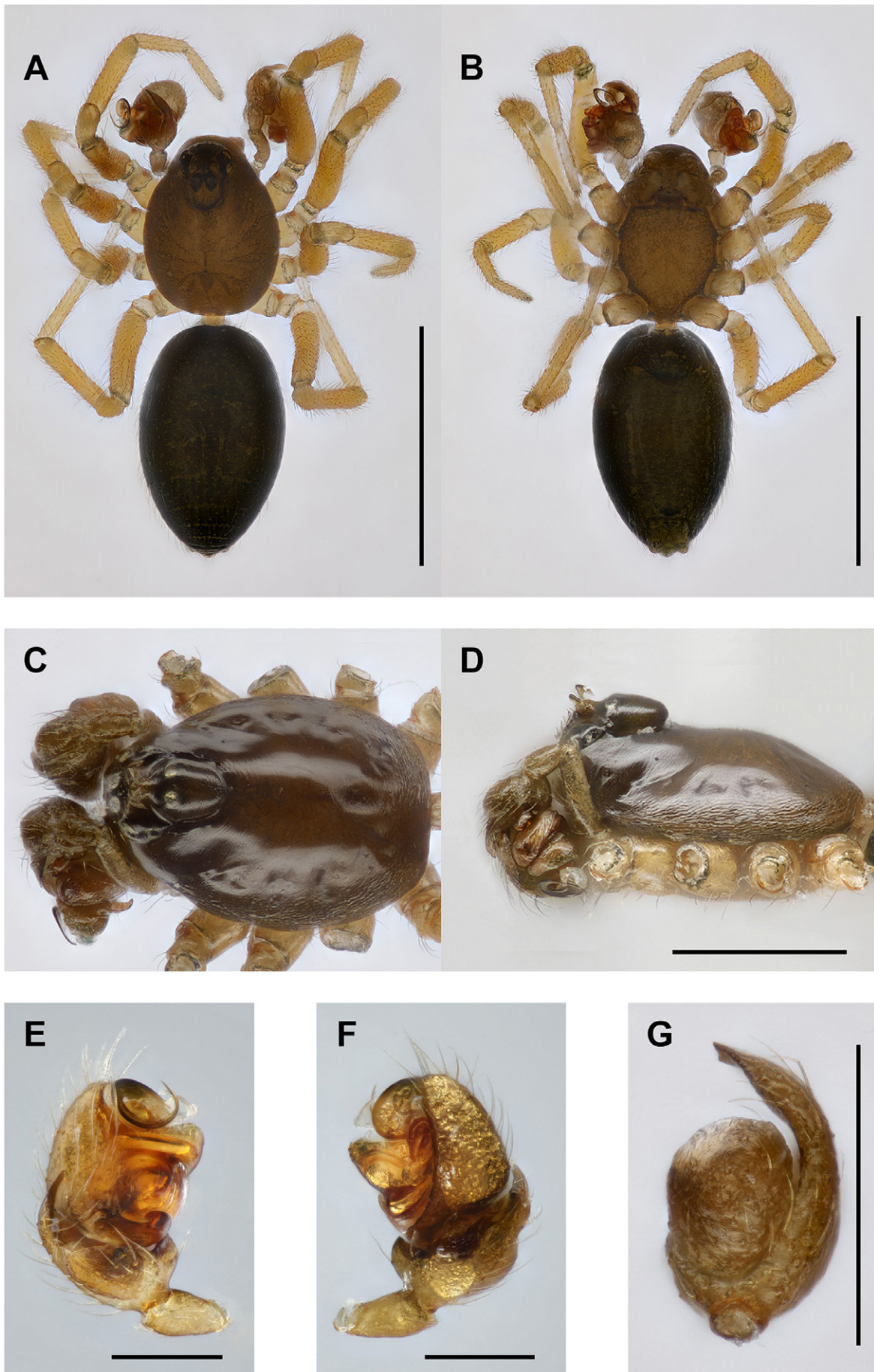


Figure 3. *Walckenaeria stylifrons* (O. Pickard-Cambridge, 1875), male from Slovakia. **A.** Dorsal view. **B.** Ventral view. **C.** Cephalic region of male, dorsal view. **D.** Idem., lateral view. **E.** Left pedipalp of male, retrolateral view. **F.** Idem., prolateral view. **G.** Idem., tibial apophysis. Scale bars: A, B = 1 mm, D = 0.5 mm, E, F, G = 0.1 mm.

