

## The distribution and habitat preferences of an extremely rare European spider, *Glyphesis taoplesius* (Araneae: Linyphiidae)

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*Glyphesis taoplesius* Wunderlich, 1969 is a very rare spider species that has only been found in a few locations in Europe. Two specimens of *G. taoplesius* were recently collected in the Bug river valley in eastern Poland. It is the first record of this species in Poland. A morphological description of the male and a distribution map of the species are given in the paper. *G. taoplesius* is a hygrophilous spider typically found near bodies of water and the Polish specimens were found in a periodically flooded meadow.

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### 1. Introduction

Four spider species of the genus *Glyphesis* Simon, 1926; have been found in Europe: *G. taoplesius* Wunderlich, 1969; *G. cottonae* La Touche, 1944, *G. servulus* Simon, 1881 and *G. nemorialis* Esyunin & Efimik, 1994 (van Helsdingen 2009, Platnick 2010).

These species are characterised by their very small body size (about 1 mm). Moreover, they are hygrophilous, stenotopic, and are considered to be rare or very rare spider species (Platen *et al.* 1999, Nentwig *et al.* 2003, Staudt 2010). *G. servulus*, the smallest species of the genus, is recorded more often than the other three species and has been reported altogether in 14 European countries (van Helsdingen 2009, Blick *et al.*

2004, Staudt 2010). Nevertheless, in Germany and Slovakia it still belongs to the group of endangered species (Gajdoš *et al.* 1999, Platen *et al.* 1996, 1998), and in Czech Republic and Poland is regarded as a vulnerable species (Buchar & Růžička 2002, Starega *et al.* 2002). *G. cottonae* has been reported in fewer European countries (8 countries) than *G. servulus* (van Helsdingen 2009). In Germany it is classified as critically endangered and in Poland as an endangered species (Platen *et al.* 1996, 1998, Starega *et al.* 2002). *Glyphesis taoplesius* is a very rare species that has only been found in four countries in Europe: Denmark (Scharff & Gudik-Sørensen 2006), Germany (Staudt 2010), Hungary (Szinétar 1995) and Russia (Esyunin *et al.* 1998, Mikhailov 1999) (Fig. 1). This species was initially de-

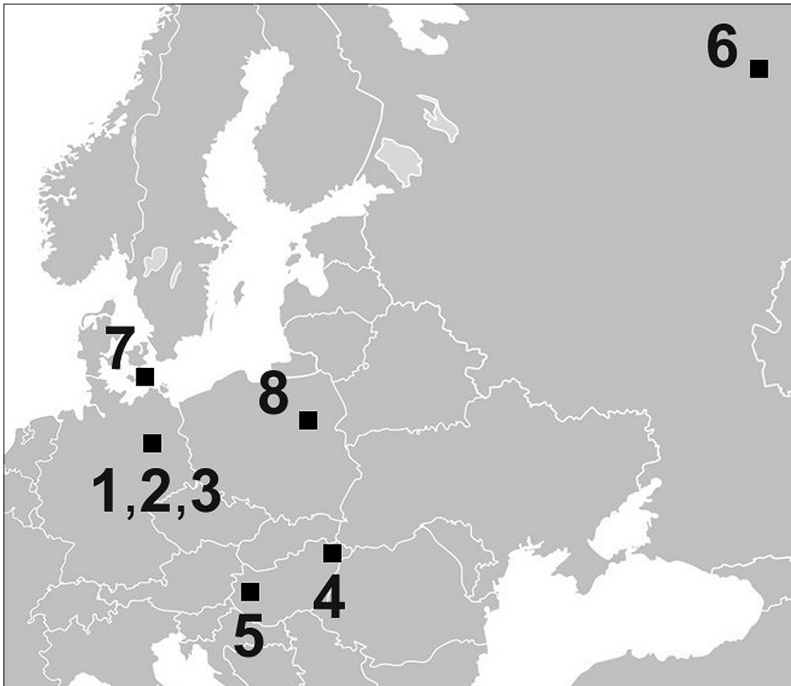


Fig. 1. Known records of *Glyphesis taoplesius*. Stands are indicated as black squares. The locations are: Germany: 1 – Berlin (locus typicus), 2 – Potsdam, 3 – Wilhelmshorst; Hungary: 4 – Csaroda, 5 – Balatonyörök; Russia: 6 – Kishert; Denmark: 7 – Ulvshale; Poland (new record): 8 – Morzyczyn.

scribed from Germany by Wunderlich (1969). It is reported as a critically endangered species on the Red Data List of this country (Platen *et al.* 1996, 1998). In the Danish Red List (2004) it has the DD status (Data Deficient). *G. nemoralis* has only been recorded in Eastern Europe – Russia (Urals) and Ukraine (Esyunin *et al.* 1998, Mikhailov 1999).

