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Enoplognatha bryjai, a remarkable spider record in a city park in Bulgaria (Araneae: Theridiidae)

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Abstract. The stenotopic littoral species *Enoplognatha bryjai* Řezáč, 2016 is reported for the first time from Bulgaria and the Balkan Peninsula. Its natural history at the new locality, a pond in an urban park in the city of Sofia, is briefly discussed and illustrations of male and female genitalia are provided.

Keywords: Balkan Peninsula, cobweb spiders, rare, wetland

Zusammenfassung. *Enoplognatha bryjai*, ein bemerkenswerter Fund in einem Stadtpark in Bulgarien (Araneae: Theridiidae). Die stenotope Uferart *Enoplognatha bryjai* Řezáč, 2016 wird erstmals aus Bulgarien und von der Balkanhalbinsel nachgewiesen. Ihr Vorkommen am neuen Fundort, einem Teich in einem Stadtpark in Sofia, wird kurz besprochen und es werden Abbildungen der männlichen und weiblichen Genitalien präsentiert.

Резюме. *Enoplognatha bryjai*, един забележителен паяк в градски парк в България (Araneae: Theridiidae). Стенотопният вид паяк *Enoplognatha bryjai* Řezáč, 2016, среща се по крайбрежията на сладководни басейни, е съобщен за първи път от България и Балканския полуостров. Неговият начин на живот на новото находище – градски парк в София – е накратко дискутиран и са представени илюстрации на мъжките и женските гениталии.

Enoplognatha bryjai Řezáč, 2016 was recently described from southern Moravia in the south-eastern part of the Czech Republic (Řezáč et al. 2016). It was only reported from several closely situated localities, and no records from other parts of the Czech Republic or other countries are known since its original description (Czech Arachnological Society 2021, Nentwig et al. 2021). The species is stenotopic, inhabiting the littoral zone of lakes covered with *Phragmites*, *Carex* and *Typha* (Řezáč et al. 2016). It has been assessed as critically endangered in the Red List of Czech Spiders because of the vulnerability of its habitat (Řezáč et al. 2015).

Therefore, it was surprising to find a single female spider of unusual appearance in late summer 2019 at a park pond in Sofia, Bulgaria, whose banks were covered in *Typha* sp. It was tentatively identified as belonging to the genus *Enoplognatha* Pavesi, 1880. At this point, its species identity remained unclear because males were lacking and because of the existence of at least two species with very similar females – *Enoplognatha monstrabilis* Marusik & Logunov, 2002 and *Enoplognatha bryjai* Řezáč, 2016, neither of which have been recorded from any territory adjacent to or within Bulgaria (Nentwig et al. 2021). An undescribed related species could not be excluded, either. The same autumn and the following early summer, five further specimens (three females and two males) were collected. The presence of both sexes allowed the identification of the species as *Enoplognatha bryjai* Řezáč, 2016. Juveniles were also observed in other parts of the same pond and near an adjacent pond too. Including this new record, the number of *Enoplognatha* species recorded in Bulgaria increases to ten (cf. Blagoev et al. 2018).

Materials and methods

Spiders were collected by hand, preserved in 70–80% ethanol and examined under MBS-8 and Bresser Advance ICD

stereomicroscopes. One leg from the first collected specimen was dissected and stored separately in 96% ethanol. Epigynes were dissected using needles and made transparent in lactic acid at room temperature. Drawings were made based on digital photos from a smartphone model Samsung Galaxy A50 using rice paper, an ink pen, and pencil. Digital photos of preserved spiders and habitat were taken with a smartphone model Samsung Galaxy A50 equipped with a 20 MP camera. Digital photos of living spiders were taken with a Canon 500D DSLR with a Sigma 105 mm macro lens. Living spiders were kept in small transparent plastic boxes, fed with diverse small or medium sized insects and hydrated regularly in order to ensure that the juveniles reached maturity. Related species, of which the author had no comparative material, were excluded using Bosmans & Van Keer (1999), Marusik & Logunov (2002) and Nentwig et al. (2021). The map was modified from d-maps (2021). Unless otherwise noted, material is deposited in the author's private collection.

Abbreviations

NMNHS – National Museum of Natural History Sofia.

Results

Theridiidae Sundevall, 1833

Enoplognatha Pavesi, 1880

Enoplognatha bryjai Řezáč, 2016 (Figs 1-3)

Material examined. BULGARIA: Sofia, South park, 42.6605°N, 23.3078°E, 595 m a.s.l., pond margin, inside *Typha* stems above water (Fig. 4): 1 ♀, 22. Aug. 2019 (one leg deposited at NMNHS in 96% ethanol); 1 ♀, 2. Sep. 2019, found dead; 1 juvenile, 20. May 2020 (♀ matured on 15. Jun. 2020); 1 ♂ and 2 juveniles, 15. Jun. 2020 (♀ matured on 18. Jun. 2020 and ♂ matured on 20. Jun. 2020). 1 ♂ and 1 ♀ will be deposited at the NMNHS.

