Biologia Serbica, 2025, 47(2): 44-49 DOI: 10.5281/zenodo.18082941

Original paper

On the status of some species of the genus *Trichoniscus* Brandt, 1833 (Isopoda: Oniscidea: Trichoniscidae) in the fauna of Serbia

Ivo Karaman[1, 2]

[1]*Department of Biology and Ecology, Faculty of Sciences, University of Novi Sad, Trg Dositeja Obradovića 2, SR – 21000 Novi Sad, Serbia*
[2] *Serbian Biospeleological Society, Trg Dositeja Obradovića 2, 21000 Novi Sad, Serbia*

Accepted: 25 December 2025 / Published online: 27 December 2025

Summary. Synonymy has been established for the three taxa, *Trichonsicus serboorientalis* Pljakić, 1977 *T. bononiensis timocensis* Pljakić, 1977 and *T. bononiensis sotirovi* Pljakić, 1977, with previously described troglobiotic species *T. bureschi* Verhoeff, 1926 and *T. bononiensis* Vandel, 1965. Known localities for *T. bureschi* and *T. bononiensis* in Serbia are listed and an approximate distribution map of both species is presented. *Trichonsicus bureschi* is treated as a younger troglobiont, and not as a troglophile. The closely related group of *Trichonsicus* species, *„inferus"* group, is expanded and its distribution is presented on the map.

Keywords: Balkans, *„inferus"* group, synonymy, taxonomy, troglobiont.

INTRODUCTION

The genus *Trichonsicus* Brandt, 1833 contains the largest number of species in the family Trichoniscidae, and is one of the most numerous among terrestrial isopods. Over one hundred species from this genus are known to date (Schmalfuss 2003). It consists of species with smaller body sizes (mainly 2-5 mm) that prefer wetter places next to springs, smaller watercourses, Mesovoid Shallow Substratum (MSS), and caves. They are mainly related to forest biotopes. The center of the genus' diversity is in Europe, along with its neighboring areas: predominantly the Mediterranean region and the Balkan Peninsula. In fact, half of all known species are present in the Balkans. They are often endemic to a narrow area, and some cave species are often stenoendemic. Cave species of this genus are more numerous in the areas of the eastern part of the Balkan Peninsula, from the southern Carpathians in the north to the southern Aegean islands in the south and eastern Serbia in the west (Pljakić 1977; Tabacaru and Giurginca 2013; Paragamian et al. 2025).

The isopod cave fauna of eastern Serbia was investigated by Milika Pljakić in the 1970s, and she published descriptions of seven taxa of the genus *Trichoniscus* (Pljakić 1970, 1972, 1977). They are: *Trichoniscus bogovinae* Pljakić, 1970; *T. buturovici* Pljakić, 1972; *T. naissensis* Pljakić, 1977; *T. pancici* Pljakić, 1977; *T. serboorientalis* Pljakić, 1977; *T. bononiensis timocensis* Pljakić, 1977 and *T. bononiensis sotirovi* Pljakić, 1977. In the analysis of the collected specimens and the preserved part of Pljakić's collection (holotypes whereabouts unknown), the validity of *T. bogovinae*, *T. buturovici*, and *T. pancici* was established. However, synonymy has been established for the remaining taxa with previously described species *T. bononiensis* Vandel, 1965 and *T. bureschi* Vandel, 1965.

E-mail: ivo.karaman@dbe.uns.ac.rs

RESULTS

***Trichoniscus bononiensis* Vandel, 1965**
(Fig.1)
Trichoniscus bononiensis timocensis Pljakić, 1977 nov. syn.
Trichoniscus bononiensis sotirovi Pljakić, 1977 nov. syn.

