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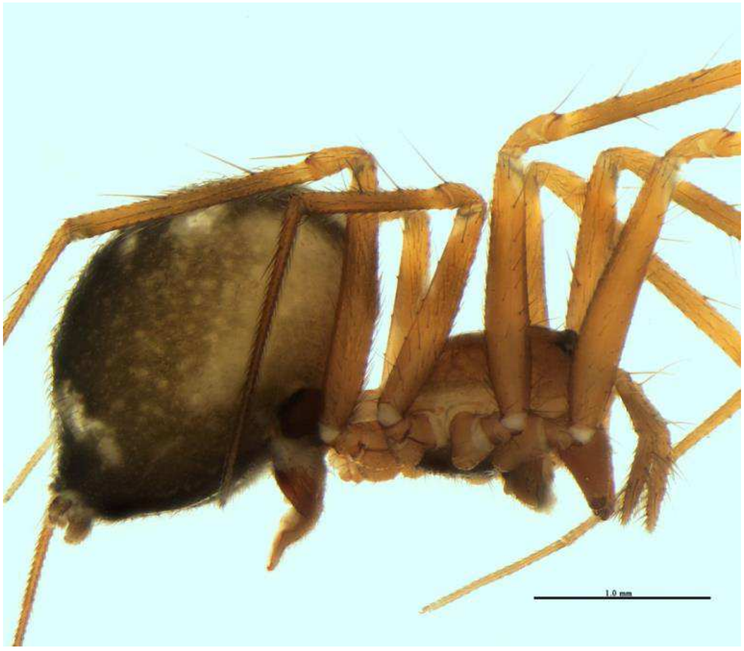

FEUILLE DE CONTACT DE LA SOCIÉTÉ ARACHNOLOGIQUE DE BELGIQUE

Nieuwsbr. Belg. Arachnol. Ver.

Volume 35 (3) 2020

Geciteerd in / Cité dans : **Zoological Record.**

Leescommissie / Commission de lecture: Marc Alderweireldt, Léon Baert, Robert Bosmans, Arnaud Henrard, Rudy Jocqué, Kevin Lambeets, Koen Van Keer.
Redactie / Rédaction : Léon Baert.

Cover : *Midia midas (Simon, 1884), foto Pierre Oger* *ISSN 0774-7225*

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INHOUD-SOMMAIRE

(Léon Baert, Redactie / Rédaction – XII/2020)

Harvestmen (Opiliones) of forests destroyed during World War One in the Ypres Salient (1914-1918)

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Abstract
During World War One (WWI) many forests along the frontline were completely destroyed and wept out a large part of the biological diversity. Therefore, these forests provide the opportunity opportunity to study the biodiversity recovery 100 years after a large-scale disturbance. We analysed harvestmen (Opiliones) communities in oak forests which had been completely destroyed during WWI to look for a possible signature in the species community composition due to the large disturbance. Although the soil and dominant vegetation in our research plots were relatively homogeneous, harvestmen communities strongly differed between forest patches. We found some relatively rare and slowly dispersing species to be present in the study area, but, on the other hand, we could not find some other species that are expected to occur in the sampled forest. These missing species are slow-dispersing and strongly affiliated to forest habitat. We provide some tentative indications that local species pools have not fully recovered yet 100 years after the large disturbance of WWI.
Key words: Biodiversity recovery, Forest biodiversity, Large scale disturbance, Litter fauna, WWI

Samenvatting
Tijdens Wereldoorlog 1 (WOI) werden vele bossen langsheen de frontlijn totaal verwoest met een groot verlies aan biodiversiteit tot gevolg. Deze bossen geven de mogelijkheid om de gevolgen van een grootschalige verstoring te bestuderen, nu 100 jaar later. We analyseerden hooiwagen (Opiliones) gemeenschappen uit eikenbossen die compleet verwoest werden tijdens WOI om te onderzoeken of er nog steeds een teken kan gevonden worden in de gemeenschapssamenstelling na een dergelijke grote verstoring. Alhoewel de bodem en vegetatie in ons onderzoek zeer homogeen waren zagen we grote verschillen in hooiwagengemeenschappen tussen bosbestanden. We vonden relatief zeldzame en traag verbreidende soorten in het studiegebied, maar er werden ook een aantal soorten niet gevonden, die op basis van de regio en het bostype zeker te verwachten waren. De ontbrekende soorten zijn trage verbreiders en sterk gebonden aan boshabitat. Dit geeft een eerste voorzichtige indicatie dat de lokale soortenpool niet compleet hersteld is 100 jaar na de grote verstoring van WOI.

