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The Spotted Orb-weaver Neoscona byzanthina (Pavesi, 1876) – An Enigmatic but Common Species on the Balkans (Araneae: Araneidae)

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Abstract. The spotted orb-weaver spider *Neoscona byzanthina* was described from the south-eastern point of the Balkan Peninsula – the town Istanbul (Constantinople) in Turkey by Pavesi (1876) and herein is reported from Albania, Bulgaria, Kosovo and North Macedonia for the first time. Its taxonomy, ecology and general distribution are summarized and discussed.

Key words: Albania, Bulgaria, global distribution, Kosovo, North Macedonia, spider, taxonomic features.

Introduction

The spider Neoscona byzanthina was originally placed in a genus Epeira Walckenaer, 1805 (now considered a junior synonym of Araneus Clerck, 1757) and was described on the base of female specimens from European part of Istanbul (Constantinople) independently by Pavesi (1876) and Simon (1879), respectively as Epeira byzanthina and E. turcica, after specimens collected by Spagnolini (Spagnolini, 1877). Simon (1884) subsequently synonymized the two and much later (Simon, 1929) pointed out that N. byzanthina might be a local variety of N. adianta (Walckenaer, 1802). The species was accepted in the catalogue of Bonnet (1955), whereas in the catalogue of Roewer (1955) the author considered that *N. byzanthina* is synonymous with *N. adianta*. Since then, N. byzanthina was not cited (except in Ledoux & Canard (1981) under a single male palp drawing), until Ledoux (2008) differentiated

© Ecologia Balkanica http://eb.bio.uni-plovdiv.bg it from N. adianta. Ledoux (2008) studied in detail and illustrated the species in France and concludes that: 1) the individuals of *N. byzanthina* are larger than those of N. adianta and the genitalia size follows that difference in size between the two species; 2) opisthosoma design is more variable in N. byzanthina than in N. adianta and the first elongations of the bands are a little bit larger in N. adianta. In addition 3) the apical ends of the femurs are usually darker in N. byzanthina (after Simon, 1929) and 4) the hook of the epigyne has a triangular form in N. adianta, whereas in N. byzanthina it is more elongated and rounded. Also, the phenology of both species is different, since adults of N. adianta are frequent on June and July and adults of N. byzanthina are frequent on August and September.

The aim of this work is to present new faunistic and taxonomic data of the Balkans population of *Neoscona byzanthina*.

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Material and Methods

The spider material was collected by hand picking and also includes some observations documented by digital images. Specimens were examined and measured using Wild M5A stereomicroscope. Digital images were taken by Canon EOS1300D digital camera, attached to a Carl Zeiss Stemi 2000-c stereomicroscope and with Canon EOS1100D attached to a Carl Zeiss Amplival microscope. The final processing of the figures was done in Adobe Photoshop CS6. The specimens are preserved in 70-80% ethanol and deposited in the Institute of Biodiversity and Ecosystem Research (IBER) and Laboratory of Zoology, University of Prishtina (UP). The geographical coordinates are given in decimal degrees and the altitudes are given in metres above sea level. Country codes are according to ISO 3166-2 (www.iso.org). Maps visualization: projection coordinate system "WGS 84 UTM 35N". All measurements are in millimetres.

Results

A total of 44 specimens (3 33, 18 99, 5 imm33, 13 imm99, 5 jj) of *Neoscona byzanthina* were collected or observed in 15 localities within the Balkans (Fig. 1).

Araneidae Clerck, 1757 Neoscona Simon, 1864 Neoscona byzanthina (Pavesi, 1876) Epeira byzanthina Pavesi, 1876: 59. Epeira turcica Simon, 1879: 36. Epeira byzanthina Simon 1884: 328. Neoscona adianta forma byzanthina Simon (1929): 693. Neoscona byzanthina Ledoux, 2008: 49.

Material: ALBANIA: 1 \bigcirc (deposited in IBER), Krongji, near Syri i Kaltër (Blue Eye spring) (Fig. 1: 1), N 39.9180°, E 20.1855°, 151 m, 05.10.2019, lgt. M. Naumova; BULGARIA: 1 \bigcirc (deposited in IBER), Plovdiv, Yagodovo village (Fig. 1: 5), N 42.1284°, E 24.8556°, 152 m, 28.09.2018, lgt. V. Genchev, backyard; 1 \bigcirc (deposited in IBER), the same locality and legator, 03.10.2018; 1 \bigcirc (deposited in IBER), Plovdiv, Yagodovo village (Fig. 1: 5), N 42.1145°, E 24.8284°, 158 m, 14.08.2019, lgt. V. Genchev; 1 \bigcirc , S Black Sea coast, Aheloy (Fig. 1: 5)

