Micaria subopaca Westring, 1861, *Scotophaeus blackwalli* (Thorell, 1871) and *S. scutulatus* (L. Koch, 1866): three species of gnaphosids new to Luxembourg (Arachnida, Araneae, Gnaphosidae)

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Abstract. The first records of the gnaphosids *Micaria subopaca* Westring, 1861, *Scotophaeus blackwalli* (Thorell, 1871) *and Scotophaeus scutulatus* (L. Koch, 1866) from Luxembourg are presented.

Key words. Araneae, Gnaphosidae, *Micaria*, *Scotophaeus*, Luxembourg

1. Introduction

According to the World Spider Catalog (Platnick 2014), 2173 species in 123 genera have been described in the family Gnaphosidae, with 447 species in 37 genera occurring in Europe (Lissner 2011). Up to 2015, 30 species in 10 genera have been recorded in Luxembourg (unpublished data by the present author). With the exception of the genus *Micaria*, the species of this ecribellate family have typically rather long, cylindrical spinners (Lissner 2011, Roberts 1995). Concerning their general appearance, they look rather stout and have flattened and elongated abdomens. The posterior median eyes normally are oval, irregular or slit-like, except in the genus *Scotophaeus* and some *Zelotes* species, which have round median eyes (Lissner 2011, Roberts 1995). Generally, the eight small eyes are not well developed in gnaphosids (Lemke et al. 2014). The majority of the species are nocturnal hunters and have a rather unimpressive colour (from a dark or light greyish-brown to jet-black) and short-haired monochromatic abdomens (Lissner 2011, Lemke et al. 2014, Roberts 1995). In contrast, a few species have striking colours and are mostly active in daytime (Lissner 2011, Lemke et al. 2014, Roberts 1995). For some, the lifestyle is not yet explored (Lemke et al. 2014). In all the species there is no conspicuous sexual dimorphism except for for the body shape and size, males having slimmer abdomens (Roberts 1995), an anterior abdominal scutum in most species (Lissner 2011) and generally being smaller.

At present there are 34 known species in the genus *Micaria* in Europe (Lissner 2011) of which four are known to occur in Luxemburg (unpublished data by the present author). All *Micaria* species are ant-mimics, with relatively slim legs and iridescent abdomens (Lemke et al. 2014, Lissner 2011, Roberts 1995). Most species live on ground level, usually near areas inhabited by ants (Lemke et al. 2014, Lissner 2011, Roberts 1995). It is not sure whether the spiders feed on ants (Lemke et al. 2014). Some of the species seem to be associated each with a given ant species, others less, and some individuals have even been found in ant nests (Lemke et al. 2014). While not many details are known about the lifestyles of the different species, it appears likely that several levels of myrmecophilic lifestyles have evolved within the genus (Lemke et al. 2014).

The biology of the genus *Micaria* is so dissimilar from other gnaphosids that some arachnologists have allocated it to the

clubionids (Lissner 2011). Generally, ant-mimics have passed through an important specialization process influenced by quite a few factors during their evolution. There are hundreds of myrmecomorphous spider species all over the world. They have strikingly similar lifestyles, behaviour and appearances although they originated from different taxonomic groups (Nelson & Jackson, 2011). These circumstances seem to complicate the classification of those ant-mimics into families. Lemke et al. (2014) write that it has been thought of splitting the genus *Micaria* into two groups, depending on the lifestyles of their species: ground-living species, constituting the majority, should remain in *Micaria* whereas the tree-living species should be classified into a 'new' genus, *Arboricaria*, as suggested in 2000 by Bosmans R. and T. Blick. The World Spider Catalog however did not adopt this modification (Lemke et al. 2014).

Micaria subopaca was originally described by Westring in 1861. Unlike other *Micaria* species, the spiders live on three trunks, preferentially of coniferous wood, exposed to bright sunlight and may be quite numerous in suitable sites (British Arachnological Society 2010-2015, Nentwig et al. 2014, Roberts 1995). The species shows a palaearctic distribution and is widespread in northern and central Europe. The adults of both sexes appear from April to October, with a peak of records in April and May. *Micaria subopaca* is supposed to prefer ants as food source (Lemke et al. 2014).

At present there are 20 known species in the genus *Scotophaeus* in Europe (Lissner 2011), none of which was known to occur in Luxembourg until 2013. Individuals of these greyish spiders show important differences of up to more than 6 millimetres in size, females being larger (Lissner 2011, Roberts 1995). Adult males in this genus have a small scutum on the dorsum of the abdomen (Lemke et al. 2014, Lissner 2011, Roberts 1995). These strictly nocturnal and shade-loving hunters usually live on trees, under bark or in natural cavities (Nentwig et al. 2014). However, houses and buildings have become suitable alternative habitats, especially in northern, colder regions (Lissner 2011, Roberts 1995). In the daytime, the *Scotophaeus*-species hide in cocoons which they tend to build in crevices (Lemke et al. 2014).

Scotophaeus blackwalli was first described by Thorell in 1871 and *S. scutulatus* by L. Koch in 1866. Both gnaphosids are very similar in general appearance and can only be distinguished by the structure of their fully developed genitalia (Lemke et al. 2014, Roberts 1995). They are regarded as common representatives of *Scotophaeus* having a palaearctic distribution (Lemke et al. 2014, Nentwig et al. 2014, Roberts 1995, British Arachnological Society 2010-2015). Adult females of both species may be found all year long, but the maturity period of males seems to be restricted to late summer and early autumn (British Arachnological Society 2010-2015, Nentwig et al., Lemke et al. 2014, Roberts 1995), most probably resulting from the generally longer lifespan of the females in spiders.