Introduction

During World War One (WWI), the war of movement quickly changed into a stalemate in the trenches. During four years' time the frontline barely moved and the Ypres Salient – an arc of fortification on the higher ridges east of the city – became an infamous theatre of static trench warfare. As a result of unprecedented artillery fire during the Third Battle of Ypres (31 July 1917 – 10 November 1917) large parts of the villages, forest and countryside were destroyed and turned into a lunar like landscape peppered with uncountable shell holes (DE SCHAEPDRIJVER, 2013; NOTE *et al.,* 2018; VAN DEN BERGH *et al.,* 2019). This resulted in a highly intense disturbance of the forests in the area. In a relatively short period of time, the forest canopy was almost completely destroyed and the underlying soil was thoroughly disturbed, with an inevitable strong impact on the biodiversity of these forests. Because of the substantial spatial overlap between the shifting front line about a century ago and the majority of the present forests**,** hardly any forest patch remained in the spacious surroundings of the Ypres Salient by the end of WWI, greatly reducing the potential for re-colonisation of fauna and flora in the subsequent decades.

A large-scale disturbance such as along the Ypres Salient makes it especially challenging for species with low colonising capacity to re-colonise the area. It is unclear how long the signature of such a disturbance remains visible in the forest's biodiversity. In order to get an idea about the remaining effects, we sampled soil dwelling fauna in different forest patches that were heavily damaged during WWI. This article gives an overview of the soil dwelling harvestmen (Opiliones) sampled in these forests in attempt to investigate the completeness of the post-WWI species composition. Harvestmen are interesting study organisms in this respect because of their limited mobility. Harvestmen do not produce silk like spiders, which gives spiders the opportunity to fly to colonize new areas. The most important way of dispersion for harvestmen is via walking or via passive transportation (e.g. by humans) (see e.g. VESTBO *et al.,* 2018). Harvestman are a relatively species poor taxonomic group making it relatively easy to catch a large share of the occurring fauna (WIJNHOVEN, 2009). Most species prefer forested habitat (CURTIS & MACHADO, 2007) and they can be very numerous in the litter layer (even from the same order of magnitude as spiders; DE SMEDT *et al.,* 2019). Therefore, we consider harvestmen and their community composition as an interesting study object to assess the potential signature of WWI, more than 100 years after its ending.

Material and methods

Harvestmen were sampled using pitfall traps in 10 forest stands, each covering an area of approximately 1 ha, along the Ypres Salient (located in the Belgian province of West Flanders), spread over an area of 1493 ha between Molenaarelst and Wijtschate (Fig. 1). The Salient is located in the interfluvium of the rivers Leie and IJzer, where it acts as a natural barrier between the basins of both streams. Structurally the Salient can be described as a rather open agricultural landscape consisting of a series of hills and valleys, in which the largest part of the landscape is converted into croplands and pastures but the higher areas are often forested.

