

Observation of *Stenamma westwoodii* WESTWOOD, 1839 in Belgium (Formicidae, Hymenoptera); a species of European concern

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Abstract

From the end of April until the end of October 2008, seven sets of three pitfall traps and a Malaise trap were used to make an inventory of the soil and leaf litter invertebrates in a grassland at the military training field in Schaffen (province of Vlaams-Brabant - Belgium). During this sampling campaign we collected 21 ant species. Of the rare *Stenamma westwoodii* WESTWOOD, 1839 five specimens were collected with a Malaise trap that was installed on the edge of the investigated area. We give comments on the ant community encountered and we discuss ecology and identification of this rare species (3 times encountered in Belgium before 2008).

Keywords: Formicidae, faunistics, *Stenamma westwoodii*, Belgian records

Samenvatting

Van eind april tot eind oktober 2008 werd met zeven reeksen van drie bodemvallen en een Malaiseval een inventaris van de bodeminvertebraten gemaakt van een grasland op het militair domein, Opleidingscentrum voor Parachutage in Schaffen (provincie Vlaams-Brabant - België). Tijdens deze staalname verzamelden we in totaal 21 mierensoorten. Aan de rand van het domein plaatsten we een Malaiseval waarmee we vijf exemplaren konden inzamelen van de zeer zeldzame mier *Stenamma westwoodii* WESTWOOD, 1839 (tot op heden slechts 4 records in België). We bespreken de identificatie en ecologie van deze zelden waargenomen soort en gaan dieper in op de mierengemeenschap die we aantreffen.

Introduction

Most of the 'Military areas' in Flanders are large areas with a relatively reduced fragmentation. One of these areas is the military training field in Schaffen (Diest), a grassland with a continuous management for the past 100 years (BERWAERTS *et al.*, in press). In 2008, we had the opportunity to investigate the biodiversity of spiders and several insect groups of this site. Here we present the results of the ant fauna found.

Material and Methods

Description of the habitat

The military training field in Schaffen consists

mainly of dry, nutrient-poor grassland with a few patches of dry heathland vegetation. An important part of the investigated site was grazed by sheep during the summer. However, for more than 25 years already, management has to a great extent consisted of periodically cutting with mechanical mowers resulting in an open, low vegetation. Beside the presence of *Calluna vulgaris* L. with some lichens we especially noticed sheep sorrel (*Rumex acetosella* (L.) MILLER), velvetgrass (*Holcus lanatus* L.) and bentgrass (*Agrostis* sp.). For several years and until 2006 the forest in the northern part of the area has been enclosed by a corn field. As a consequence, at present this area is the most nutritious part of the investigated site.

Sampling

To make an inventory of the soil and leaf litter invertebrates, seven sets of three pitfall traps, placed at an intermediary distance of 5 m and a Malaise trap were used. The pitfall consisted of a glass container with a diameter of 10 cm, buried in the ground with the rim at soil surface level, containing a 4 % formaldehyde solution. The pitfall was covered by a plexy-glass roof constructed in a metal frame to reduce the amount of rain falling into the trap and to prevent animals like sheep to step in the trap (Fig 1).



Fig. 1: Pitfall trap covered by a plexy-glass roof (photo: Koen BERWAERTS).

The Malaise trap we used is a tent-like structure constructed for the interception of flying insects such as Diptera and Hymenoptera (Fig. 2). However in practice, we sometimes noticed that not only flying insects are found in this type of trap but also ground dwelling insects and mostly workers of several ant species.



Fig. 2: Malaise trap installed at the edge of the site (photo: Koen BERWAERTS).

The Malaise trap was set up in the northern part of the investigated area nearby a deciduous forest with mainly Pedunculate oak (*Quercus robur* L.), separating the field from the road. The pitfalls and the Malaise trap were emptied on fortnightly intervals and ants, bees, carabid beetles, hoverflies, ladybirds, robber flies, longhorn beetles, soldier flies, spiders and wasps were sorted out.

Identification

To identify the ants we used the key of Seifert (2007). To identify the female *Stenamma* specimens collected, we considered some typical morphometric characters. The measurements were made on dried and mounted specimen. An Olympus SZX12 stereomicroscope equipped with a 1.2 x PF objective was used at magnifications of 96-216 times. The following characters were measured: CW: maximum head width including the eyes; CL: in median line the maximum head length; SL: maximum scapus length and FL: maximum distance between the margins of the frontal lobes (Fig. 3); FR: minimum distance between frontal carinae; AW: width of the central smooth area frontalis (Fig. 4). All specimens are deposited in the collection of the first author.