Localities in Serbia: Goveđa peć Cave, v. Pričevac, Kalna, (30-07-1973, M. Pljakić; 30-08-1973, M. Pljakić); Pećina u Gabrovnici Cave, left bank of the river Timok (29-07-1973, M. Pljakić); no name cave on the road to Korenac, close to Pećina u Gabrovnici Cave (29-07-1973, M. Pljakić); Velika pećina Cave, road Kalna – Knjaževac (30-12-2022, 31-12-2013, D. Antić, M. Šević); Gornja Lenovačka pećina Cave, v. Lenovo, Tupižnica (22-09-2022, D. Antić); Crvena stena Cave, v. Vasilj, Knjaževac (31-07-1973, M. Pljakić); Gornja manastirska pećina Cave, Selačka, Zaječar (4-06-2016, D. Antić); Bižina duvka Cave, Papratno, Kalna (3-08-1974, M. Pljakić); Kravljanska pećina Cave, v. Kravlje, Niš (20-10-1974, M. Pljakić); Jama na Prinovcu Pit, Cerje, Kamenički vis (23-01-2023, I. Njunjić). Ranjena dupka Cave, Vratarnica, Stara planina Mt. (04-08-2016, D. Antić).

Trichoniscus bononiensis has a disjunct range, and is more widely distributed in the caves of the extreme northwest of Bulgaria and the eastern part of Serbia, where it is mainly present in the limestone massifs of the upper and middle reaches of the Timok River in a broader sense (the middle part of the Svrljiški Timok and the Kalafat Mountains, the upper reaches of the Trgoviški Timok and the central part of the Veliki Timok) (Fig. 2).

In the caves near the village of Kalna, *T. bononiensis* occurs sympatrically with the endemic cave species *T. pancici* (Pljakić 1977).

The subspecies (*T. bononiensis timocensis* and *T. bononiensis sotirovi*) described by Pljakić (1977) from Serbia show the features of the relevant characters (Fig. 1) in accordance with those presented in the original description of *T. bononiensis* (Vandel 1965). It is also common for the subspecies to be geographically separated, which is not the case with the two subspecies of *T. bononiensis* in Serbia.