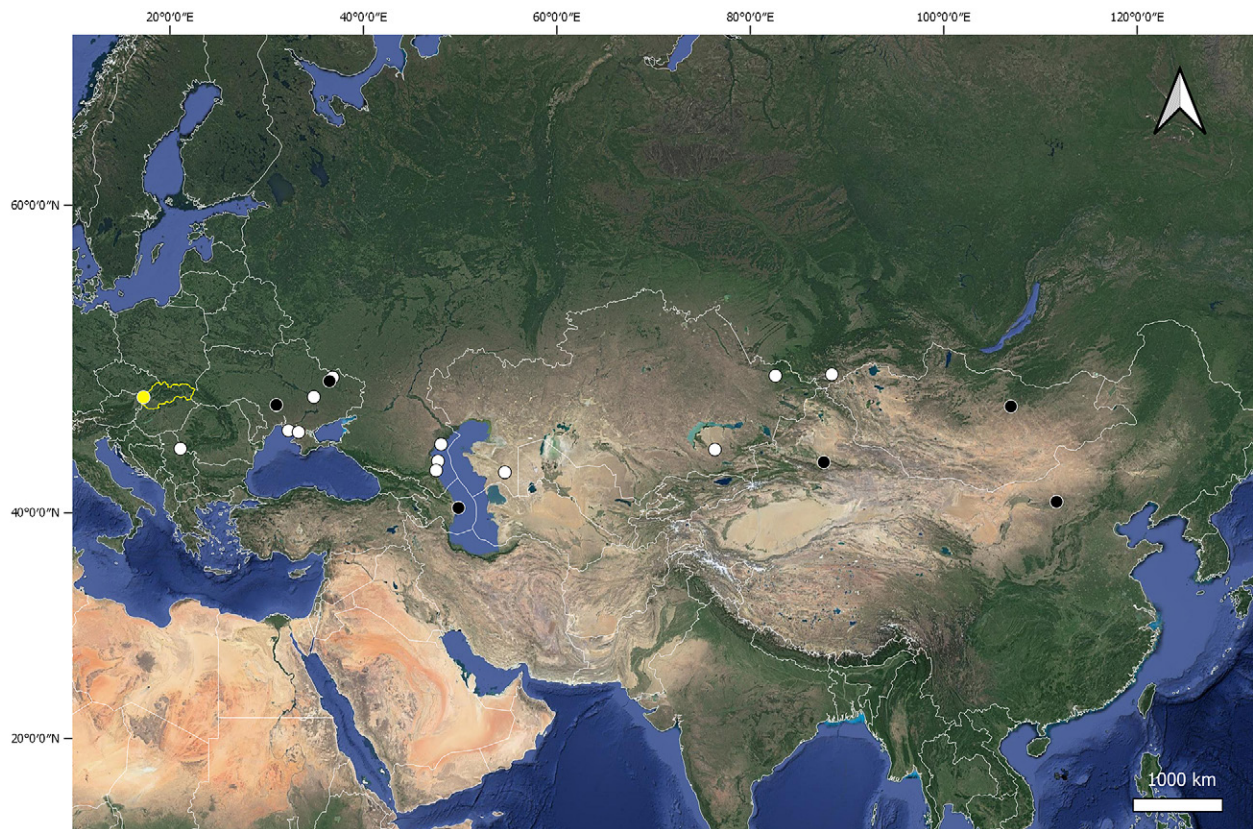


Figure 4. Distribution of *Spiracme mongolica* in Eurasia; Azerbaijan, Inner Mongolia, Kazakhstan, Mongolia, European Russia, Altai, Slovakia, Serbia, Ukraine; yellow border = Slovak border, white circle = records with high precision, yellow circle = new records, black circle = records with regional precision.