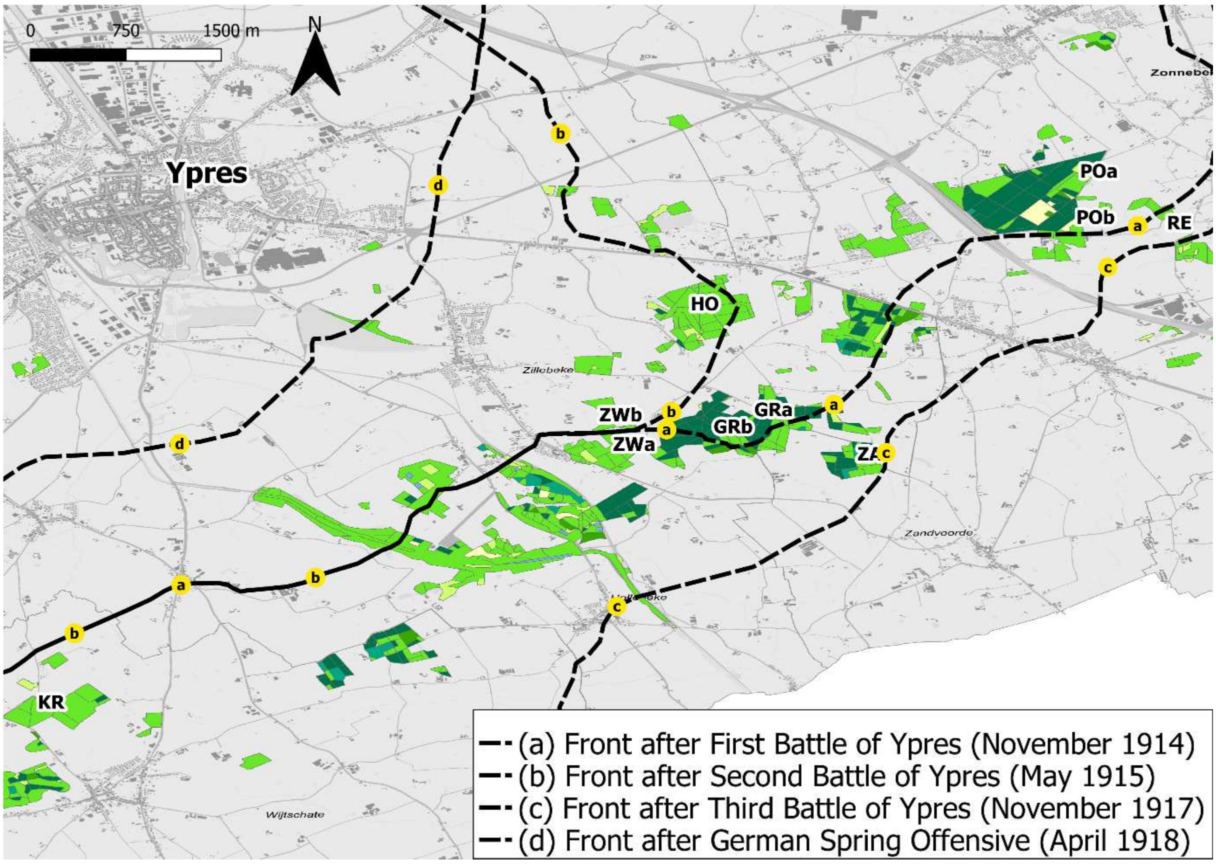

Figure 1: ***10 selected forest stands (ID's: POa, POb, HO, GRa, GRb, ZA, ZWa, ZWb, KR) along the Ypres Ridge, together with the general front line during 4 different phases of WWI (a,b,c,d) and the forest mapping of 1990.***

Table 1: Attributes of the different forest stands: common name of the forest, abbreviation (Abb.) of the stand, y-coordinate, x-coordinate (WGS84), soil type (see VAN RANST & SYS, 2000), surface area of the stand in which the approximately 1 ha study area was embedded.

Name	Abb.	y	x	Soil type	Surface area (ha)
Polygoonbos	POA	50.85468	2.99221	S-PDxe	1.919
Polygoonbos	POB	50.84922	2.99115	S-PDxe	0.706
Reutelbos	RE	50.85076	3.00086	S-PDxe	1.214
Hoge bossen	HO	50.84066	2.95188	S-PDxe	6.669
Zandvoordebos	ZA	50.82244	2.96901	wPdc	3.983
Groeneburg	GRA	50.82745	2.95940	S-PDx	2.665
Groeneburg	GRB	50.82529	2.95374	S-PDxe	4.61
Zwarte Leen	ZWA	50.82415	2.94005	wPDxe	5.702
Zwarte Leen	ZWB	50.82678	2.93787	wPDxe	2.205
Kroonaartbos	KR	50.79451	2.87501	Ldc	8.630