2), N 42.6431°, E 27.6456°, 8 m, 11.09.2018, 1 ♀, 16.09.2018 (observed and photographed by I. Yanev); $1 \stackrel{\bigcirc}{_+}$, S Black Sea coast, Burgas (Fig. 1: 3), N 42.4804°, E 27.4150°, 5 m, 23.09.2018 (observed and photographed by I. Yanev); $1 \stackrel{\circ}{\downarrow}$, N Black Sea coast, Shabla (Fig. 1: 7), N 43.5678°, E 28.5604°, 2 m, 03.08.2016 (observed and photographed by Z. Barzov); 1 imm^o, Varna, Beloslav village (Fig. 1: 9), N 43.1931°, E 27.7214°, 2 m, 26.07.2018; 1 °, Ruse, Batin village (Fig. 1: 6), N 43.6692°, E 25.6798°, 18 m, 06.10.2019 (observed and photographed by I. Angelova); 1 imm^o₊, Svilengrad (Fig. 1: 8), N 41.7704°, E 26.1948°, 50 m, (observed and photographed by H. Hristov); 1 9, Haskovo (Fig. 1: 4), N 41.9595°, E 25.5287°, 205 m, 08.10.2019 (observed and photographed by E. Nankova); 1 9, Sashtinska Sredna Gora Mts., Zmeyovo village (Fig. 1: 10), N 42.5075°, E 25.6069°, 440 m, 29.09.2020 (observed and photographed by V. Ilieva); KOSOVO: $1 \stackrel{\circ}{\downarrow}, 5$ $\operatorname{imm}_{4}^{3}$, 6 $\operatorname{imm}_{++}^{0}$, 3 jj (deposited in UP), Prilep village near Deçan (Fig. 1: 11), N 42.4955°, E 20.3087°, 547 m, 14.07.2018, lgt. D. Geci; 2 ්ර, 3 QQ (deposited in UP) the same locality, 30.07.2020, lgt. D. Geci; 3 ♀ (deposit in UP), Vaganicë village (Fig. 1: 14), Mitrovicë Municipality, N 42.8489°, E 20.8624°, 621 m, 24.08.2020, lgt. D. Geci; 3 99 (deposited in UP) the same locality and legator. 17.10.2020; 1 \bigcirc (deposited in UP), Henc wetland (Fig. 1: 12), N 42.5822°, E 21.0486°, 538 m, 02.09.2020, lgt. D. Geci; 2 jj (deposited in UP) Deig village, Klinë Municipality (Fig. 1: 13), N 42.6121° E 20.5592°, 383m, 26.07.2020, lgt. D. Geci; 1 ♀ (deposited in UP), the same locality and legator 30.08.2020; 3 imm^Q (deposited in UP), Dollc village, Klinë Municipality (Fig. 1: 13), N 42.5947° E 20.5923°, 394m, 26.07.2020, lgt. D. Geci; 1 ♀ (deposited in UP), the same locality and legator, 30.08.2020. 2 imm^{OO}₊₊ (deposited in UP), Zajm village, Klinë Municipality (Fig. 1: 13), N 42.5930° E 20.5552°, 411m, 26.07.2020, lgt. D. Geci; NORTH MACEDONIA: 1 Q (deposited in IBER), Skopie, Stajkovsko Ezero lake (Fig. 1: 15), N 42.0240°, 21.4942°, 266 m, 14.09.2019, lgt. G. Dimovski.

Comparative material examined: N. adianta: 3 33, 1 \bigcirc (deposited in IBER), N Black Sea coast, Kranevo village, N 43.3470°, E 28.0627°, 8 m,

11.08.2015, lgt. M. Naumova; 2 \Im (deposited in IBER), Plovdiv, Yagodovo village, N 42.1284°, E 24.8556°, 152 m, 10.07.2018, lgt. V. Genchev.

Description: General appearance: relatively large (7.0-13.0 mm) araneid spiders with ovoid opisthosoma without and appendages. Carapace: tubercles yellowish to pale brown with dark longitudinal median and lateral stripes; regularly covered with short grey hairs. Sternum: dark brown to black. Legs: light to medium yellow-brownish, distally dark on femora, patellae and tibiae. Femora with grey lateral stripes. Opisthosoma: dorsally coloured in yellow with brown reticulate pattern and 6-8 pairs of black dots or short posterior horizontal stripes, the ones converging. White/light median part, formed from ovoid spots, at an angle with symmetry axis present in most the specimens but may be reduced. Continuous

wavy black longitudinal bands are never present (Figs 2-3). Ventrally coloured in black with two bright longitudinal stripes between the epigastric furrow and spinnerets, 2 pairs of bright spots and one curved stripe surround the spinnerets (Fig. 3).