This paper presents a new record of *Glyphesis taoplesius* in eastern Poland as well as the distribution and habitat preferences of this extremely rare spider.

## 2. Material and methods

The specimens of *G. taoplesius* were obtained during a research project: “Habitat heterogeneity and diversity of selected groups of arthropods in the Bug River Valley”, conducted in the years 2007 and 2008. Several representative habitats in the river valley were studied: riparian forests, rushes at oxbows, meadows of lower and upper flooded terraces, sandy grasslands, thermophilous grasslands and thermophilous brushwood. Specimens were collected using sweep nets and pitfall traps. In the first year of the study

more than 50,000 spiders were caught, but *G. taoplesius* was not observed in any of the habitats.

Two specimens of *G. taoplesius* were collected in a flooded meadow near the village Morzyczyn on the Mazovian Lowland in 2008. This site was located in the Bug River Valley Landscape Park, in the area of Natura 2000. Ten pitfall traps were placed in one straight line, at a distance of 2 meters one from another. The beginning of the trapping period was in the middle of March and the end was in the middle of November.

The coordinates and height above sea level of a beginning and an end of the trap line are as follows: N52° 41.305' E21° 54.970', 94 m a.s.l. and N52° 41.311' E21° 54.983', 93 m a.s.l.

The collection dates were as follows: Male-1 – 09.05.–23.05.2008, leg. P. Jastrzębski det. M. Oleszczuk; Male-2 – 21.06.–07.07.2008, leg. M. Stańska, det. M. Oleszczuk

### 2.1. Habitat characteristics

The meadow was located in the meadows and grasslands complex of lower flooded terrace

which was underwater during high tides of the river. Based on syntaxonomy, this plant community was classified as an alluvial meadow of river valleys of the *Cnidion dubii*, but it demonstrated characteristics intermediate between alluvial meadows *Cnidion dubii* and fresh meadows (Zaluski 1995, Matuszkiewicz 2005). Predominant plants were species typical of a grassy habitat: *Carex praecox*, *Poa angustifolia* and *Agrostis capillaris*. The dense cover also included dicotyledonous plants such as *Lotus corniculatus*, *Ranunculus sardous* and *Plantago lanceolata*.

The meadow was extensively subjected to human impacts and was mown once in two years. Moreover, it was periodically poorly grazed by cattle. In the complex of meadows and grasslands on the distance about 2 km along the river the dairy herd of approximately 20 individuals were pastured in summer.

### 3. Diagnostic features

*G. taoplesius* is quite easy to distinguish from other species from this genus occurring in Europe. The carapace shape of the male *G. taoplesius* differs from remaining species, which is best noticeable in the side view profile (Esyunin & Efimik 1994, Nentwig *et al.* 2003). The carapace is slightly raised and shaped into a sharp point, with clypeus projecting a little beneath the eye region (Fig. 2). Post-ocular sulci are present, but poorly distinct in comparison with *G. cottonae* (Roberts 1993, Wunderlich 1969). The carapace has a yellow-brown colour while the median flecks, radial stripes and border are darker. The abdomen is dark grey or dark brown in colour. The legs have yellow-brown colouration. A bit similar colours are noticed in *G. nemoralis*, but carapace and legs of this species are yellow-gray (Esyunin & Efimik 1994). *G. servulus* and *G. cottonae* usually are darker – prosoma is brown or brown-black and abdomen is black in both species (Nentwig *et al.* 2003).

The male palp of *G. taoplesius* is easily distinguished from other *Glyphesis*-species by the shape of tibia. In *G. cottonae* and *G. nemoralis* tibial apophyses are curved and they lack the long bristles (Esyunin & Efimik 1994, Nentwig *et al.* 2003). The dorsal tibial apophysis in *G. servulus*

