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Walckenaeria incisa (O.P.-CAMBRIDGE) – a rare European species,
new to Poland
(Araneae: Linyphiidae)

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ABSTRACT. *Walckenaeria incisa* (O. P.-CAMBRIDGE, 1871) is a rare spider species occurring only in Europe. In Poland, the first females of the species were collected in thermophilous thickets along the middle of the Bug River valley and in a very dry and transformed riparian forest in the Lower Vistula valley. The paper presents diagnostic images of *Walckenaeria incisa* – the body and female reproductive organs.

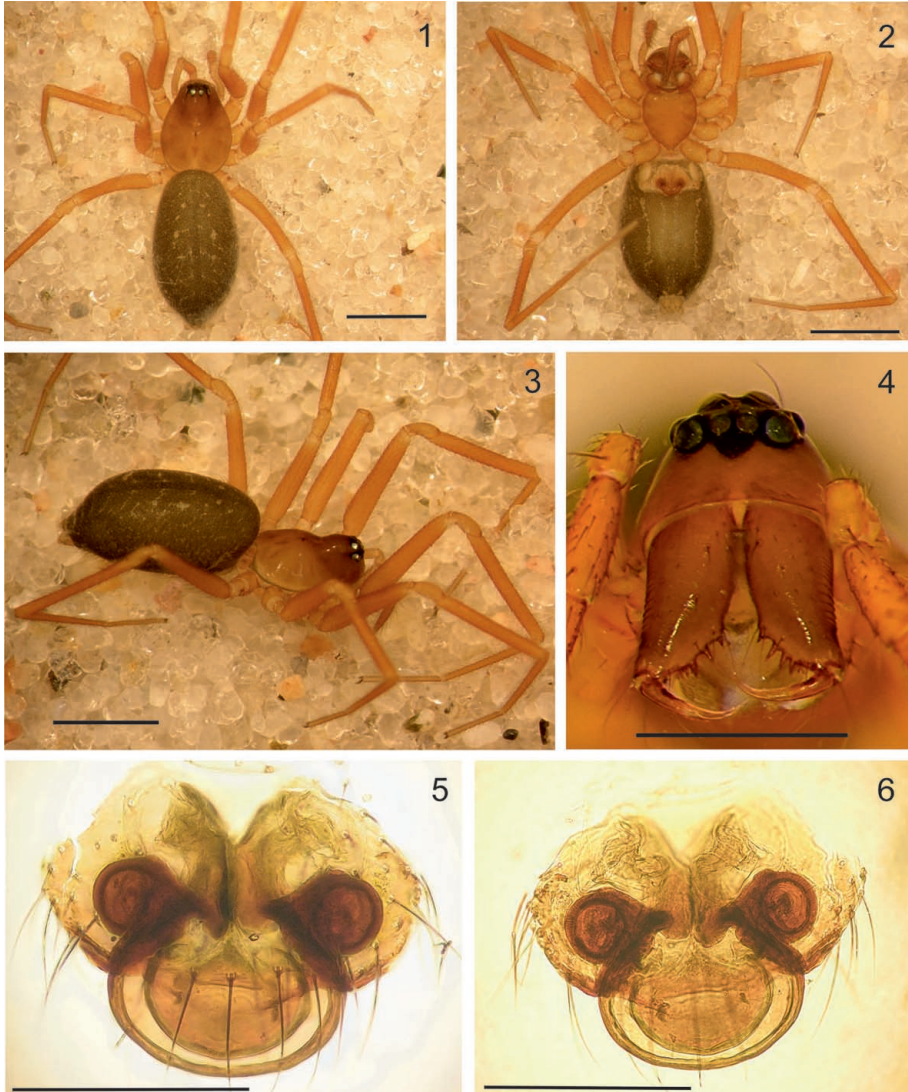
Key words: arachnology, faunistics, *Walckenaeria incisa*, deciduous forests, deciduous bushes, river valleys, Poland.

INTRODUCTION

The family Linyphiidae contains a relatively large number of genera and species; most of them occur in the Palearctic (TANASEVITCH 2011, PLATNICK 2014). The genus *Walckenaeria* belongs to one of the largest genera in the family and includes 199 species and subspecies distributed mostly in the Nearctic. So far, 71 species from the genus have been identified in Europe (HELSDINGEN 2013, PLATNICK 2014).

Like most representatives of Linyphiidae, spiders in this genus are small – the body size ranges from 1.5 to 4 mm in length (WUNDERLICH 1972, RŮŽIČKA & BRYJA 2000, NENTWIG et al. 2014). In Europe, species from the *Walckenaeria* genus occur most frequently in various types of forest and on oligo- and mesotrophic peat bogs, in litter and moss layer (WUNDERLICH 1972, HÄNGGI et al. 1995, PLATEN et al. 1999).