Comment. The Bulgarian specimens seem not to differ significantly in size from the specimens given by Řezáč et al. (2016). Males (n = 2) have a total length of 4.0–4.5 mm and a carapace length 2.0–2.2 mm, thus they are slightly smaller than the holotype of *Enoplognatha bryjai*. Females (n = 2)

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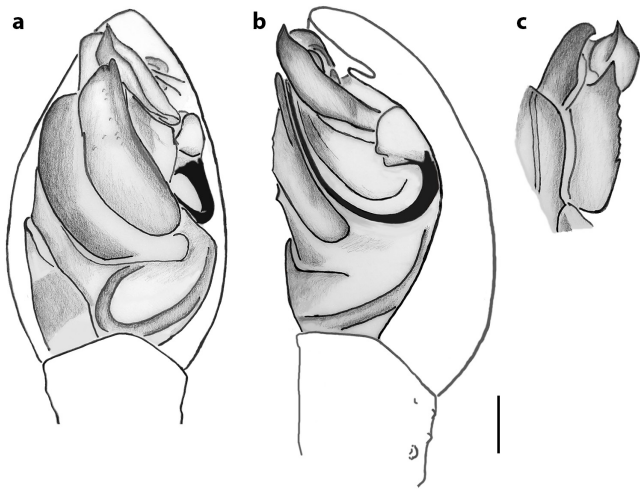


Fig. 1: *Enoplognatha bryjai* Řezáč, 2016, left male pedipalp. **a.** ventral view; **b.** retrolateral view; **c.** prolateral view, detail of bulbous. Scale bar 0.1 mm

have a cephalothorax length of 2.1–2.4 mm, thus being slightly larger than or equal to the females given by Řezáč et al. (2016). The total length measured is 4.5–5.4 mm, with the larger female measured having a smaller opisthosoma and thus a smaller total size. It is important to note that the figures of the vulva in the original description were labelled incorrectly: figs 1F and 1I from Řezáč et al. (2016) in fact show the dorsal view while fig. 1G shows the ventral view. This is in line with Fig. 2a–b in the present paper as the fertilization ducts are not visible from a ventral view and the copulatory ducts bend towards the ventral surface first.

Phenology. An adult male specimen was collected in the middle of June, another male and one female collected on the same day as subadults, matured three to five days later. One adult female was collected in the second half of August. The observed maturation times are two or three weeks later than those given by Řezáč et al. (2016) – a female collected on 20. May 2020 still needed several moults to reach maturity.

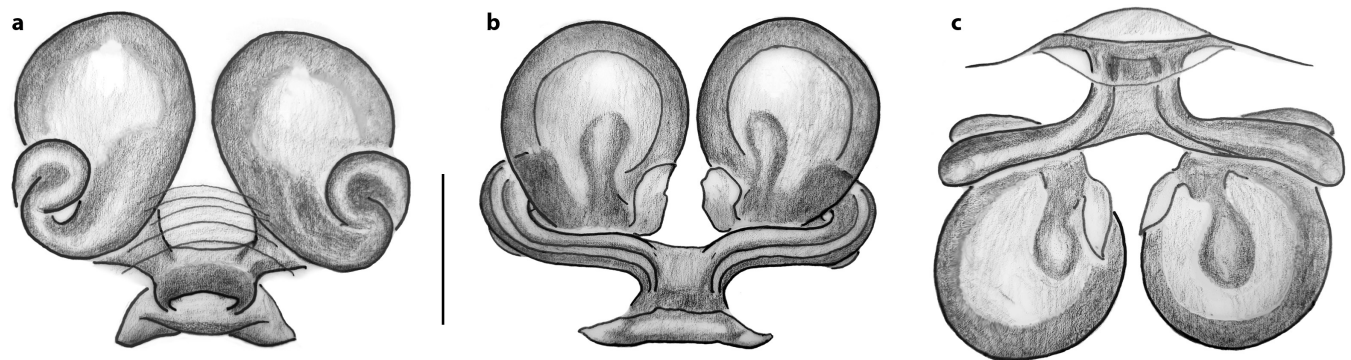


Fig. 2: *Enoplognatha bryjai* Řezáč, 2016, female epigyne and vulva (cleared). **a.** ventral view; **b.** dorsal view; **c.** caudal view. Scale bar 0.1 mm