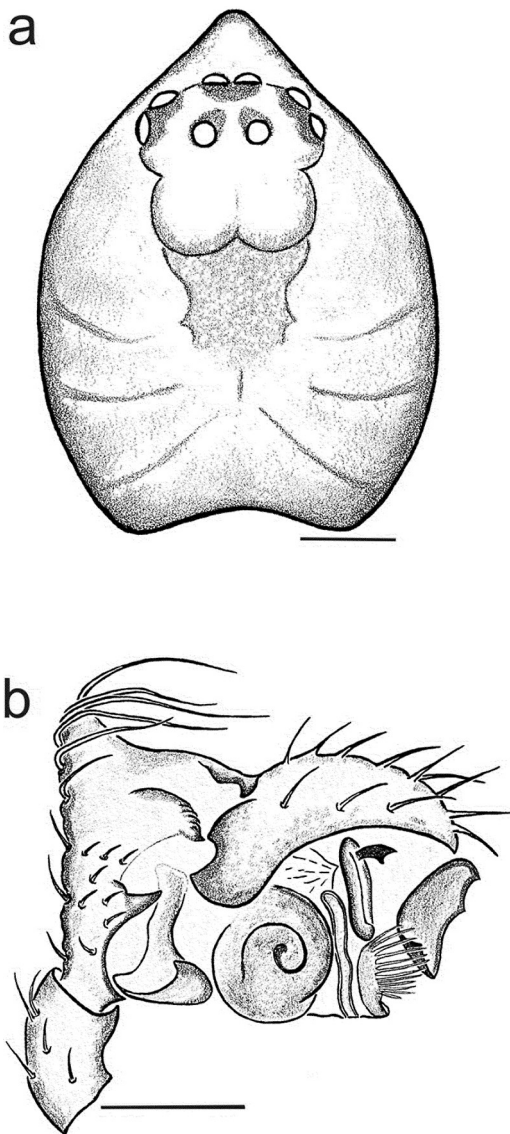


Fig. 2. Diagnostic drawings of a male of *Glyphesis taoplesius*. – a. Carapace, – b. Lateral view of palpal organ. Scale bar – 0,1 mm.

is flat, almost twice longer than high and has five long bristles running along its length and continuing across the cymbium (Wunderlich 1969, Roberts 1993, Nentwig *et al.* 2003). By contrast, in *G. taoplesius* the dorsal tibial apophysis is highly elevated (almost as long as high) and has six long curved bristles at the top of a hump (Fig. 2).

According to the literature, *G. taoplesius* is very small in size with a total body length of 1.3 mm for males and females (Nentwig *et al.* 2003).

Measurements of the specimens collected in Poland were as follows:

Male-1: total body length: 1.2 mm, carapace length: 0.6 mm, carapace width: 0.3 mm, carapace height: 0.2 mm, abdomen length: 0.6 mm, abdomen width: 0.4 mm.

Male-2: total body length: 1.2 mm, carapace length: 0.6 mm, carapace width: 0.4 mm, carapace height: 0.2 mm, abdomen length: 0.6 mm, abdomen width: 0.3 mm.

#### 4. Distribution

*Glyphesis taoplesius* is an extremely rare European spider species known only from few locations. This species has only been observed in widely separated stands in Europe that include locations in Denmark (Scharff & Gudik-Sørensen 2006), north eastern Germany (Wunderlich 1969, Moritz 1973, Platen *et al.* 1999), Hungary (Loksa 1981, Szinetár 1995) and the Urals in Russia (Esyunin *et al.* 1998) (Fig. 1). In Germany *G. taoplesius* was reported from four stands in the north eastern part of the country. The specimens originally described by Wunderlich (1969) were found in the outskirts of Berlin in the Pfauen Island Reserve on the Havel river. A second study conducted many years later (1983–1988) on this island did not reveal the presence of the species (Platen & Wunderlich 1990), so the authors reported it to the Red Data List of Berlin as extinct (Platen *et al.* 1991). However, Blick & Szinetár (1996) reported a new finding of this species in the reserve in 1993. The next specimen was found in neighbouring Potsdam (Brandenburg) also at the Havel River (Moritz 1973). Many years later *G. taoplesius* was recorded in Wilhelmshorst near Potsdam (Platen *et al.* 1999). The authors consider *G. taoplesius* in Brandenburg as a very rare species (1–5 locations in the region) and endangered by extinction. The presence of this species in Mecklemburg-Vorpommern has not been confirmed (Blick & Szinetár 1996).

In Hungary the species was described by Loksa (1981) as *G. conicus*. However, Blick & Szinetár (1996) reported this name as a junior synonym of *G. taoplesius*. This spider was found in stands in the northeastern part of the Hungarian

Plain near Nyírestó, in the Upper Tisza region, in a strictly protected peat bog (Loksa 1981). This species was also observed in the northwestern region of Lake Balaton, in the vicinity of Balatonyörök (Szinetár 1995).