In order to ensure optimal comparability between sites, only pedunculate oak (*Quercus robur*)-dominated sites were selected that have been at least forested since the Ferraris mapping (1775), with a similar soil type (moderately wet loamy sand to sand loam) and the same potential natural vegetation (typical oak beech forest, wet variant, CORNELIS *et al.,* 2009) (Table 1).
Within each site, five sample plots were selected. For each of these locations it was opted to set two pitfall traps and this during two periods of three weeks each, from the end of September to the beginning of November (2019). In this period of the year, adults of most harvestmen species can be found (WIJNHOVEN, 2009). The two pitfall traps per plot were always arranged in the same way; one pitfall trap close to a tree (50cm from a tree trunk) and one pitfall further away from the same tree (5m from any tree trunk). A trap was constructed as follows: an open jar (depth 10 cm and diameter 11 cm) was buried in such a way that the edge of the opening was flush with the surface of the soil, ensuring that invertebrates could easily walk into the trap. The trap was filled with about 300 ml car-antifreeze (50% ethylene glycol and 50% water) and a drop of hand soap, lowering the surface tension of the mixture to prevent animals from floating and escaping. Finally, above each trap an aluminium roof was placed in order to prevent the traps from filling up with precipitation or unwanted organic material. After retrieving the pitfall traps, harvestmen were identified to species level.

Using the NMDS method (non-metric multidimensional scaling method) the different forest sample plots were cross-compared on the basis of their sampled harvestman species composition. In this method a matrix is calculated containing the 'distances' between the different plots and visualises them in a low-dimensional configuration. For the calculation of these distances between the forest stands, the pairwise Jaccard dissimilarity was used, which only takes presence/absence of the species into account.

$$pairwise\ Jaccard\ dissimilarity = \frac{b+c}{a+b+c}$$

With:
a: the number of species sampled in both sites
b: the number of species sampled only in the one site
c: the number of species sampled only in the other site

Furthermore, the affinity to forest habitat of the sampled harvestman species was investigated based on the lists of DOROW *et al.* (2019) (Table 2). Only the species *Nelima doriae* is not represented in the list of DOROW *et al.* (2019) but has been attributed to the category “m” by us, based on observations from the Netherlands and Belgium (see e.g. WIJNHOVEN, 2009 and VANHERCKE & SLOSSE, 2012).

Table 2: Forest affinity categories according to DOROW *et al.* (2019).

w: strong affinity to forest habitat, without known preference for light or closed forest

  wg: mainly found in forests, with strong affinity to closed forest habitat

  wl: mainly found in forests, with strong affinity to open forests, forest edges or glades

m: occurring in both open landscapes and forest habitat, but without preference for forest habitats

  mm: occurring equally in open landscapes and forest habitats

  mo: strong affinity to open landscapes, but also regularly occurring in forests, at forest edges or in glades

o: only occurring in open landscapes or other habitats without forest cover like caves or buildings

u: unknown

Results

A total of 500 harvestman specimens were identified belonging to 12 species (Table 3). The most abundant species were *Oligolophus tridens* (30.6%) (Fig. 4A), *Nemastoma bimaculatum* (25.2%) (Fig. 4B) and *Lophopilio palpinalis* (16.8%). There were two singletons *Opilio canestrinii* and *Nelima doriae* (Fig. 4C). Species richness ranged from three to eight species per forest stand and the number of individuals from 15 to 165.

Table 3: Species list and number of individuals identified per forest stand and the species forest affinity (fa).