Figure 5. Locality of new record of *Spiracme mongolica* in Slovakia; Záhorie protected landscape area, a two-year old afforested pine stand after clearcutting on aeolian sand dunes.

Discussion

Our discovery of *Walckenaeria stylifrons* from the Pannonian part of Slovakia (the finding from Záhorie protected landscape area, Borská nížina; Fig. 1) and on the border of Pannonian biogeographical region and Carpathian Mountains (the Small Carpathian Mountains; the

findings from Modra; Fig. 1) are evidence of its occurrence in the Pannonian Basin. Considering the nature of the biota there, we assume that this species lives elsewhere in Europe. *Walckenaeria stylifrons* is thermophilic species which lives in various dry localities (Nentwig et al. 2021), usually on sandy soils in grasslands (Harvey et al. 2002; Jocqué 1977; Baert and Maelfait 1999; Bonte

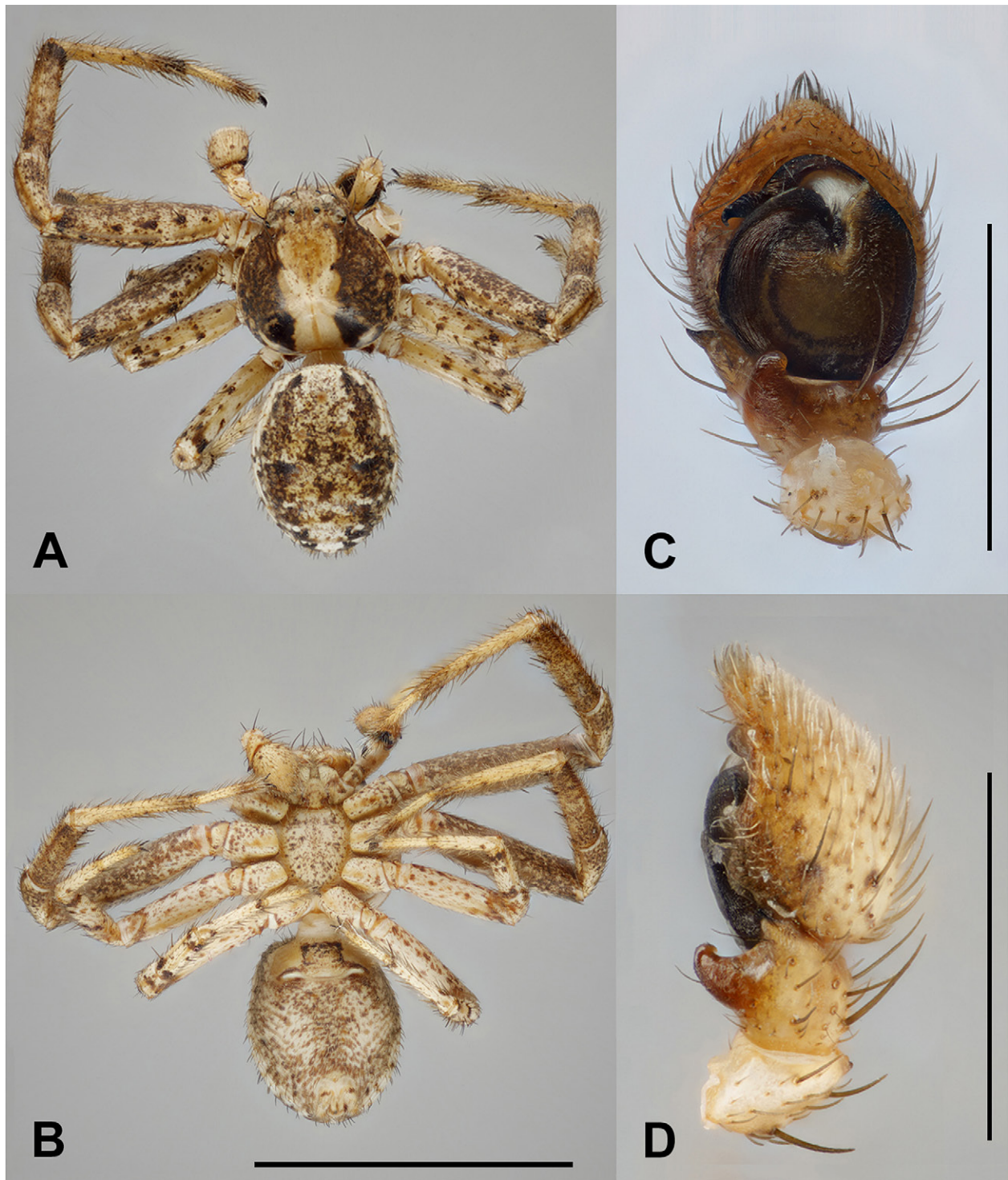


Figure 6. *Spiracme mongolica* (Schenkel, 1963) comb. nov., male from Slovakia. **A.** Dorsal view. **B.** Ventral view. **C.** Left pedipalp of male, ventral view. **D.** Right pedipalp of male, retrolateral view. Scale bars: A, B = 5 mm, C, D = 1 mm.

et al. 2000), heathlands (Duffey and Denis 1967; Wunderlich 1972), pine forests (Wiehle 1965; Wunderlich 1995), tall dense *Festuca* turfs (Harvey et al. 2002), and xerophytic steppe on limestone (Komnenov 2013). It is sporadically documented from other types of habitats such as alpine meadows (Thaler 1989), under rocks on the seacoast (Kovblyuk et al. 2008), and from leaf litter of damp beech forest (Perez et al. 2015). The new finding of this species on aeolian sands in Borská nížina (Fig. 2A) is practically identical with the majority of habitats

mentioned in the literature. Borská nížina has a semi-natural habitat characterized by dry, sandy substrate with a pine stand. According to other authors, *W. stylifrons* can inhabit man-made and agriculturally used landscapes, for example urban parks, cherry orchards, and vineyards (Hansen 1995; Pantini et al. 2013). Our new Slovakian record from a ruderalized soil–stone terrace between two vineyard parcels in Modra (Fig. 2B) corroborates the previous findings of this species in man-made habitats. In Central Europe, however, *W. stylifrons* is a rarely