In Denmark *G. taoplesius* was found in Ulvs-hale on Moen island in the Baltic Sea (Scharff & Gudik-Sørensen 2006). The species is in the Danish Red List (2004) with the DD status.

*G. taoplesius* was also reported from Russia, in the middle Urals. One male of this species (in original text erroneously – one female) was found on the bank of the Silva River in Perm Area, Kishert District, Preduralie Reserve, and was reported as a new record for Russia (Esyunin *et al.* 1998, Esyunin pers. comm.).

The first reported occurrence of this spider species in Poland comes from the northeastern part of country, on the Mazovian Lowland, in the Bug River valley at the river (present paper).

#### 5. Habitat and phenology

All specimens of *Glyphesis taoplesius* were discovered in regions characterised by bodies of water such as large rivers, lakes, and the sea. These regions have a humid microclimate and specific conditions which create desirable habitats along the edge of water that are preferred by this species.

Habitats of *G. taoplesius* were correlated with the presence of large bodies of water. In Germany this species was found near a river characterised by the presence of specific vegetation including rushes *Glycerietum maximae* and riparian forest *Pruno-Fraxinetum* (Wunderlich 1969). These spiders have also been found in a thick layer of vegetation debris borne by the river (Moritz 1973). In Russia the specimens were found on the bank of a river in a *Salix* bed (Esyunin *et al.* 1998) and in Poland in a flooded meadow of the lower river terrace (present paper). This spider was captured in Hungary among reeds at a lake in an off-shore bar of vegetation debris created by waves (Szinetár 1995).

Another biotope of *G. taoplesius* were plant associations of wet areas characterised, at least periodically, by the presence of stagnant water. These sites were peat bogs *Eriophoro vaginato-*



*Sphagnetum* and *Carici lasiocarpae-Sphagnetum* in Hungary (Loksa 1981), on the edge of a water reservoir in a eutrophic peat bog in Brandenburg Land, Germany (Platen *et al.* 1999), as well as an alder swamp forest *Dryopteridi-Alnetum* in Hungary (Loksa 1981) and a swamp forest in Denmark (Scharff & Gudik-Sørensen 2006).

This species is considered to be stenotopic, and a photobiont – hygrobiont in terms of its specific habitat preferences (Platen *et al.* 1999). Because of the presence of *G. taoplesius* in bright forests it can be considered as a photophilous species.

Based on current data from the northern part of its range (Denmark, Germany, Poland and Russia) *G. taoplesius* occurred in eutrophic habitats such as riparian and alder swamp forests, willow beds, and rushes (Platen *et al.* 1999), while in the southern part of its range, such as Hungary, this species also occurs in oligotrophic and mesotrophic habitats like peat bogs. It is possible that in the southern part of its range the species can tolerate a broader range of habitat conditions and characteristics. However, the oligotrophic peat bog microclimate is characterised by lower temperatures than mesotrophic wetlands (Szafer & Zarzycki 1977); therefore, northern European peat bogs might have a microclimate that is too cold for *G. taoplesius*.

Peak activity of *G. taoplesius* occurs in May and June (Wunderlich 1969), but this species has been collected from 5<sup>th</sup> April (Scharff & Gudik-Sørensen 2006) to 8<sup>th</sup> August (Szinetár 1995) and in present study in July. Typically this spider has been captured as a single specimen in pitfall traps (Szinetár 1995, Esyunin *et al.* 1998, present paper). However, Wunderlich (1969) collected 11 males and 2 females using pitfall traps in a long-term seasonal study. Loksa (1981), using the same method during a one-year study, found about 25 specimens in three peat bogs and 20 specimens in three alder swamp forests in Hungary. In a few studies, the method of capture for this species has not been disclosed (Moritz 1973, Platen *et al.* 1999).

One reason for the rarity of *Glyphesis taoplesius* is that it prefers wet habitats and the availability of such appropriate habitats has decreased dramatically over the last century in Europe

(Szafer & Zarzycki 1977, Succow & Jeschke 1990). In addition, there can be methodological problems of collecting spider species such as *G. taoplesius*, which prefers habitats that are particularly difficult to access. Scharff & Gudik-Sørensen (2006) suggested also that its small size often causes this species to be overlooked. However, smaller *G. servulus* living in the middle humid deciduous forests have been recorded often. Further investigation of wetland areas may reveal new populations of *G. taoplesius* throughout Europe.

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