

## New data on the occurrence of *Gnaphosa rufula* (L. KOCH, 1866) and *Gnaphosa mongolica* SIMON, 1895 in Hungary (Araneae: Gnaphosidae)

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**Abstract:** Several years of study on the spider assemblages of mosaics of grassland habitats in Hungary revealed that two little known gnaphosid species are both dominant spiders of their particular habitats. *Gnaphosa rufula* (L. KOCH, 1866) proved to be one of the most dominant spiders in salt marshes and saline meadows, while *Gnaphosa mongolica* SIMON, 1895 was collected in large numbers on sandy grasslands. Hungary is their westernmost location. Both species can be collected mainly from April to August.

**Key words:** spiders, *Gnaphosa*, habitat preferences, phenology, faunistics

### Introduction

Most of the grassland habitats of Hungary are mosaics of agricultural and different types of natural habitats. These habitats possess their specialised flora and fauna. In the last few years remarkable attention was devoted to many kinds of natural grassland habitats, e.g. loess steppes, alkaline grasslands, wet marshes and sandy grasslands from a faunistical and ecological point of view.

Our several years of studies on the spider assemblages of these mosaics of grassland habitats in Hungary revealed that two, previously little known gnaphosid species are in fact the dominant spiders of their particular habitats. *Gnaphosa rufula* (L. KOCH, 1866) was found for the first time in Hungary in 1998 (DUDÁS 2001, SZITA *et al.* 2000), while *Gnaphosa mongolica* SIMON, 1895 was known earlier from Hungarian and Romanian localities as *Gnaphosa spinosa* KULCZYŃSKI, 1897 (BALOGH, LOKSA 1946, 1948, CHYZER, KULCZYŃSKI 1897, LOKSA 1987, KEREKES 1988, WEISS, MARCU 1988). This name proved to be the junior synonym of *G. mongolica* (OVTSHARENKO *et al.* 1992). *G. mongolica* was also known from Kazakhstan, Kyrgyzstan, southern part of Russia, Ukraine and Mongolia, while *G. rufula* was found in Kazakhstan and the southern part of Russia; Hungary seems to be their known westernmost location (OVTSHARENKO *et al.* 1992, PLATNICK 2005).

### Material and Methods

#### Collecting places and study years

The sampling sites were located in areas belonging to four national parks: alkaline and sandy grasslands of Bükk N.P., Hortobágy N.P., Kiskunság N.P. and Körös-Maros N.P. The surveys

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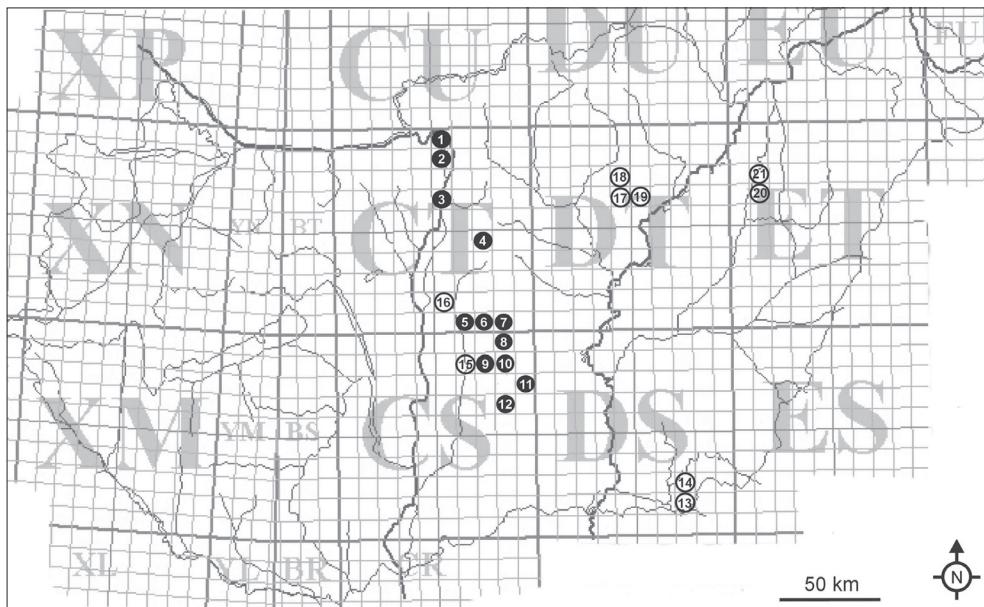
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were carried out between 1998 and 2004. We collected spiders with pitfall traps with the standard methodology of our previous experiments (SAMU, SÁROSPATAKI 1995, TÓTH *et al.* 1996). In the case of *G. mongolica* we took into consideration Hungarian literature data as well. Currently these locations belong to the Duna-Ipoly N.P. For the exact location of the study sites and the years of sampling see Table 1 and Fig. 1. The nomenclature of plant communities of habitats follows FEKETE (1997) and DEVILLERS (2000). The system used by TOFT (1976) was adopted for presentation of phenological data.