found species (sporadic records). We found adult males in the winter (November to early March). In the literature, adult males have been found from October to the end of April and in August, and adult females from February to the end of July and in December (Denis 1964; Duffey and Denis 1967; Jocque 1977; Wunderlich 1995; Kovblyuk et al. 2008; Komnenov 2013; Perez et al. 2015). The rarity of *W. stylifrons* may be due to the occurrence of adults mostly in the winter, as most researchers focus their collection efforts during spring to autumn.

Concerning habitat demands of *Spiracme mongolica* comb. nov. in Asia, this species inhabits many types of habitats from natural to semi-natural ones, such as stony semi-desert steppe (Fomichev 2015), grasslands, and forests (Hu and Wu 1989). This species also inhabits man-made and agricultural habitats, such as orchards (Hu and Wu 1989), botanical gardens (Marusik and Logunov 1990), and fields used for growing cotton (Song and Zhu 1997), alfalfa (Song 1987), wheat, and rice. In Europe, *S. mongolica* is recorded only from xerothermic habitats, namely xerothermic habitats at the northern edge of the Central Steppes of Russia (Fomichev 2015), sandy habitats in eastern Ukraine (Polchaninova et al. 2017; Polchaninova and Prokopenko 2019), and an area with loose, semi-cohesive sand with a steppe grassland community at Heronje, Serbia (Grbić et al. 2019). Polchaninova et al. (2017) considered *S. mongolica* to be sandy grassland specialist. The occurrence of *S. mongolica* on aeolic sand dunes in Slovakia (Fig. 5) confirms this species' preference for xerothermic habitats. Based on the record of *S. mongolica* in Serbia (Grbić et al. 2019), we assume that this species naturally occurs in the Pannonian Basin.