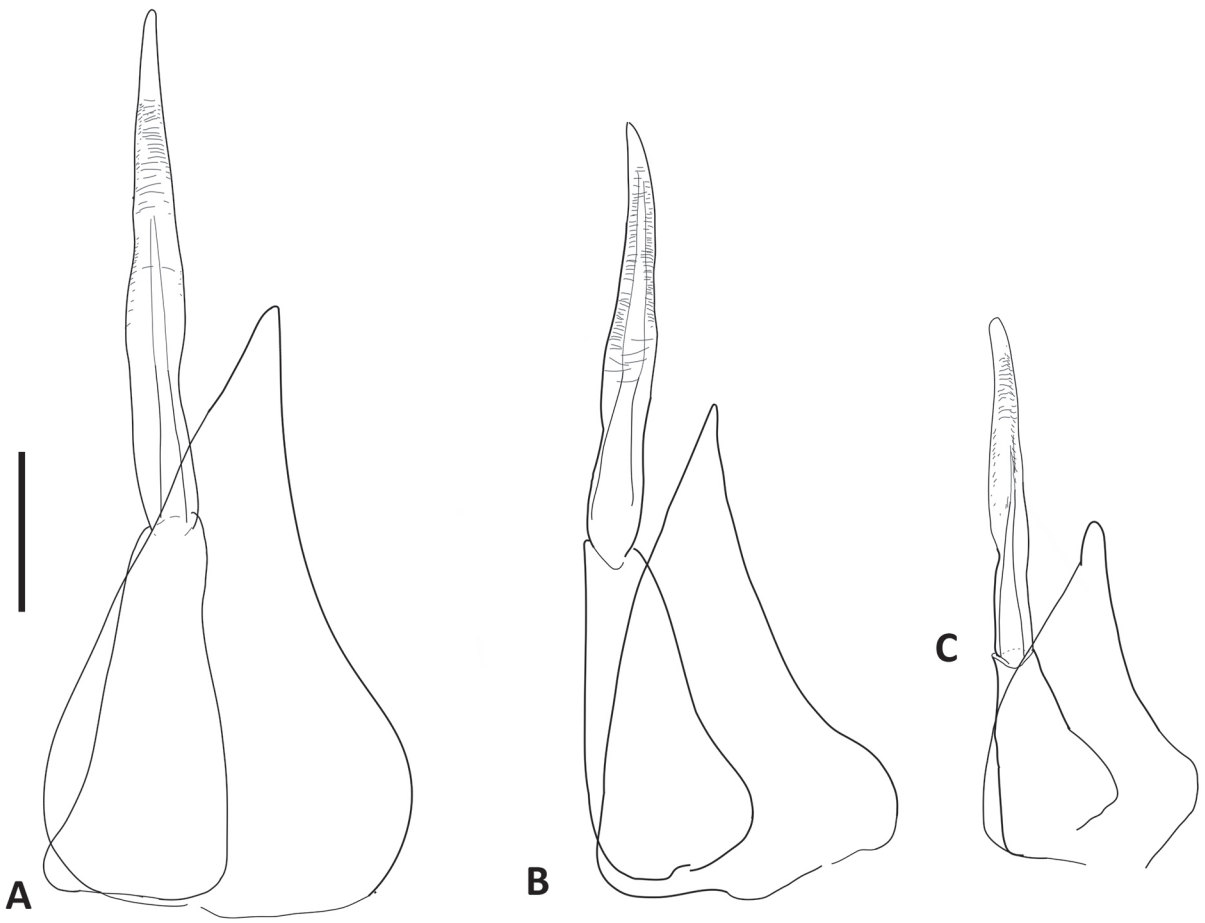

Fig. 1. *Trichoniscus bononiensis* Vandel, 1965, male pleopod 1. **A**, Goveđa peć Cave, Pićevac, Kalna, paratype; **B**, Gornja manastirska pećina Cave, Zaječar; **C**, Jama na Prinovcu Pit, Cerje, Niš. (Scale bar = 100 μm.)