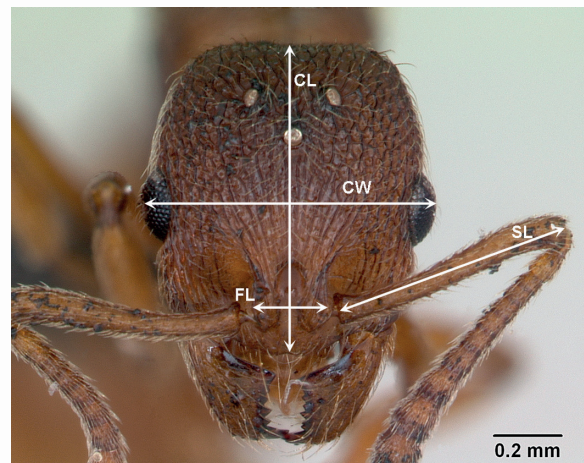


Fig. 3. Head of *S. westwoodii* gyne with CL (head length), CW (head width), SL (scapus length) and FL (maximum distance between the margins of the frontal lobes). © Photographed by April Nobile www.antweb.org (modified image).

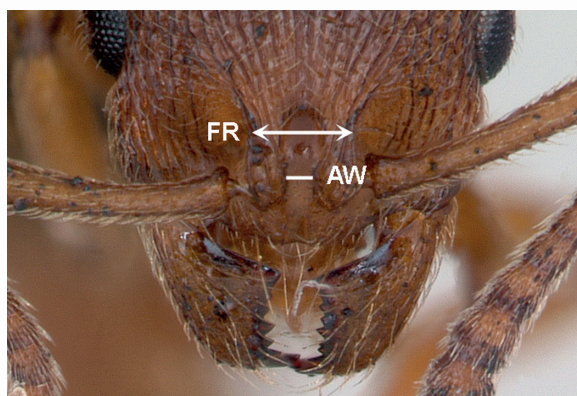


Fig. 4. Part of the head showing one of the discriminant characters for the workers and gynes of *S. debile* and *S. westwoodii*. © Photographed by April Nobile www.antweb.org (modified image)

Results

Ant species collected

During six months of sampling we collected 453 ants belonging to 21 species (Table 1 & Table 2). Only 13 species were captured with the pitfalls and for eight of these species we counted less than ten individuals for the whole period. The species collected with pitfall traps are presented in table 1 together with their Provisional Red list status.

Table 1: Ant species collected with pitfalls. Species marked with * were also found in the Malaise trap. NT : Not Threatened, VU : Vulnerable according to DEKONINCK *et al.*, 2003.

Species	Provisional Red List Status
<i>Formica fusca</i> LINNAEUS, 1758 *	NT
<i>Formica pratensis</i> RETZIUS, 1783	VU
<i>Formica rufibarbis</i> FABRICIUS, 1793	VU
<i>Lasius flavus</i> (FABRICIUS, 1781)	NT
<i>Lasius fuliginosus</i> (LATREILLE, 1798) *	NT
<i>Lasius niger</i> (LINNAEUS, 1758) *	NT
<i>Lasius platythorax</i> SEIFERT, 1991	NT
<i>Lasius umbratus</i> NYLANDER, 1846 *	NT
<i>Myrmica ruginodis</i> NYLANDER, 1846 *	NT
<i>Myrmica rugulosa</i> NYLANDER, 1849	NT
<i>Myrmica sabuleti</i> MEINERT, 1861 *	NT
<i>Myrmica schencki</i> VIERECK, 1903 *	VU
<i>Tetramorium caespitum</i> (LINNAEUS, 1758)	NT

On the other hand, we collected 15 species in the Malaise trap and a total of 265 individuals. The complementary species we sampled with the Malaise trap are presented in Table 2 adding

another eight species to the ant species list. In total we collected four species mentioned as Vulnerable and one mentioned as Indeterminate on the Provisional Red List of the Ants of Flanders (DEKONINCK *et al.*, 2003).

Table 2: Ant species only collected with the Malaise trap; IN: Indeterminate; NT: Not Threatened; VU: Vulnerable according to DEKONINCK *et al.*, 2003.