**Fig. 1.** Study sites of *Gnaphosa mongolica* (●) and *G. rufula* (○). Numbers correspond to those of Table 1.

## Results and Discussion

### Diagnosis

Genitalia of both species are rather characteristic, easy to distinguish from other Hungarian *Gnaphosa* species (*G. alpica* SIMON, 1878; *G. bicolor* (HAHN, 1833); *G. lucifuga* (WALCKENAER, 1802); *G. lugubris* (C.L. KOCH, 1839); *G. microps* HOLM, 1939; *G. modestior* KULCZYŃSKI, 1897; *G. opaca* HERMAN, 1879) (SAMU, SZINETÁR 1999).

The males of *Gnaphosa mongolica* can be recognized by the long embolus originating from the prolateral part of the tegulum and by slightly curved median apophysis with hook-like apical part (Figs 2 a,b), while females have large diamond-shaped epigynal hood and the spermathecal ducts are anteriorly extended (Figs 2 c,d). Male body size: 7-9 mm, female body size: 8-11 mm. The males of *Gnaphosa rufula* can be recognised by the long narrow embolus with rounded basal prolateral protuberance and the slim and curved median apophysis (Figs 2 e,f). Females have deep epigynal atrium with long parallel lateral margins, wide epigynal midpiece and long wide median ducts of spermathecae (Figs 2 g,h). Male body size: 6-8 mm, female body size: 7-9 mm.

### Habitat preferences

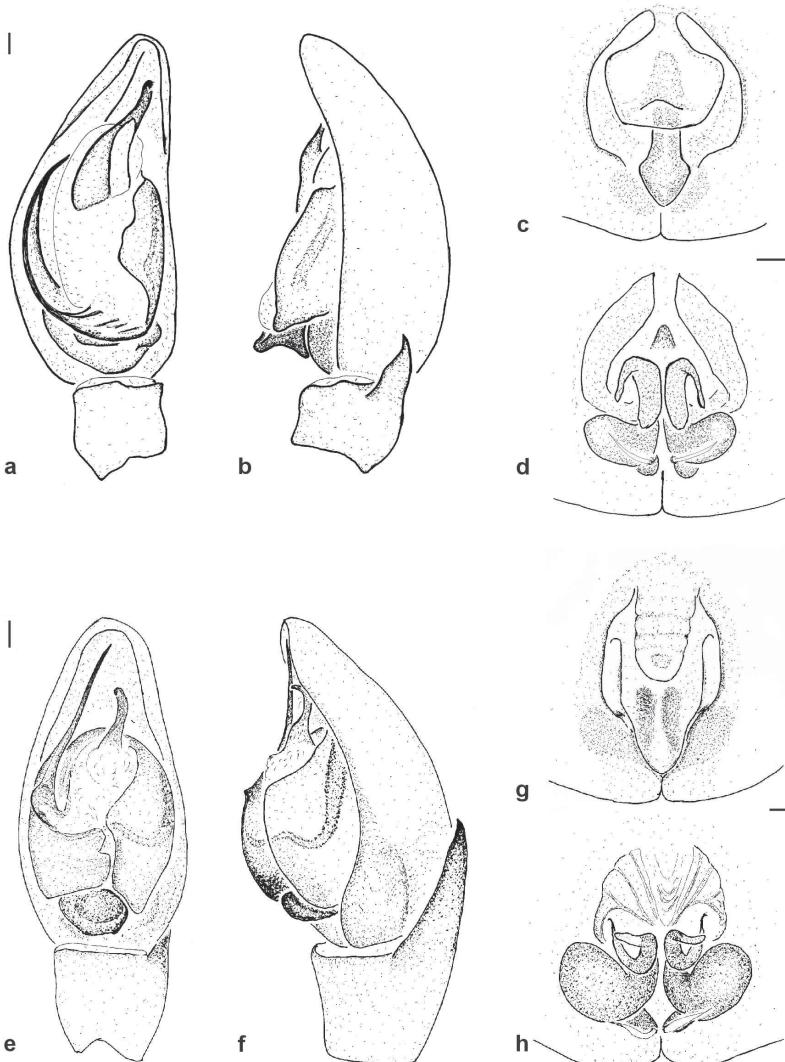
Both species prefer xerothermic habitats.