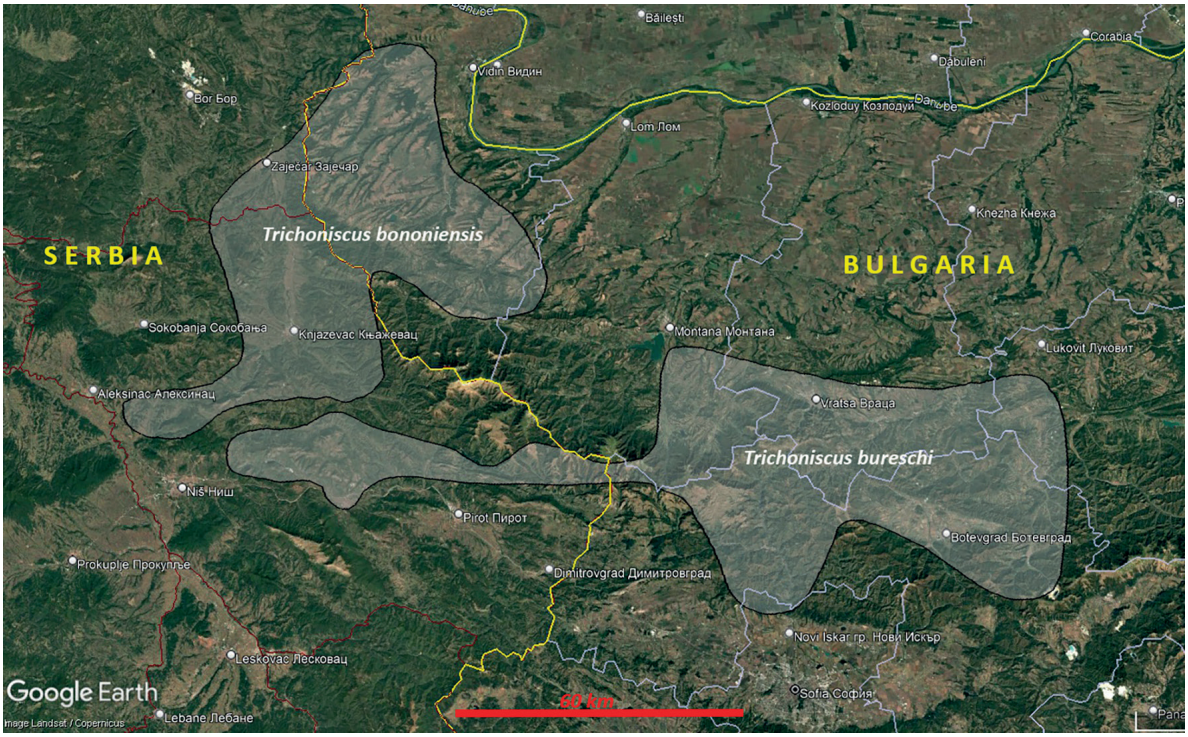

Fig. 2. Approximate distribution area of *Trichoniscus bononiensis* and *T. bureschi* based on the map (fig. 2) in Andreev 2000 and data from this paper. (Google Earth Pro 7.3.6.10441, © 2025 Google LLC.)

***Trichoniscus bureschi* Verhoeff, 1926**

(Fig. 3)

Trichoniscus naissensis Pljakić, 1977 nov. syn.

Trichoniscus serboorientalis Pljakić, 1977 nov. syn.

Localities in Serbia: Kojina pećina Cave, v. Krupac, Bela Palanka (6-7-08-1972, M. Pljakić; 14-08-1972, M. Pljakić; 27-07-1973, M. Pljakić); Donja pećina u Zbegu Cave, Sićevo Gorge (7-08-1972, M. Pljakić); Velika Balanica Cave, v. Sićevo, Sićevo Gorge (5-08-1972, M. Pljakić); Vadivoda Cave, v. Periš, Svrljig (28-07-1973, M. Pljakić); Golema dupka Cave, Prekonoga, Svrljig (28-05-2013, D. Antić; 02-11-2024, D. Antić); Peć, Dojkinci, Stara planina Mt. (11-08-1972, M. Pljakić); Vrelska pećina Cave, Bela Palanka (27-10-2017, D. Antić); Small cave, Temska, (26-10-2008, I. Karaman).

Trichoniscus bureschi is a regional endemic of the caves of the northwestern part of Stara Planina Mt. in Bulgaria (Andreev 2000), and the eastern part of Serbia. In Serbia, the species has a disjunct areal, stretching in an east-west direction, in some caves of Stara planina Mt. and Svrljiške planine Mts with the Sićevo Gorge, mostly above the right bank of the Nišava river. The largest part of the known range of this species is located in the territory of Bulgaria (Fig. 2).

Based on the reviewed material from Serbia, I concluded that the differences between *T. naissensis* and *T. serboorientalis*, compared to specimens of *T. bureschi* from Bulgaria, fall within the limits of variability of the relevant characteristics (male pleopods 1) presented by Vandel (1965). In specimens of *T. serboorientalis*, Pljakić (1977) pointed out the structure of the endopod of pleopod 1 of males as a key difference compared to *T. bureschi* and *T. naissensis*. A review of the available material determined that it corresponds to the structure of specimens from other localities in Serbia within the limits of their variability. Adult male specimens (type and paratype) from the Pljakić collection are missing, only a subadult male, females and a few juvenile specimens have survived. On several occasions, my colleagues and I (separately) explored the only cave in the village of Dojkinci, Peš dupka, which should be the cave Peć from Pljakić (1977), the type locality of *T. serboorientalis*. However, we were unable to find specimens of *T. serboorientalis* there. Therefore, for comparison, I used drawings of the species *T. serboorientalis* by Pljakić (1977).

A small unnamed cave in the village Temska (Fig. 3A) is closest (18 km aerial distance) to the type locality of *T. serboorientalis* (in the mountain village Dojkinci). Both caves are located on the banks of two small rivers of the same catchment area (Visočica river, which flows into the Temska river). The specimens from the cave in the village of Temska are pigmentless, but ocellated compared to the specimens from Dojkinci, which were blind and also without pigmentation.