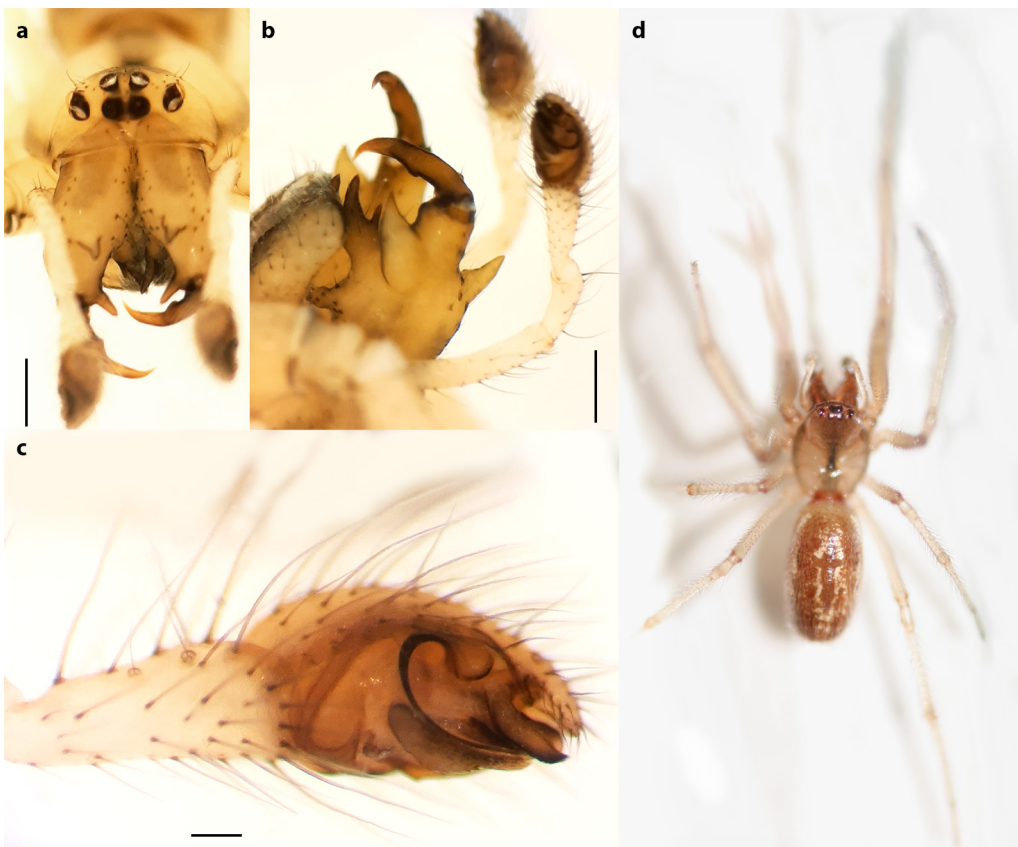


Fig. 3: *Enoplognatha bryjai* Řezáč, 2016, male. **a.** chelicerae, frontal view; **b.** left chelicera, lateral view; **c.** right pedipalp, retrolateral view; **d.** male habitus, dorsal view. Scale bar of a–b 0.5 mm, of c 0.1 mm



Fig. 4: Habitat of *Enoplognatha bryjai* Řezáč, 2016 in Sofia, photo taken on 13. Apr. 2021.



Fig. 5: Distribution of *Enoplognatha bryjai* (records in Řezáč et al. 2016 – empty circles, new record – filled square). **1.** Tvrdonice; **2-5.** Lednické rybníky National Nature Reserve (four closely situated localities); **6.** Sofia (map based on https://d-maps.com/carte.php?num_car=29975)

Discussion

The current findings of *Enoplognatha bryjai* significantly expands its known range to the south-east by approximately 835 km (linear distance between Tvrdonice and the new locality), being the first record for Bulgaria and the Balkan Peninsula (Fig. 5). Situated in a park within an urban zone, the locality suggests the possibility of an anthropogenic introduction of this species by plants or soil material. Only if further records become known from other, natural wetland habitats in the Sofia Kettle, or anywhere else between the known localities in the future, would this prove a larger natural distribution in Europe. It also means the newly reported population in Bulgaria is vulnerable to construction work or other landscape changes in the park.

Enoplognatha bryjai is not easy to find – while juveniles were occasionally seen in the open or beaten from *Typha* leaves, adults tend to live deeply hidden in dead *Typha* stems

right above the water surface. No adults were sampled by beating, and it is expected that sweeping might give similar negative results. It is uncertain whether conventional pitfall trapping would be effective for sampling, especially for the sessile females. In conclusion, probably only a selective search for *E. bryjai* in other wetlands with similar habitats might reveal further populations of the species.

Wetlands are a highly endangered habitat type in Europe and many have already been lost due to exploitation and drainage for agricultural use, especially in the last 100 years (Čížková et al. 2013, Řezáč et al. 2016). The, according to Řezáč et al. (2015), critically endangered *E. bryjai* would thus certainly benefit from conservation and restoration of wetlands.

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