Walckenaeria incisa (O. P.-CAMBRIDGE, 1871) is a rare spider species known only from Europe (PLATNICK 2014). The species has so far been recorded in: Great Britain, France, Belgium, the Netherlands, Denmark, Germany, Switzerland, Sweden, Lithuania, Ukraine, Slovakia, Hungary, and Greece (HELSDINGEN 2013, SCHARFF & GUDIK-SØRENSEN 2011, TANASEVITCH 2011, NENTWIG et al. 2014). The purpose of this paper is to present the distribution and habitat preferences of *Walckenaeria incisa* in Poland and Europe and to present, for the first time, diagnostic images of the body and female reproductive organs.



1-6. *Walckenaeria incisa*: 1 – female dorsal, 2 – female ventral, 3 – female lateral, 4 – eyes and chelicerae, 5,6 – epigyne

MATERIAL AND METHODS

Two females of *Walckenaeria incisa* were collected at two sites in Poland, at the edges of the valleys of large lowland rivers – the Bug River and the Vistula River (Fig. 1-6).

Site 1

1 female – 09-21 July 2007, Gnojno, Podlasie Bug Gorge Landscape Park (N52°16'55" E 23°08'05"); thermophilic scrub *Rhamno-Cornetum sanguinei*; Barber pitfall traps; leg./ det. Izabela Hajdamowicz

The material was collected during research conducted from March to November 2007 in the Bug River valley using Barber pitfall traps and a sweep net.

The site was located at the edge of the river valley, on a steep slope covered with an impoverished and terminal form of thermophilous thickets, corresponding to the plant community of deciduous forest (Fig. 7). The layer of shrubs consisted of *Quercus robur*, *Cornus sanguinea*, *Corylus avellana*, and *Populus tremula* also occurred as single trees. In a sparse herb layer, *Dryopteris filix-mas* dominated, which is a species characteristic of deciduous forests. In herb and thicket fringe communities occurred: *Anemone sylvestris*, *Sedum maximum* and *Primula veris* (Fig. 8). The thickets bordered on mixed forest with some admixture of *Pinus sylvestris*, and psammophilous grasslands.

Site 2

1 female – 03 March 2013, the lower Vistula valley, Bydgoszcz, “Park Milenijny” (Millennium Park) (N53°08'41" E18°09'39"); scattered deciduous tree layer; sifted leaf litter; leg./det. Tomasz Rutkowski

The research in the “Millennium Park” was conducted mainly in winter 2013 and 2014 using an entomological sifter and Barber pitfall traps.

The site was located at the edge of the Vistula River valley with southern and eastern exposure, in the city park situated at a flooded clay excavation pit, on a very dry and transformed habitat of riparian forest (Fig. 9). Open forest canopy on the slope was composed of *Populus alba* and other species of deciduous trees from the genus *Acer* sp. and *Betula* sp., as well as *Robinia pseudacacia* and *Alnus glutinosa* on the shore of



7-9. Collecting site of *Walckenaeria incisa*

the reservoir. *Sambucus nigra* occurred in the shrub layer, while *Urtica* sp. and *Galium* sp. dominated in the herbaceous layer. The shores of the water body were covered with reed beds of *Phragmites australis*. At the slope, the park is adjacent to housing and wide streets. The habitat was transformed as a result of land drainage.

DESCRIPTION AND MORPHOMETRICS OF FEMALES

Site 1 – 1 female

Due to poor preservation of the specimen collected in the Bug River valley, it was possible to measure only carapace and sternum. Length of carapace: 1.10mm, width of carapace: 0.86mm. Length of sternum: 0.71mm, width of sternum: 0.62mm.

Site 2 – 1 female

The total length 2.97mm. Carapace smooth yellow-brown with darker radial stripes 1.10mm long, 0.90mm wide (Fig. 1). The head region elevated (Fig. 3). Abdomen yellow-grey. Sternum smooth yellow-brown 0.72mm long, 0.62mm wide (Fig. 2). Promargin of chelicera with 4 teeth, retromargin with 5 very small teeth (Fig. 4).

Legs yellow-brownish in colour. Position of trichobothrium on metatarsus: Leg I – 0.44; Leg II – 0.43; Leg III – 0.40; Leg IV – 0.52.

DISCUSSION

The body structure of the females collected, and particularly the diagnostic traits related to the structure of sexual organs, clearly indicate their affiliation with *Walckenaeria incisa* (O. P.-Cambridge, 1871). The best diagnostic trait is semicircular shape of the wide epigyne with a clearly thickened rim and the system of spermathecae and internal canals of female reproductive organs – vulva (WIEHLE 1960, ROBERTS 1987, NENTWIG et al. 2014). Other traits supporting the identification include: yellow, orange and brown colours of the body, the elevated eye field on the cephalothorax, the number of teeth on chelicerae and the location of trichobothria on the first pair of legs. Also the size of the body and of the cephalothorax, the length of legs and their segments do not differ from the data presented in the literature (WIEHLE 1960, WUNDERLICH 1970, ROBERTS 1987, GNELITSA 2002, NENTWIG et al. 2014). The length of the female body ranges from 2.5 mm in Ukraine (GNELITSA 2002) and 2.75 in Great Britain (ROBERTS 1987) to 3.5 mm in Central Europe (WUNDERLICH 1970, NENTWIG et al. 2014). The body length of the female from western Poland has an intermediate value, ca. 3 mm. Nevertheless, based on the data from the western parts of the range of *Walckenaeria incisa* and few data on the species size from the eastern portion of its range, one can assume that the body size of this species is smaller on the borderlines of its range.