***Gnaphosa mongolica***: Specimens were collected in large numbers (85 females, 331 males) in sandy grasslands and on clearings of Juniper downs on sand (Fig. 1 and Table 1: 1-12). This species proved to be one of the most abundant spiders. Values ranged between 1<sup>st</sup> rank with 37.8% or 16% of all collected specimens of a given area to 7<sup>th</sup> rank with 4.9%. Their occurrence in adjacent agricultural fields was not investigated. Sandy grasslands (*Festucetum vaginatae*) are perennial, more or less open grasslands dominated by *Festuca vaginata* or feather grasses (*Stipa capillata*, *Stipa borystheneica*). Juniper downs on sand (*Festucetum vaginatae juniperetosum*) constitute a primary successive stage in the colonisation of sand dunes, with groove-like appearance of mosaics of open sandy grassland and juniper (*Juniperus communis*) shrubs.

***Gnaphosa rufula***: We collected 205 female and 450 male specimens of *G. rufula*. This species proved to be one of the most dominant spiders of saline steppes and saltmarsh meadows (Fig. 1 and Table 1: 13-21). Abundance values ranged between 2<sup>nd</sup> with 13%-11% of all collected specimens to 8<sup>th</sup> with 3%. This species may occur also in the adjacent non-saline meadows or cereal fields, but in negligible amount (1 or 2 specimens per year). The grassy saline steppe (*Achilleo-Festucetalia pseudovinae*) and the *Artemisia* saline steppe (*Artemisio-Festucetalia pseudovinae*) are dominant salt-steppe communities of dry soils. The latter developed on more low-lying surfaces, mostly constituting intermediate belts between grassy saline steppes and rills-alkali

**Table 1.** Sampling sites, study years and habitats of *G. mongolica* and *G. rufula* in Hungary.

Nr. on Fig 1.	Sampling site	National park	Study years or lit. data	Plant community
1	Pócsmegyer	DINP	(BALOGH, LOKSA 1946)	<i>Festucetum vaginatae</i>
2	Szigetmonostor	DINP	(BALOGH, LOKSA 1948)	<i>Festucetum vaginatae</i>
3	Sashegy /Budapest/	DINP	(CHYZER, KULCZYŃSKI 1897)	?
4	Csévháraszt	DINP	(LOKSA 1987)	<i>Festucetum vaginatae juniperetosum</i>
5	Kunadacs	KNP	2001-2002	<i>Festucetum vaginatae</i>
6	Kunbaracs	KNP	2001-2002	<i>Festucetum vaginatae</i>
7	Kerekegyház	KNP	(LOKSA 1987)	<i>Festucetum vaginatae stipetosum</i>
8	Fülöpháza	KNP	2001-2002	<i>Festucetum vaginatae</i>
9	Soltzentimre	KNP	2001-2002	<i>Festucetum vaginatae</i>
10	Orgovány	KNP	2002-2004	<i>Festucetum vaginatae juniperetosum</i>
11	Bugac	KNP	(KEREKES 1988), 2001-2002	<i>Festucetum vaginatae juniperetosum</i>
12	Bócsa	KNP	2001-2002	<i>Festucetum vaginatae juniperetosum</i>
13	Csanádpalota	KMNP	1998-2000	<i>Artemisio-Festucetum pseudovinae</i>
14	Királyhegyes	KMNP	1998-2000	<i>Puccinellietum limosae + Artemisio-Festucetum pseudovinae</i>
15	Fülöpszállás	KNP	2001-2002	<i>Camphorosmetum annuae + Artemisio-Festucetum pseudovinae</i>
16	Kunszentmiklós	KNP	2001-2002	<i>Artemisio-Festucetum pseudovinae</i>
17	Pély	BNP	1998-1999	<i>Agrostio-Alopecuretum pratensis + Artemisio-Festucetum pseudovinae</i>
17	Jászivány	BNP	1998-1999	<i>Camphorosmetum annuae + Artemisio-Festucetum pseudovinae</i>
18	Heves	BNP	1998-1999	<i>Achilleo-Festucetum pseudovinae</i>
19	Tarnaszentmiklós	BNP	1998-1999	<i>Artemisio-Festucetum pseudovinae + Agrostio-Beckmannietum eruciformis</i>
20	Hajdúszoboszló	HNP	2004	<i>Achilleo-Festucetum pseudovinae + Agrostio-Alopecuretum pratensis</i>
21	Hortobágy	HNP	2004	<i>Artemisio-Festucetum pseudovinae + Camphorosmetum annuae</i>