Males (n=3): total length 7.0-8.0; prosoma: length 2.5-3.0, width 2.0-3.5; opisthosoma length 4.0-5.5, width 4.3-4.5. Tibia II strongly armed as Fig. 4A. Palpal organ as in Fig. 4B-C.

Females (n=10): total length 10.0-13.2; prosoma length 3.0-5.0, width 2.0-4.0; opisthosoma length 5.5-8.0, width 4.0-7.0. Colouration as in males, slightly lighter. Epigyne as in Fig. 5A-C. Scape with shape of elongated rounded triangle, longer than wide, wider at its base, reaching distinctly beyond epigyne; easily distinguished from N. adianta (Fig. 5D-F) especially in lateral view (Fig. 5B, E).



Fig. 1. Map with the new localities of *Neoscona byzanthina* in Albania (1 = Syri i Kaltër), Bulgaria (2 = Aheloy, 3 = Burgas, 4 = Haskovo, 5 = Plovdiv, 6 = Ruse, 7 = Shabla, 8 = Svilengrad, 9 = Varna, 10 = Zmeyovo), Kosovo (11 = Deçan, 12 = Henc wetland, 13 = Klinë, 14 = Vaganicë) and North Macedonia (15 = Skopie).



Fig. 2. Variations of colouration and opisthosomal patterns of *Neoscona byzanthina*. Adult females and immature specimens from Bulgaria and Kosovo, dorsal view.



Fig. 3. Variations of opisthosomal patterns of *Neoscona byzanthina*: dorsolateral (A), lateral (B-D), caudal (E-F) and ventral (G-I) views.

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Fig. 4. *Neoscona byzanthina*, male: right tibia II (A) and left pedipalp (B-C), prolateral (A), apical (B) and ventral (C) views.

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Fig. 5. *Neoscona* sp. female, scape of epigyne: *N. byzanthina* (A-C) and *N. adianta* (D-F), ventral (A, D), lateral (B, E) and posterior views. Scales: 0.5 mm. Both specimens are almost equal in body size.

Discussion

The large and attractive orb web spider *Neoscona byzanthina* was "invisible" until 12 years ago, because it was erroneously synonymized with the frequent congener *N. adianta*, which is abundant in the Holarctic region. In this study *N. byzanthina* is reported for the first time from Albania, Bulgaria, Kosovo and North Macedonia. The mature specimens were found from mid-July to mid-October. All observations were in humid areas

(a variety of wetlands and mesophilous grasslands near lakes, swamps, bogs or river shores) in altitudes between 2 and 621 m. The Balkan population, compared with the relatively well-studied population in France (Ledoux, 2008) shows no differences in individual body measurements, variety of body patterns, distally darker femora, habitat preferences and phenology.

The long period during which *Neoscona* byzanthina was assigned as *N. adianta* requires

revision of the historical records, so earlier citations of *N. adianta* should all be reviewed. The males of both species are hard to distinguish based on their copulatory organs but easier to distinguish on the base of the opisthosomal patterns (discussed above) and also on the body size and armament of tibia II, as males *N. byzanthina* are obviously larger and more strongly armed. The females of both species are easier to identify both by the somatic and the genital aspects; the body sizes

overlapping insignificantly and *N. byzanthina* being obviously larger. The current range of *N. byzanthina* is shown in the Fig. 6. Until now, the known localities in the literature are in Western Europe (France, Italy and Spain), South-eastern Europe (Greece and Turkey) and Asia Minor (Turkey) (Bolognin et al., 2021, Ledoux, 2008, Mora-Rubio et al., 2019, Pavesi, 1876, Simon, 1879, 1884). The new records partially fill the range gaps and hint at a wider distribution in Europe and the Western Palearctic.



Fig. 6. Currently established global range of *Neoscona byzanthina*. Historical records (circles, numbered chronologically) in France (4 = Aramon, 5 = Bouches-du-Rhône, 6 = Corrèze, 7 = Fréjus, 8 = Galargues, 9 = Lot-et-Garonne, 10 = Monclar de Quercy, 11 = Sainte-Opportune-la-Mare), Greece (3 = Steni Dirfyos, Euboea isle), Italy (13 = Palermo, Sicily isle), Spain (12 = Extremadura: Badajoz) and Turkey (1 = Istanbul, 2 = Izmir) and new records (triangles, for details see Fig. 1).

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