Numerous studies on the occurrence of spiders in the countries of Western and Central Europe have been conducted (PRÓSZYŃSKI & STARĘGA 1971, 1997, HÁNGI et al. 1995, GAJDOŠ et al. 1999, SPIDER AND HARVESTMAN RECORDING SCHEME 2014), and thus it can be concluded that the araneofauna of this region is well researched (BLICK et al. 2004, HELSDINGEN 2013). In Europe, *Walckenaeria incisa* has been recorded mainly from lowlands, and occasionally river valleys of uplands or mountains. Most

of records, i.e. about 110 sites are known from Great Britain (HARVEY et al. 2002, SPIDER AND HARVESTMAN RECORDING SCHEME 2014). Significantly fewer sites (ca. 40) were reported from Germany, mainly in the northern part of the country (STAUDT 2014). Sites of the species occurrence are, however, very dispersed and only singletons were caught. For this reason, the species is still considered to be rare in both countries and has been included in lists of rare and endangered species (PLATEN et al. 1999, HARVEY et al. 2002, SPIDER AND HARVESTMAN RECORDING SCHEME 2014). In western France, as in Great Britain, the species has the status of the highest rarity (PÉTILLON et al. 2008). Single sites of *Walckenaeria incisa* were found in the Netherlands (HELSDINGEN 1999, TUTELAERS 2012), Denmark (SCHARFF&GUDIK-SRRENSSEN 2012), Lithuania (BITENIEKYTĖ & RELYS 2008), Hungary (SAMU & SZINETÁR 1999), Slovakia (GAJDOŠ et al. 1999), Ukraine (GNELITSA 2002) and Greece (TANASEVITCH 2011). In Poland, the species is also very rare – only two sites with single specimens have been found so far. It appears that the number of reported sites of *Walckenaeria incisa* decreases in Europe from the west to east, and in the northern and southern direction from central Europe, which indicates a relationship of this species with warm and humid climate.

Due to the fact that only single specimens of *Walckenaeria incisa* were found at most sites, it is difficult to define precisely habitat preferences of this species. Nevertheless, the largest number of findings was reported from forests. In Great Britain, the species is most common in deciduous but also coniferous and mixed forests, on heathlands, heath peat bogs and grasslands, the latter often developed after forest logging (SPIDER AND HARVESTMAN RECORDING SCHEME 2014). There is only one case known with more numerous findings, in “open ancient woodland” of the deciduous forest habitat (HARVEY et al. 2002). “Ancient woodland” is a well preserved, natural fragment of forest in Great Britain, characterised by high species diversity and presence of many rare and endangered species (RACKHAM 2008). In Germany, *Walckenaeria incisa* is thought to be a stenotopic species associated with well preserved, moderately humid deciduous forests with *Fagus sylvatica*, *Fraxinus excelsior*, *Quercus* sp., *Ulmus* sp. from the warm period ca. 6000 years ago, from the Atlantic period (PLATEN et al. 1999). In Poland, the habitats of the species were dry riparian mixed forest and thermophilic thickets resembling the forest. In the eastern part of the range, the species occurs mainly in deciduous forests, whereas in the western part of the range with more humid climate it also occurs in open areas.

It is likely that the sites of *Walckenaeria incisa* in deciduous forests and thickets in Poland and in other parts of Europe are relic sites from the Atlantic period. In river valleys, particularly in Eastern Europe, natural deciduous forests still occur, both at the river bed and at the edges of valleys, and they act as important ecological migration corridors. The Polish sites of *Walckenaeria incisa* are located in regions with valuable natural assets, proving their well-preserved status (GACKA-GRZESIKIEWICZ 1995, GŁOWACKI et al. 2002). The site in the Bug River valley is located in the Podlasie Bug Gorge Landscape Park and at the Natura 2000 SPA and SAC, where particularly well-preserved willow-poplar, elm-ash and oak riparian forests, as well as xerothermic oak forest and thermophilic thickets, occur in nature reserves (GŁOWACKI et al. 2002). Bug River valley is also a region of great spider species richness, including species very rare

in Europe (reviewed in: STAREGA 2003, HAJDAMOWICZ & STAŃSKA 2006; OLESZCZUK et al. 2011). The site in the lower Vistula valley is located near the Vistula LP and in the immediate vicinity of the Natura 2000 SPA and SAC with thermophilous communities on the valley slopes, with well-preserved willow-poplar and elm-ash alluvial forests at the river bed, which are also under a nature reserve conservation plan (GACKA-GRZESIKIEWICZ 1995). Also other, rare in Europe, species of spiders were found in this region (T. RUTKOWSKI unpubl. data).

We can assume that *Walckenaeria incisa* can spread along the river valleys, covering available, optimal habitats of moderately wet forests and thickets. On the other hand, due to the lack of natural habitats, it can also occur in other habitats with similar conditions of moisture, temperature and insolation.

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