Our new records of *W. stylifrons* in Slovakia extend the known distribution of this species to the Pannonian biogeographical region (Fig. 1). Our new record of *S. mongolica* in Slovakia extends its known distribution to Central Europe and represents the westernmost known occurrence of this species (Fig. 4).

Acknowledgements

We are grateful to Christian Komposch (Graz, Austria) for providing data. We would like to thank our colleagues from Bratislava, Slovakia, namely Tengyue Zhang for translation of Chinese language papers and Alica Christophory for technical assistance with the figures. Special thanks belong to Matthew Prince (Nižný Čaj, Slovakia) for improving the English of the manuscript. We are also grateful to all the reviewers for their constructive comments. The research was financially supported by the VEGA grant no. 1/0704/20, and No. 2/0149/20 and UGA grant VIII/16/2021.

Authors' Contributions

Conceptualization: PP. Data curation: PP. Methodology: PP. Resources: AP. Software: NH, KK. Supervision: PP, PG. Validation: PG. Visualization: NH, KK. Writing –

original draft: PP, KK. Writing – review and editing: PG, AP, LV.

References

- Baert L, Maelfait JP (1999) The spider fauna of the Belgian salt marshes. Bulletin van het Koninklijk Belgisch Instituut voor Natuurwetenschappen, Entomologie 69: 5–18.
- Bonte D, Maelfait JP, Hoffmann M (2000) The impact of grazing on spider communities on a mesophytic calcareous dune grassland. Journal of Coastal Conservation 6: 135–144. <https://doi.org/10.1007/BF02913810>
- Denis J (1964) Compléments à la faune arachnologique de Vendée. Bulletin de la Société Scientifique de Bretagne 38: 99–117.
- Duffey E, Denis J (1967) *Wideria stylifrons* (O. P.-C.), a southern European spider from the Norfolk Breckland. Transactions of the Norfolk and Norwich Naturalists' Society 21: 25–31.
- Fomichev AA (2015) New data on the crab spider genus *Xysticus* C.L. Koch, 1835 from the Altai, South Siberia (Aranei: Thomisidae). Arthropoda Selecta 24 (1): 91–97. <https://doi.org/10.15298/arthsel.24.1.05>
- Gajdoš P, Černecká L, Franc V, Šestáková A (2018) Pavúky Slovenska. Slovenské názvoslovie, prehľad čeľadí a súčasné poznatky. Veda, vydavateľstvo Slovenskej akadémie vied, Bratislava, Slovakia, 172 pp.
- Grbić G, Hänggi A, Gajić I, Vaselek S, Ivković S (2019) Spiders (Araneae) of the Deliblato Sands (Serbia). Acta Entomologica Serbica 24 (1): 79–93. <https://doi.org/10.5281/zenodo.3249916>
- Hansen H (1995) Über die Arachniden-Fauna von urbanen Lebensräumen in Venedig-III. Die epigäische Spinnen eines Stadtparkes (Arachnida: Araneae). Bollettino del Museo Civico di Storia Naturale di Venezia 44: 7–36.
- Harvey PR, Nellist DR, Telfer MG (2002) Provisional atlas of British spiders (Arachnida, Araneae). Volume 1. Biological Records Centre, Huntingdon, UK, 214 pp.
- Hu JL, Wu WG (1989) 新疆农区蜘蛛. [Spiders from agricultural regions of Xinjiang Uygur Autonomous Region, China]. Shandong University Publishing House, Jinan, China, 435 pp. [in Chinese].
- Jocqué R (1977) Contribution à la connaissance des araignées de Belgique. IV. Biologisch Jaarboek Dodonaea 45: 141–149.
- Komnenov M (2013) Spider fauna of the Osogovo Mt. Range, north-eastern Macedonia. Fauna Balkana 2: 1–267.
- Kovblyuk M, Nadolny AA, Gnelitsa VA, Zhukovets EM (2008) Spiders (Arachnida, Aranei) of the Martyan Cape Reserve (Crimea, Ukraine). Caucasian Entomological Bulletin 4 (1): 3–40. <https://doi.org/10.23885/1814-3326-2008-4-1-3-40>
- Krasnobaev YP (2002) New spider records from middle reaches of the River Volga. (Arachnida: Aranei). Arthropoda Selecta 11 (3): 239–246.
- Marusik YM, Logunov DV (1990) The crab spiders of Middle Asia, USSR (Aranei, Thomisidae). 1. Descriptions and notes on distribution of some species. Korean Arachnology 6 (1): 31–62.
- Nentwig W, Blick T, Bosmans R, Gloor D, Hänggi A, Kropf C (2021) Spiders of Europe. Version 05.2021. <https://www.araneae.nmbe.ch>. Accessed on: 2021-05-26. <https://doi.org/10.24436/1>
- Otto S (2020): Caucasian spiders. A faunistic database on the spiders of the Caucasus. Version 10.2020. <https://caucasus-spiders.info/>. Accessed on 2020-8-24.
- Pantini P, Sassu A, Serra G (2013) Catalogue of the spiders (Arachnida Araneae) of Sardinia. Biodiversity Journal 4: 3–104.
- Perez JF, Castro A, Prieto C (2015) Nuevos registros de arañas (Araneae) para Cantabria (Norte de la Península Ibérica). Revista Ibérica de Aracnología 27: 99–104.
- Polchaninova N, Karolinskiy E, Filatova O, Filatov M (2017) Semi-natural grasslands across borders. In: 14th Eurasian grassland conference: book of abstracts, Riga, Latvia, 47.
- Polchaninova NY, Prokopenko EV (2013) Catalogue of the spiders