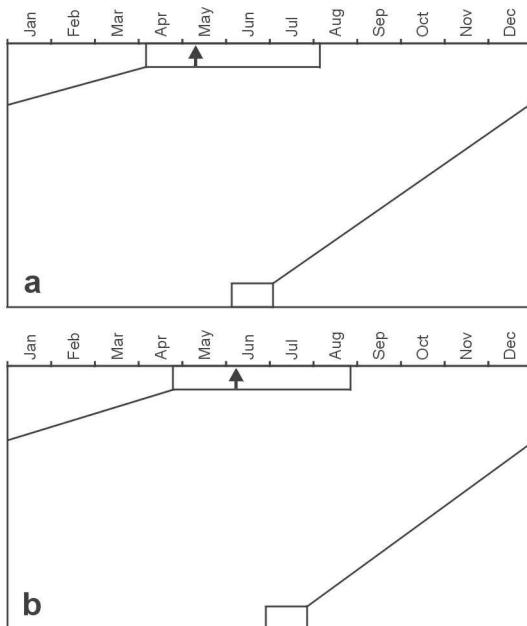
**Fig. 2.** *G. mongolica*: **a** - male palp, ventral view; **b** - retrolateral view; **c** - epigyne; **d** - spermatheca. *G. rufula*: **e** - male palp, ventral view; **f** - retrolateral view; **g** - epigyne; **h** - spermatheca. Scale lines: 0.1 mm

hollow communities. These rills are eroded shallow depressions with bare or sparsely vegetated saline soils, dry (*Camphorosmetum annuae*) or moist (*Puccinellietum limosae*) in spring and prone to white salt efflorescences.

Salt-marsh meadow communities (*Festuceto-Puccinellietalia*) are also associated with saline steppes. They mainly consist of medium tall often tussock-forming grasses developed on summer-dry carbonate-poor clay soils (*Agrostio-Beckmannietum eruciformis*) and on silt accumulations, in particular of drift lines of larger marshes and along rills (*Agrostio-Alopecuretum pratensis*).

### Phenology

Both species are stenochronous – adult specimens can be collected mainly from April to August (Fig. 3). Individuals of *G. mongolica* overwinter in Hungary in juvenile or subadult stages and the first adult spiders appear at the beginning of April, while most of matures in May. Specimens



**Fig. 3.** Phenology of *G. mongolica* (a) and *G. rufula* (b). The figure covers one year. Small rectangle in the upper part of the figure = period of adulthood, the arrow in it = time of copulation. Small rectangle at the bottom = egg-laying period. Solid line = rate of development.

in the collection of the material. The first author thanks to the fieldwork teams of Bükk, Hortobágy, Kiskunság, and Körös-Maros national parks, who helped

of *G. rufula* overwinter mainly as juveniles, the first adult spiders appear at the end of April and most of the individuals mature in June.

Hungarian spider fauna can be considered a well studied one (SAMU, SZINETÁR 1999). Exploration of special habitats like the extremely dry sandy grasslands and saline steppes, however, lead to surprising results: the discovery of two poorly known gnaphosid species with a relatively large body size which proved to be the dominant species of their respective habitat. The reasons for previous underestimation of the amount of these two species in the Hungarian arachnofauna might be the narrow niche of the species and the sparse data on these specific habitats. Taking into consideration their occurrence in such particular habitats (DEVILLERS 2000), the presence of *G. mongolica* and *G. rufula* can also be expected in the countries of the Balkan Peninsula.

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## Нови данни за паяците *Gnaphosa rufula* (L. KOCH, 1866) и *Gnaphosa mongolica* SIMON, 1895 в Унгария (Araneae: Gnaphosidae)

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### (Резюме)

Дългогодишните изследвания на паяците, обитаващи тревни хабитати в Унгария, показват, че два слабо познати вида – *Gnaphosa rufula* и *G. mongolica*, са доминанти в някои специфични местообитания. *G. rufula* е сред най-често срещаните видове паяци около солени блата и ливади, докато *G. mongolica* живее в песъчливи пасища. И двата вида могат да бъдат намерени в периода от април до август. Представени са оригинални илюстрации на мъжки и женски копулаторни органи, основаващи се на новия материал. Новите находки оформят западната граница на ареалите на двата вида.