Species	fa	HO	GRA	GRB	KR	POA	POB	RE	ZA	ZWA	ZWB
Nemastomatidae											
Nemastoma bimaculatum	w	15	4	4	5	29	31	17	14	5	2
Nemastoma lugubre	w	4	1	4	1	23	3	8		3	
Paranemastoma quadripunctatum	wg					1	1	3			
Trogulidae											
Trogulus tricarinatus	w	2		3	1			1		1	
Trogulus nepaeformis s.s.	w	3			7						
Phalangiidae											
Opilio canestrinii	mo				1						
Rilaena triangularis	wl	8		5	2	1		2	3		
Lophopilio palpinalis	w	5	2	1	23	35	6	10	2		
Oligolophus tridens	mm	4	1		11	69	16	46		6	
Oligolophus hanseni	w	3									
Paroligolophus agrestis	mm		7	1		7		7			19
Nelima doriae	m										1
Total no. of individuals		**44**	**15**	**18**	**51**	**165**	**57**	**94**	**19**	**15**	**22**
Species richness		**8**	**5**	**6**	**8**	**7**	**5**	**8**	**3**	**4**	**3**

The NMDS-plot of the harvestmen communities (Fig. 2) does not show a strong separation between the different forest stands. Although, the site ZWB is clearly separated from the other sites due to the high abundance of *P. agrestis* and the presence of *N. doriae* in combination with a low number of species. There is also a strong range difference between the sites. Some sites like GRA and GRB have strongly dissimilar communities within the site while other sites (e.g. POB) have a small range in the NMDS plot, with low dissimilarities between the different plots within the forest stand.

The division of harvestmen into forest affinity classes indicates that 64% (8 species) show a strong affinity to forest (Fig. 3A). *P. quadripunctatum* is the only species with a strong affinity to closed forest while *R. triangularis* is the only species with a strong affinity to open forest. Four species do not show a strong preference for forest habitat being *N. doriae* (m), *P. agrestis* and *O. tridens* (mm) and *O. canestrinii* (mo). Dividing the number of individuals to forest affinity classes we see a comparable pattern with 61% of the individuals with a strong affinity to forest habitat and 39% of the species occurring equally in open landscape and forest habitat (Fig. 3B).