- (Arachnida, Aranei) of Left-Bank Ukraine. *Arthropoda Selecta* 2: 1–268.
- Polchaninova NY, Prokopenko EV (2013) Catalogue of the spiders (Arachnida, Aranei) of Left-Bank Ukraine. *Arthropoda Selecta* 2: 1–268.
- Polchaninova NY, Prokopenko E (2019) An updated checklist of spiders (Arachnida: Araneae) of Left-Bank Ukraine. *Arachnologische Mitteilungen* 57: 60–64. <https://doi.org/10.30963/aramit5711>
- Schenkel E (1963) Ostasiatische Spinnen aus dem Muséum d'Histoire naturelle de Paris. *Mémoires du Muséum National d'Histoire Naturelle de Paris (A, Zoologie)* 25: 1–481.
- Song DX (1987) 中国农区蜘蛛. [Spiders from agricultural regions of China (Arachnida: Araneae)]. Agriculture Publishing House, Beijing, China, 376 pp. [in Chinese].
- Song DX, Zhu MS (1997) 中国动物志. [Fauna Sinica: Arachnida: Araneae: Thomisidae, Philodromidae]. Science Press, Beijing, China, 259 pp. [in Chinese].
- Thaler K (1989) Epigäische Spinnen und Weberknechte (Arachnida: Aranei, Opiliones) in Bereich Höhentransektes Glocknerstrasse – Südabschnitt (Kärnten, Österreich). In: Cernusca SA (Ed.) *Struktur und Funktion von Graslandökosystemen im Nationalpark Hohe Tauern*. Universitätsverlag Wagner, Innsbruck, Austria, 201–215.
- Wiehle H (1965) Beiträge zur Kenntnis der deutschen Spinnenfauna IV. *Mitteilungen aus dem Zoologischen Museum in Berlin* 41 (1): 11–57. <https://doi.org/10.1002/mmnz.19650410103>
- World Spider Catalog (2021) World spider catalog. Version 22.0. Natural History Museum Bern. <http://wsc.nmbe.ch>. Accessed on: 2021-05-26. <https://doi.org/10.24436/2>
- Wunderlich J (1972) Zur Kenntnis der Gattung *Walckenaeria* Blackwall 1833 unter besonderer Berücksichtigung der europäischen Subgenera und Arten (Arachnida: Araneae: Linyphiidae). *Zoologische Beiträge* 18: 371–427.
- Wunderlich J (1995) Beschreibung bisher unbekannter Arten der Baldachinspinnen aus der östlichen Mediterraneis (Arachnida: Araneae: Linyphiidae). *Beiträge zur Araneologie* 4: 655–686.