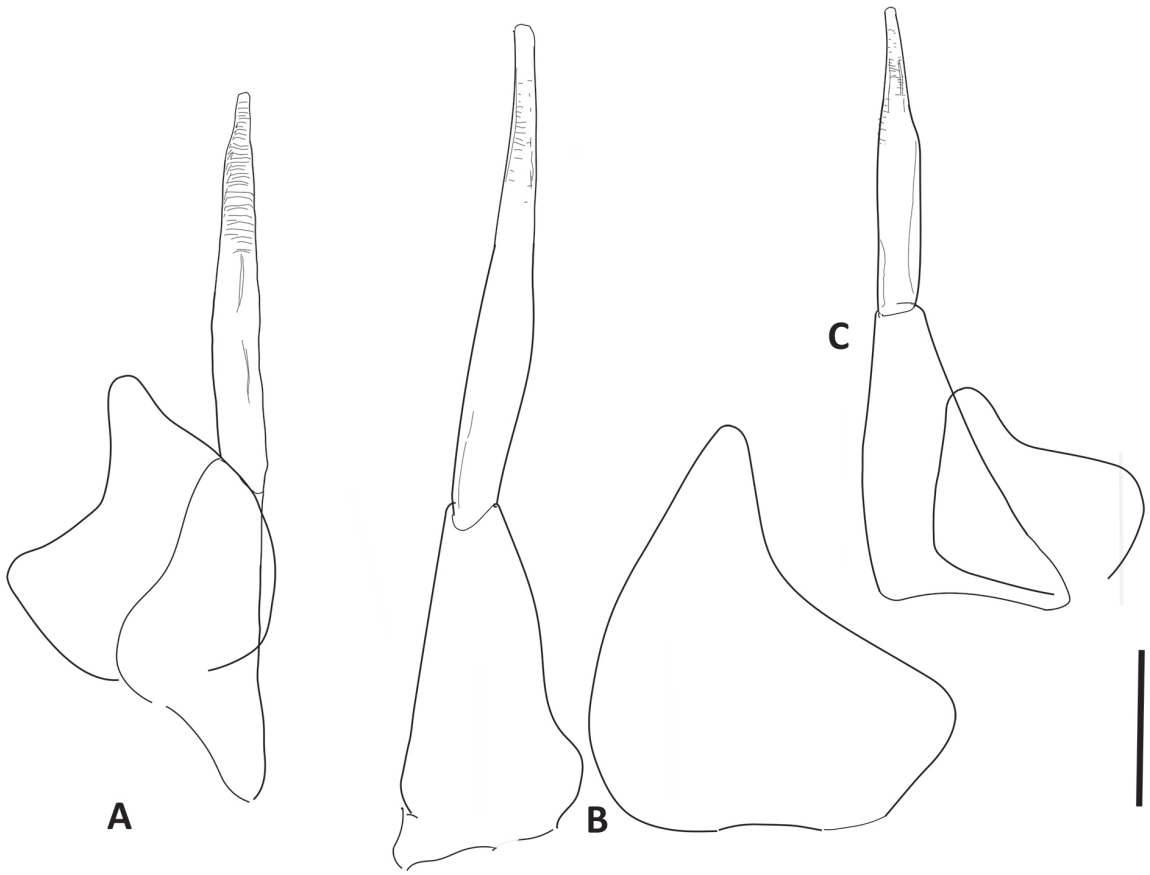

Fig. 3. *Trichoniscus bureschi* Verhoeff, 1926, male pleopod 1. **A,** Small cave Temska; **B**, Kojina pećina Cave, Bela Palanka, paratype; **C**, Peć cave, Dojkinci, paratype subadult. (Scale bar = 100 μm.)

