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First record of spider *Tegenaria ferruginea* (Panzer, 1804) from Belarus with notes on overwintering

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ABSTRACT

First record of the spider *Tegenaria ferruginea* (Panzer, 1804) from Belarus, along with taxonomic diagnosis and photographs are presented. Contrary to the expectations, males and females were found during overwintering in the silken sac in the fort of Brest, Belarus.

KEYWORDS

Agelenidae; Araneae; epigyne; fort; hibernation; *Tegenaria*

INTRODUCTION

Belarus is a lowland country in Central Europe; a large part of it is covered by peatlands. Although in recent years, the number of spider species reported from Belarus has increased, the arachnofauna in this region is still not sufficiently studied in comparison to other European countries (Petrusevich et al., 2008; Ivanov, 2013; Hajdamowicz et al., 2015). Most of the reported species from Belarus are so far cosmopolitan. According to the catalog "araneae–Spiders of Europe", currently, 474 species of spiders from Belarus have been identified (Nentwig et al., 2018). However, due to the changing climate, their number may increase in the coming years, which is why it is necessary to study the changes of arachnofauna from year to year. Invasive species can occupy niches of native species.

The Agelenidae is a cosmopolitan family currently containing ca. 1272 species belonging to 77 genera. In Belarus, Agelenide is represented by five species: *Agelena labyrinthica* (Clerck, 1757), *Coelotes atropos* (Walckenaer, 1830), *Eratigena agrestis* (Walckenaer, 1802), *Eratigena atrica* (C. L. Koch, 1843) and *Tegenaria domestica* (Clerck, 1757). Usually, they are spiders of a small or medium size, characterized by long legs ending in three claws and tarsus with a row of long trichobotrias. The spinnerets are long, mobile and posterior pair consist of two segments. These spiders build horizontal, sheet like webs, ending with a funnel, which is the spider's shelter. Representatives of this family can be found in dense vegetation, under stones, but also often in apartments, in basements and on attics (Roberts, 1995). Some species are also known as a troglophile (Mammola et al., 2018). *Tegenaria ferruginea* (Panzer, 1804) is widespread in Europe and either known from Azores It was also introduced to Venezuela (Bolzern et al., 2013). The closest record to Belarus: Poland and Ukraine (Platnick, 2013). Usually, it inhabits fissure inside and outside of buildings and tree holes. Until now, genus *Tegenaria* Latreille, 1804 in Belarus was represented by only one species, that is, *Tegenaria domes-*

tica (Clerck, 1757), which is cosmopolitan and synanthropic (Bolzern et al., 2013).

1. MATERIALS AND METHODS

One male and four females of *T. ferruginea* were collected on Fort No. 5 in Brest, Belarus (52°02'51"N 23°40'23") in December 2017 (Fig. 1). They were collected by hand from the internal walls and preserved in 96% ethanol. Species identification was performed using the Roberts (1995) key on the basis of male and female reproductive organs. Also, the quotient of its metatarsus I length and its carapace width was taken into account (Oxford & Merrett 2000). Photos were taken by digital camera Olympus UC30 mounted on microscope SZ16. The measurements were taken during microscopic identificationin a program dedicated to the camera: Olympus CellSens Entry. The material is stored in the private author's collection.

2. RESULTS

2.1. Description of *T. ferruginea*

Female: total length 12 to 15 mm, carapace length 6.0–6.8 mm, width 4.2–4.8 mm. Male: length 10 to 12 mm, carapace length 5.0–6.2 mm, width 3.9–4.5 mm. This species does not show significant intra-species variation, especially in coloration. Abdomen has a distinctly reddish median band, flanked by prominent whitish patches, large anteriorly and reduced to small spots posteriorly (Roberts 1995) (Fig. 2). The pattern on the sternum consists of three pairs of symmetrically arranged bright dots on the sides and a light strip through the center, which in the back narrows or dips with dots (Fig. 3E) (Bolzern et al., 2013).

The reproductive organs of *T. ferruginea* are most similar to *Tegenaria parietina* (Fourcroy, 1785). The male palps of *T. parietina* are clearly different from *T. ferruginea* (Figs. 3A, C), but the epigynes (the external reproductive structures) of the two species are very similar. In *T. ferruginea* the anterior margin of the sclerotised posterior plate is smoothly rounded. In *T. parietina*, that margin takes the form of three sides of a trapezium with rounded posterior corners. The sclerotized plate is also much narrower in the median part of the epigyne (Figs. 3B, D) (Oxford & Merrett 2000). The individuals of these two species are easily identifiable by the quotient of its metatarsus I length and its carapace width. Oxford and Merrett (2000) give mean values for both species, which amount for female and male respectively: *T. parietina* – 3.6; 2.1; *T. ferruginea* – 1.6; 1.5.