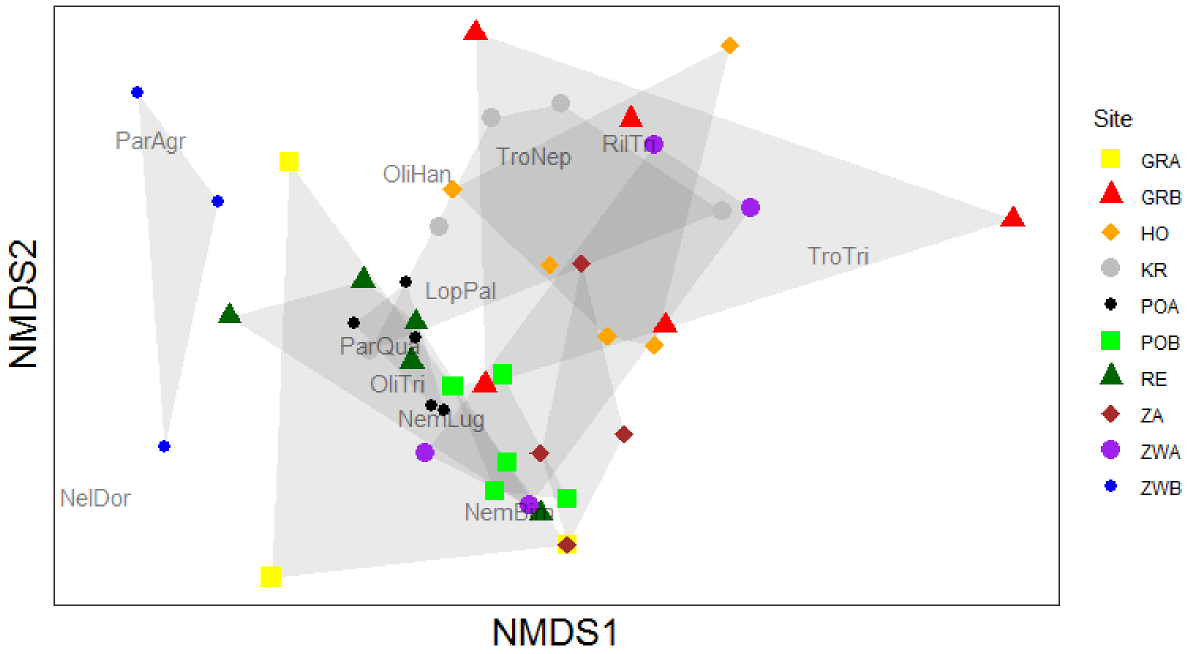

Figure 2: *NMDS-ordination of the plots according to their harvestmen community. Ordination based on Jaccard dissimilarity. Colours and envelopes represent the different forest stands.*

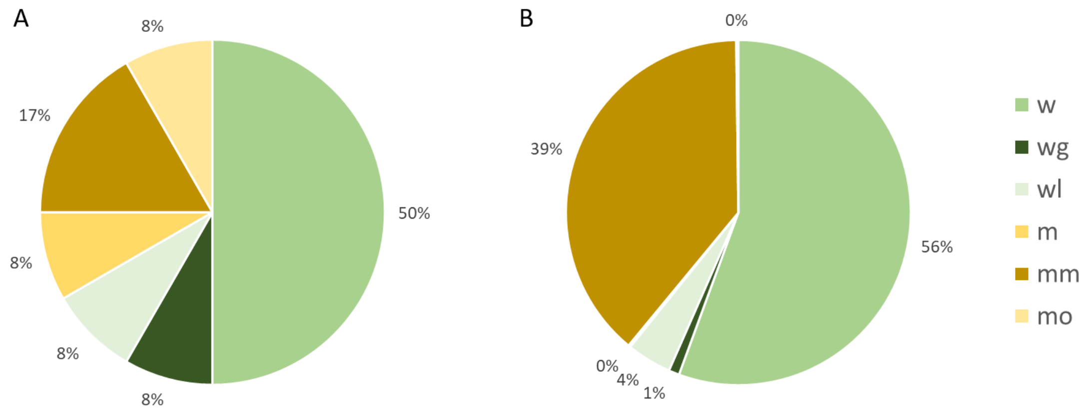

Figure 3: *Forest affinity classes of the studied harvestmen species (A) and individuals (B). Classes according to* Dorow *et al., (2019), see Material and methods section.*

Discussion

The forests along the Ypres Salient have suffered extreme damage about 100 years ago during World War One. Although most forests have been reforested (mostly by replanting), it is unclear if the signature of this large-scale disturbance is still visible as witnessed by the current biodiversity. The studied harvestmen communities give some tentative insight in the recolonization and persistence of biodiversity in these forest patches.

Although we carefully selected the forest stands based on the same soil characteristics and dominating tree species, there are clear differences in community composition between forest stands ranging from species poor to species rich forest stands. Forest stand ZWB is an outlier and the low number of species is probably due to heavy thinning activities that took place during our research, resulting in low numbers of drought sensitive species and a high representation of *P. agrestis*, a species adapted to warmer habitats and abundant in forests on trunks of living trees (own observations). Also in our study, this was the only species with a clear preference for pitfall traps close to tree trunks (data not shown).

Figure 4: *Some of the collected harvestman species:* Oligolophus tridens *(A),* Nemastoma bimaculatum (B), Nelima doriae *(C),* Trogulus tricarinatus *(D),* Paranemastoma quadripunctatum *(E),* Oligolophus hanseni*. Pictures: Jinze Noordijk.*

Our sampling protocol using pitfall traps resulted in a dominance of litter dwelling species, while vegetation dwellers are hardly caught using this technique. The actual number of species is therefore expected to be higher and species such as *Leiobunum rotundum*, *Mitopus morio*, *Phalangium opilio* and *Dicranopalpus ramosus* are almost certainly present since they are very abundant vegetation dwellers in Belgian forests (unpublished data, VANHERCKE, 2010) but rarely end up in pitfall traps. This is also the case for *O. canestrinii*, which is probably much more common compared to the numbers in our dataset. The forest affinity assessment of the sampled harvestmen indicates about 60% of the species with a strong affinity to forest. This is comparable to the total number of harvestmen species with a strong affinity to forest in Germany (DOROW *et al.,* 2019). Assuming that we missed some vegetation dwelling species which have generally no strong affinity to forest per se, we infer that we also lack some species with a strong affinity to forest. We believe that our sampling protocol was quite complete, covering a wide range of forests across a large area; we can thus assume that some litter dwelling species are either not present or not widespread in the area.