DISCUSSION

Colonization of underground habitats is most often a response to a changed humidity regime in an area, due to major climate changes, and is made possible by the karstification process that creates suitable underground habitats in karst areas. As a result, the metapopulation becomes fragmented into a larger number of isolated populations, where the process of adaptation to life in changed conditions begins. This implies regressive evolutionary changes, such as loss of pigment in the integument, and a reduction of the eyes. Although there is a specific synchronicity associated with this process, it is not perfectly aligned. And climate change itself does not happen instantly, but is instead a long process that unevenly affects individual populations across a species' range, and over a given time period.

Among younger troglobionts, it is not uncommon to encounter populations where some specimens or entire populations have preserved pigmentation and eyes. This is the case with the species *T. bureschi*, and is evidence that it is a younger troglobiont. Due to the presence of eyes and pigment in the integument, the ecological qualification of this species varies among authors from publication to publication. Vandel (1965) designated this species as troglophilous, but later (Vandel 1967) treated it as a troglobiont; Andreev (1972) listed it as a troglophile, and noted that it could be treated as a troglobiont. However, later Andreev (2000, 2002) treated it as a troglophile, as did Beron (2020). All of the listed localities in Bulgaria where the species has been recorded are caves (Beron 2020), and there is no literature data suggesting that specimens of this species have been found outside caves. So far, it has also not been found outside of caves in the territory of Serbia, and is therefore considered to be a troglobiont. It is undoubtedly a young troglobiont. Unlike populations in Bulgaria, caves in Serbia are dominated by populations of individuals without pigment and with partially or completely reduced eyes.

The apparent similarity of *T. bureschi* to *T. inferus* Verhoeff, 1908 from a cave in southwestern Romania does not call into question the validity of the species *T. bureschi* as expressed by Vandel (1965). Tabacaru (1996) clearly highlighted the difference between these two species in the shape of the male pleopod 1 exopodite laterodistal margin. Tabacaru (1996), based on the great similarity in the struc-

ture of the male exopodite 1 (a triangular exopodite with strongly concave external side forming laterally prolonged basal part by rectangular or trapezoidal lobe and a narrow terminal lobe), and the specific structure on male pereiopod 7 basipodite (a brush of curved scales on the distal edge of its caudal margin), defined the „*inferus*“ group of species. In that group, in addition to *T. inferus* and *T. bureschi*, he included the species *T. anophthalmus* Vandel, 1965, *T. tranteevi* Andreev, 1994, *T. licodrensis* Pljakić, 1977 and species with different glandular-piliferous organs, which are present in the caves of the area of south-west Carpathians where *T. inferus* is present. These are *Trichoniscus racovitzai* Tabacaru, 1994, *T. tuberculatus* Tabacaru, 1996, *T. vandeli* Tabacaru, 1996 and *T. dancaui* Tabacaru, 1996. The recently described species *T. selenae* Giurginca, 2023 from the same area can also be added to the „*inferus*“ complex, as can the species *T. semigranulatus* Buturović, 1954. Tabacaru and Giurginca (2013) added another common character that characterizes the „*inferus*“ group of species: „the distal article of pleopode 1 endopodite without hairs and with more or less obvious transversal striae in the terminal part“.

The „*inferus*“ complex of closely related species covers a wider area of the central and eastern part of the Balkan Peninsula, quite distant from each other (Fig. 4).

Trichoniscus licodrensis and *T. semigranulatus* are endogean species of this complex, the westernmost and southernmost species, respectively (Fig. 4). All other species of this complex are cave-dwelling, without or with more or less pronounced troglomorphic features (reduced eyes and integument pigment). The presence of the eyes does not negate the troglobiotic nature of the cave-dwelling species. This may be the basis for the assumption that it is a troglophile, or a younger troglobiont: just as the absence of eyes in some endogean species does not testify to their troglobiotic nature. In these organisms, the eyes are not primary sensory organs, and as such do not provide sufficient weight of evidence for assessing the ecological nature of a particular species.

ACKNOWLEDGMENT

This study was supported by the Ministry of Education and Science of the Republic of Serbia, Grant no. III43007.