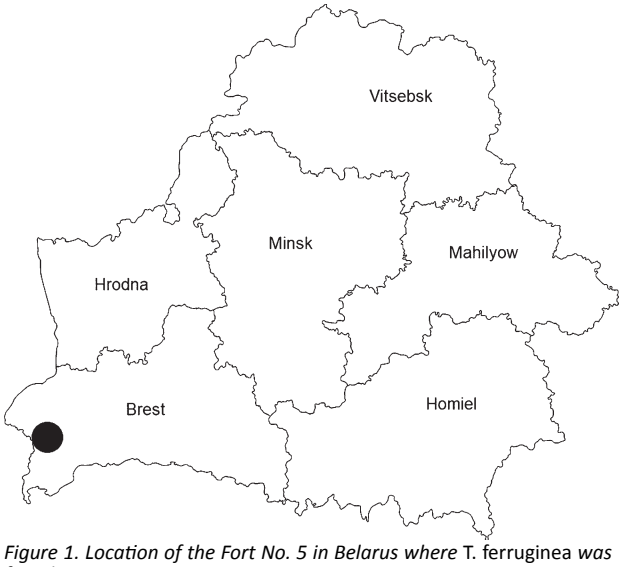

Figure 1. Location of the Fort No. 5 in Belarus where T. ferruginea *was found*

2.2. Measurements for examined specimens

Four females and one male were measured: 1.49; 1.32; 1.41; 1.41;1.51, and conform to *T. ferruginea* species.

2.3. Discussion

Owing to similar conditions: relatively stable low temperature, high humidity, lack of light, artificial habitats like old forts can be comparable in some aspects to the cave ecosystems. Examined specimens of *T. ferruginea* were found in the zone of low insolation, which can indicate that this species probably

Figure 2. Female of T. ferruginea

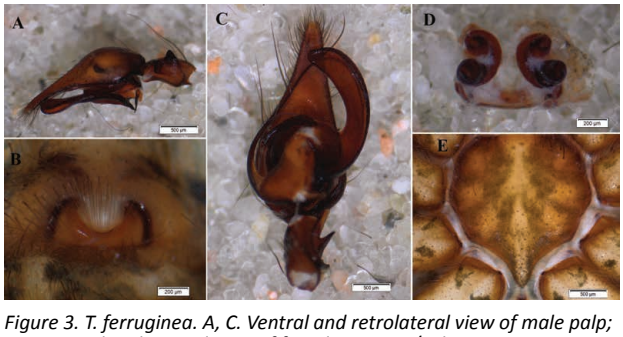

Figure 3. T. ferruginea. A, C. Ventral and retrolateral view of male palp; B, D. Dorsal and ventral view of female epigyne/vulva; E. Sternum

is troglophile, similar to some other members from this genus (like, e.g., *T. parietina*).

During multi-seasons visits in the fort, only this species of spider was observed inside the building and it abundantly inhabited the rooms in the depths of the fort with limited access to light. *Tegenaria ferruginea* is the only representative of the Araneae observed during the sampling campaigns. It also seems that this spider is the highest-level trophic consumer in fort and probably feeds on butterflies, flies (mostly mosquitoes), numerous occurrences of which have been also observed, and other accidentally biota entrapped in this part of the fort (mostly insects).

During sampling, all the specimens were in hibernation under the silken sac on the walls and ceiling during collection (Fig. 4). To the best of my knowledge, such overwintering behavior has not been observed in this family. This natural phenomenon occurs in families as Salticidae, Gnaphocidae and Clubionidae (Kirchner, 1987). Most of the spiders overwinter under tree cortex or in soil. It is especially unusual to find an overwintering males of *Tegenaria*, because in this genus, the males dye after season or are eaten by a female after copulation in autumn (Pourié & Trabalon, 1999; Oxford, 2011). In general, overwintering as adults is not profitable for spiders and is rarely occurring (Kiss & Samu, 2002).

Present observations can be a good starting point for further more advanced research on this phenomenon and fauna in human-built cave-analogue artificial habitats. Due to these observations, it is possible to discover new sites of cavernicolous species, compare fauna assemblages and their functioning in such objects to cave ecosystems. The new site is located north-east of the previously known range. Nowadays, there are changes observed in the range of many different groups of invertebrates due to climate change (Li et al., 2006). Monitoring such changes allows observing and evaluating shifts in species ranges and composition of local fauna assemblages and richness (e.g., Gobbi et al., 2006; Saupe et al., 2011, Hassall 2015).

Figure 4. Female and male of T. ferruginea *under the silken sac*

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