Species	Provisional Red List Status
<i>Formica cunicularia</i> LATREILLE, 1798	NT
<i>Lasius brunneus</i> (LATREILLE, 1798)	NT
<i>Lasius mixtus</i> (NYLANDER, 1846)	NT
<i>Leptothorax acervorum</i> (FABRICIUS, 1793)	NT
<i>Myrmecina graminicola</i> (LATREILLE, 1802)	VU
<i>Myrmica scabrinodis</i> NYLANDER, 1846	NT
<i>Stenamma westwoodii</i> WESTWOOD, 1839	IN
<i>Temnothorax nylanderi</i> (FÖRSTER, 1850)	NT

We collected four males and one female of *S. westwoodii*. The female was studied for three characters (Fig. 3 and Fig. 4): SL/CL, CW/FR and the correlation between the width of the central smooth area frontalis and the distance between the margins of the frontal lobes FL/AW. In table 3 we compare our morphometric results with the ones cited by Seifert (2007) and we can confirm the identification of one alate female as *S. westwoodii* (compare Fig. 5). The colour of our sampled female is light brown and the specimen is obvious paler than the dark brown gynes of *S. debile*.

All the males of our sample are characterised by five mandibular teeth on a triangular mandible discriminating them from *S. debile* males which have only three mandibular teeth on a cylindrical mandible. In DuBois (1993, p. 311) our attention was drawn to an illustration of the forewing of a male of *S. westwoodii* showing an incomplete mediocubital crossvein (m-cu). Our present and former results show that this is not a typical wing venation of the males of *S. westwoodii*. In the collection of the first author there are several males of *S. debile* with this incomplete vein formation, even some males missing the first discoidal cell. Therefore wing venation of the males is rather variable and cannot be used for differential diagnosis.

Table 3. Morphometric characteristics of the captured gyne of *S. westwoodii* – norm mean values according to Seifert (2007).

<i>Stenamma westwoodii</i> (gyne)	CW	CL	SL	FR	FL	AW	SL/CL	CW/FR	FL/AW
Norm mean value <i>S. debile</i>	*	*	*	*	*	*	0.748	3.557	3 to 4
Norm mean value <i>S. westwoodii</i>	*	*	*	*	*	*	0.789	3.977	± 6
Measured value of our specimen	865 µm	874 µm	686 µm	209 µm	223 µm	54 µm	0.785	4.14	4.12



Fig. 5. Alate gyne of *Stenamma westwoodii*. © Photographed by April Nobile www.antweb.org

Discussion and conclusions

The diversity of ants (only 13 species) and the number of individuals that we collected with the pitfalls was rather disappointing for this 'promising' area. During another recent ant inventory in Diest at the Halve Maan using less pitfalls traps (6 sites instead of 7 sites) in a somehow identical habitat, 20 species and 803 specimens were collected during one month (DESENDER *et al.*, 2004). The additional information on ant diversity obtained from the Malaisetraps is an indication of the importance and added value of using different sampling methods. Other ant inventory studies in Flanders where different trap types were used, already confirmed this and in this context -for instance- *Lasius bicornis* (FÖRSTER, 1850) was discovered in a Malaise trap in Voeren (DEKONINCK & GROOTAERT, 2005; DEKONINCK *et al.*, 2008). Moreover to obtain a good view of the ant community to be discovered at a particular site also the different habitats present need to be sampled. It also suggests that a wide variety of habitats is important in this context.

Stenamma westwoodii WESTWOOD, 1839 a species of European concern

It was a great surprise finding five specimens of the remarkable ant *S. westwoodii*. Records of this species are very scarce over its entire distribution area i.e. Western-Europe and Great-Britain. In the Provisional Red List of the ants of Flanders, *S. westwoodii* is mentioned as 'Indeterminate (IN)' meaning that it is an ant species assumed to be threatened, but for which there is lacking clarity to make an assessment of the risk of extinction (DEKONINCK *et al.*, 2005). Four specimens we collected were males. We also captured one alate female, being the first winged female of this species for Belgium. In Belgium there are only three other records of this species so far (Fig. 6). Two workers were collected by G. FAGEL and in 1949 identified by August STÄRCKE as *S. westwoodii*, later confirmed by DuBois. The first observation was made in 1938 in Herentals and a second in 1939 in Waasmunster (collection STAERCKE – Royal Belgian Institute of Entomology). In September 1999 a male was collected in Lokeren, Molsbergen (DEKONINCK, 2000).

Interesting to notice, is the nearby location of two sites: Waasmunster and Lokeren with a distance of only eight km. Three other records of this species from continental Europe are from the Netherlands where it was observed in 1955 in Heythuysen and more recent in Tilburg, both locations close to the Belgium border (VAN LOON, 2004). In 2007 an alate female was collected in the neighbourhood of Wageningen (BOER, 2009). In England and Wales *S. westwoodii* is more often observed and lives sympatric with *S. debile* (FÖRSTER, 1850) (SKINNER & ALLEN, 1996). The latter species is very commonly observed in Belgium. Besides the southern part of Great Britain, the Netherlands and Belgium offer the only rare

Flanders (Belgium)