REFERENCES

Andreev S. 1972. Beitrag zur Kenntnis der Landasseln in Bulgarien. II (Isopoda Oniscoidea). Izvestiya na zoologicheskiya Institut Sofiya. 34:177–188.

Andreev S. 2000. Aperçu sur le genre *Trichoniscus* en Bulgarie et description d'une nouvelle espèce - *Trichoniscus garevi* n. sp. (Isopoda, Oniscidea). Historia naturalis bulgarica. 11:39–46.

Andreev S. 2002. Trois nouvelles espèces des genres *Cordioniscus* et *Trichoniscus* (Isopoda: Oniscidea) et nouvelles données sur les isopodes terrestres de la Bulgarie. Historia naturalis bulgarica. 15:55–72.

Beron P. 2020. Checklist of Isopoda Oniscidea (Crustacea) of Bulgaria. Ecologica Montenegrina. 38:227–244.

Giurginca A, Opran F-R. 2023. A new species of *Trichoniscus* (Crustacea, Isopoda, Oniscidea) with glandular-piliferous organ from Romania. Travaux de l`Institut de Spéologie „Émile Racovitza“. 62:45–53.

Paragamian K, Poulinakis M, Paragkamian S, Nikoloudakis I. 2025. Cave fauna of Greece database - Hellenic Institute of Speleological Research. https://database.inspee.gr/. [accessed 22 Dec 2025].

Pljakić M. 1970. Nouvelles espèces des isopodes terrestres dans les grottes de la Serbie. Bulletin du Muséum d'Histoire naturelle (Belgrade), Série B. 25:305–320.

Pljakić M. 1972. Un nouveau troglobie de la faune de Serbie dans la région de l'arc alpin karpatho-balkanique: *Trichoniscus buturovici* sp. n. Wissenschaftliche Mitteilungen des Bosnisch-Herzegowinischen Landesmuseums (C). 2:159–165.

Pljakić M. 1977. Les relations taxonomiques et biogéographiques des lignées evolutives primitives des oniscoides inferieurs de la Yougoslavie, en particulier, des éléments de la faune cavernicole de la Serbie. Monographies, Académie serbe des Sciences et des Arts, Classe des Sciences naturelles et mathématiques. 48:1–184.

Schmalfuss H. 2003. "World catalog of terrestrial isopods (Isopoda: Oniscidea) – revised and updated version". Stuttgarter Beiträge zur Naturkunde, Serie A. 654: 341 pp.

Tabacaru I. 1996. Sur un groupe d'espèces cavernicoles de *Trichoniscus* (Crustacea, Isopoda, Oniscidea) caracterisées par des organes glandulo-pilifères. Mémoires de Biospéologie. 23:241–248.

Tabacaru I, Giurginca A. 2013. Cavernicolous Oniscidea of Romania. Travaux de l'Institut de Spéologie "E. Racovitza". 51:3–26

Vandel A. 1965. Les isopodes terrestres et cavernicoles de la Bulgarie. Annales de Speleologie.0:243–270.

Verhoeff KW. 1926. Über Isopoden der Balkanhalbinsel, gesammelt von Herrn Dr. I. Buresch. Zugleich 31. Isopoden-Aufsatz. Mitteilungen der bulgarischen entomologischen Gesellschaft. 3:135–158.

Fig. 4. Approximate distribution areas of „*inferus*" species group. **1**, *Trichoniscus inferus* Verhoeff, 1908, *T. racovitzai* Tabacaru, 1994, *T. tuberculatus* Tabacaru, 1996, *T. vandeli* Tabacaru, 1996, *T. dancaui* Tabacaru, 1996, *T. selenae* Giurginca, 2023; **2**, *T. bureschi* Verhoeff, 1926; **3**, *T. licodrensis* Pljakić, 1977; **4**, *T. semigranulatus* Buturović, 1954; **5**, *T. anophthalmus* Vandel, 1965; **6**, *T. tranteevi* Andreev, 1994.