All three species dealt with here (*M. subopaca*, *S. blackwalli* and *S. scutulatus*) are known to occur in France, Germany and Belgium (Blick et al. 2004, Bosmans 2009, Lissner 2011, Nentwig et al. 2014, British Arachnological Society 2010-2015, Tutelaers 2012). In this note the first records of *M. subopaca*, *S. blackwalli* and *S. scutulatus* are reported from Luxembourg.

2. Material and methods

While *M. subopaca* was discovered during a systematic examination of a tree trunk, the specimens of the two other species were chance discoveries. All spiders where caught by hand.

The spiders were identified with a stereomicroscope and the illustrated online key by Nentwig et al. (2014). Aloys Staudt (D-Schmelz) kindly confirmed the identification of the first individuals of *Micaria subopaca* and *Scotophaeus blackwalli*, both collected during the present study.

The specimens are preserved in denatured ethanol (70%) in the Natural History Museum of Luxembourg.

3. Results

M. subopaca was caught on 18.04.2013 in Luxembourg-Grund on the bark of a big cigar tree (*Catalpa speciosa*) in bright sunlight. At least two more individuals of the genus *Micaria* were observed running about rapidly on the same trunk that day. The author checked the tree in question several times and thus managed to confirm the presence of the species by a second finding on 16.04.2015. On 08.03.2013, an individual of *S. blackwalli* was captured on the outer stairs of the scientific annexe building of the Museum of Natural History in Luxembourg-Grund. *S. scutulatus* was collected on 12.09.2014 in Wasserbillig from the author's kitchen table.

All four specimens were mature, so that the fully-developed bulbus of *Micaria* and the epigynes of the two *Scotophaeus* enabled the identification to species level. Table 1 lists the details of all records. The specimens are kept in the invertebrate collections of the National Natural History Museum of Luxembourg (MNHNL).

4. Discussion

The presence of *M. subopaca, S. blackwalli* and *S. scutulatus* is reported for the first time for the fauna of Luxembourg. Despite some intensive research projects in the last decades, these spiders were identified only recently. Due to their respective lifestyles, all three gnaphosids might be more common than implied by the existing records, which are rather sparse in neighboring countries as well (Arachnologische Gesellschaft 2015, Tutelaers 2012).

Species of the genus *Micaria*, just like other ant-mimics, are easily overlooked in the field. Species that live on ground level can however be regularly recorded with pitfall-traps. The latter represent a standard and user-friendly method commonly used in research projects. The presence of *M. subopaca*, in particular, is difficult to prove because of the highly specialized lifestyle of the species. It is active in daytime, mostly during sunshine. However, the ant-like appearance of the species, its small size and fast movements on tree trunks (Lemke et al. 2014, Roberts 1995, British Arachnological Society 2010-2015) make it difficult to recognize. Furthermore, *M. subopaca* seems to have a short activity season, as suggested by the peak of records in April and May (Lemke et al. 2014). Above all, the preference for tree trunks as a habitat is generally challenging. There hardly exists trapping equipment conceived for this special habitat. As these few utilities are, in addition, rather impracticable in handling they are only rarely used in studies, and therefore inhabitants of bark and tree trunks are often underrepresented or even missing from the records.

The species of the genus *Scotophaeus* are more homogeneous in their lifestyle. Originally living on trees and in natural cavities (Lemke et al. 2014), they frequently occur in synanthropic areas like houses or sheds

Table 1. Records of *Micaria subopaca*, *Scotophaeus blackwalli* and *Scotophaeus scutulatus* in Luxembourg. All specimens were collected (hand captured) by the author.

Species	Count	Confirm.	Location	Habitat	Sexe	Latitude	Longitude	Date
Micaria subopaca	1	A. Staudt	Luxembourg-Grund	Tree trunk	Male	4961037	613575	18.04.2013
Micaria subopaca	1	–	Luxembourg-Grund	Tree trunk	Male	4961037	613575	16.04.2015
Scotophaeus blackwalli	1	A. Staudt	Luxembourg-Grund	Stair, outdoors	Male	4960998	613595	08.03.2013
Scotophaeus scutulatus	1	–	Wasserbillig	Suburb house, indoors	Female	4971542	649745	12.09.2014

(Lissner 2011, Nentwig et al. 2014, Roberts 1995, British Arachnological Society 2010-2015). It is most probably this habitat preference that brings about the relative rareness of records and occurrence points on distribution maps (Arachnologische Gesellschaft 2015, Lemke et al. 2014, British Arachnological Society 2010-2015, Tutelaers 2012), as researchers usually do not have access to private houses. Furthermore, *Scotophaeus* species are presumed to be strictly nocturnal and shade-loving and therefore, even if present in buildings, mostly pass unnoticed (Lemke et al. 2014, Lissner 2011, Roberts 1995, British Arachnological Society 2010-2015). However, in some Internet fora (e.g., spinnen-forum.de, insektenfotos.de/forum, bugguide.net, insecte.org et cetera) dedicated to arthropods, frequented by both professional zoologists and citizen scientists, *Scotophaeus* species are reported rather regularly (Lemke et al. 2014). Unfortunately, the gnaphosids of the genus in question can only be determined to species level by means of an examination of their fully developed genitalia (Lemke et al. 2014). It shows nevertheless that representatives of the genus should be more common than often assumed.

In summary, *M. subopaca*, *S. blackwalli* and *S. scutulatus* are all three more common than indicated by their sparse records in the literature and systematic surveys are needed to obtain more accurate information on their distribution. *Micaria subopaca* in particular is unlikely to be found by chance discoveries. Because the *Scotophaeus* species mostly live indoors, the help of the general public might be necessary to obtain more information on their distribution. In the summer months, when temperatures are higher, it may be possible to locate them outdoors, however. Although much remains to be done, the increased arachnological activity in Luxembourg may lead to a better knowledge on these three spiders and possibly to finds of further new species for the country.

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