Stenamma westwoodii Westwood, 1839

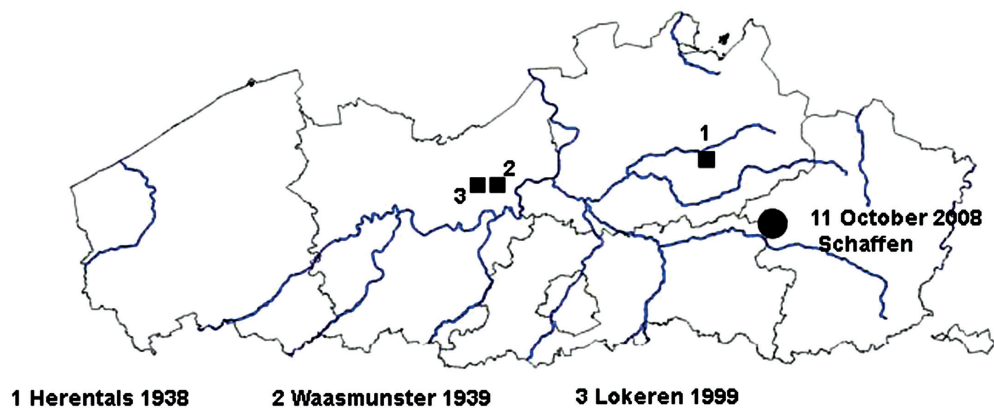


Fig. 6: Observations of *Stenamma westwoodii* in Flanders.

records of this remarkable ant. Considering the fact that the previous records from the Netherlands and Belgium all were represented by just a single specimen each, collecting four males together with one female is a truly serendipitous finding. Moreover this is a strong indication that there may be a viable population of this precious ant on the military training field of Schaffen.

The most common species of the genus *Stenamma* in Belgium and the surrounding countries is *S. debile* and the ecology and biology of this species is well known (SEIFERT, 2007). Very little is known concerning the biology of the very rarely observed *S. westwoodii*, mainly because of its probably restricted distribution area and because of misidentification with *S. debile* in the past. Even the records of the renowned myrmecologist Donisthorpe are not reliable. In his publication of 1915 (DONISTHORPE, 1915) he mentions that the males of *S. westwoodii* can have three to five mandibular teeth hence not making the distinction with the sympatric *S. debile*. Many years later Collingwood still follows the opinion that the males of *S. westwoodii* are characterised by mandibles with three teeth (COLLINGWOOD, 1979) and with this statement he renders all previous records of *S. westwoodii* for the British Isles as doubtful. It isn't always obvious whether or not the references in the publications are supported by voucher specimens but only a consultation of collections can give clearness, proving that management and re-evaluation of voucher specimens in ancient collections is very important (SCHLICK-STEINER *et al.*, 2003).

It appears that the nuptial flight of *S. debile* usually occurs during September while the nuptial flight of *S. westwoodii* is observed in the

month October (DUBOIS, 1993). Our sample dates from October eleven but contains all the insects sampled during the previous fortnightly period.

Unsuccessful search for Polyergus rufescens (LATREILLE, 1789)

In 1949 the very rare Amazone ant, *Polyergus rufescens* was noticed in the sampled study area for the first time in Flanders (RAIGNIER & VAN BOVEN, 1949). During many decades we have focused on the rediscovery of this rare ant and we have performed several searches in the field. Unfortunately, we haven't rediscovered the Amazone ant. Moreover we have good reason to consider it as an extinct species for this area because of the lack of sufficient *Serviformica* nests.

General conclusions and future research

Every record of *S. westwoodii* is very important to understand ecology and clear distinction with its sibling species *S. debile*. New records are welcome in the search for a colony with all sexes represented. Probably such a colony will be small and hidden in the soil under moss and leaf litter. *Stenamma westwoodii* probably nests in shady places in woods and forests as does the more common *S. debile*. Maybe Winkler sifting and extracting method might be successful as this technique proved interesting to discover cryptic species as *Pyramica argiola* (EMERY, 1869) (FELLNER *et al.*, 2009). The very few recent observations of *S. westwoodii* from Belgium and the Netherlands concern males and females captured during or after the nuptial flights. Many questions are

waiting for an answer and we look forward for a confrontation with a flourishing colony in the field. All these reflections emphasize the international importance of this new discovered location of this very rare representative of the Western-European ant fauna.

As the results and species list of this study were intriguing we hope that this study will help policy makers to adopt this and other recommendations for nature management in the future and take into account invertebrates in their decisions (BERWAERTS *et al.*, in press). However such recommendations need to be formulated by specialists (scientists) and then be discussed with political decision makers first.

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