Poorly dispersing litter dwelling species such as *Anelasmocephalus cambridgei*, *Trogulus closanicus* and *Mitostoma chrysomelas* are not rare, easily caught using pitfalls and common in oak forests (VANHERCKE, 2010; VANHERCKE & WIJNHOVEN, 2017; DE SMEDT & VAN DE POEL, 2017, own unpublished data) but absent in our study. The reason for their absence is unclear and could be an indication of the sizeable disturbance of World War One wiping out forest species. Nevertheless, there are some poorly dispersing species present in the sampled forest stands such as *T. tricarinatus* and *P. quadripunctatum*. *T. tricarinatus* (Fig. 4D) is even dispersed across the whole study area in 50% of the studied forest stands. However, *P. quadripunctatum* (Fig. 4E) is restricted to the most north-eastern part of our study region. Another, rather rare litter dwelling species is *O. hanseni* (Fig. 4F) which is rare across the country but more common in the western part of northern Belgium. In our study, the three individuals are all from the same pitfall trap. This species seems to have a restricted range in our study area.

Post-World War One forests have proven to provide opportunities for the establishment of rare and endangered species such as plants, amphibians and bats (DE MATOS MACHADO & HUPY, 2019). This benefit is mainly thanks to the establishment of forest pools in bomb craters or leftovers of war constructions such as bunkers. There is hardly any research focusing on invertebrates. The results of this first study, focusing on harvestmen, allow the formulation of the first tentative conclusions about the effect of major forest destruction during World War One. While there are some rare and slowly dispersing species present, there are some indications of an incomplete species pool 100 years after this extreme disturbance. Additional research on more invertebrate taxa can hopefully further aid our understanding of the impact of such a large-scale disturbance on biodiversity distribution and recovery.

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Midia midas (Simon, 1884) (Araneae, Linyphiidae), a species new to the Belgian spider fauna

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Summary
Midia midas (Simon, 1884) *can be added to the Belgian spider fauna. One female was collected by seaving litter at an old ash tree trunk at Voeren (Teuven), in the Province of Limburg.*
Résumé
Midia midas (Simon, 1884): *espèce d'araignée nouvelle pour la faune de Belgique. Une femelle a été capturée au cours de tamissage de la litière d'un vieux frêne à Voeren (Teuven) dans la province de Limbourg*.
Samenvatting
Midia midas (Simon, 1884): *een nieuwe soort hangmatspin voor de Belgische fauna. Een wijfje werd aangetroffen in een zeefstaal van molm en strooisel van een oude Es te Voeren (Teuven) in de provincie Limburg*

Introduction

It was the great French arachnologist E. Simon who described in 1884 *Lepthyphantes midas* from a single female collected in a forest near Paris. Due to the peculiarity of the genital organs of both male and female, SAARISTOA & WUNDERLICH (1995) revised this species and created a new monotypic genus *Midia*.

Results and Discussion

On February 12 2020 the second author was sieving mould from an ancient ash tree (*Fraxinus exelsior* L.) in search of xylobiontic beetles. Within one sample of mould and litter one single female of *Midia midas* was found together with one male and two females of *Harpactea hombergi* (Scopoli, 1763).
The ancient ash tree is, together with other shrubs and trees, situated in a broad valley of agriculture field providing a corridor between a maize field and a meadow. The tree is spliced over the whole length with several hollows but is still alive (50°45'37.8"N, 5°52'12.1"E, 160m asl) (Fig.1).

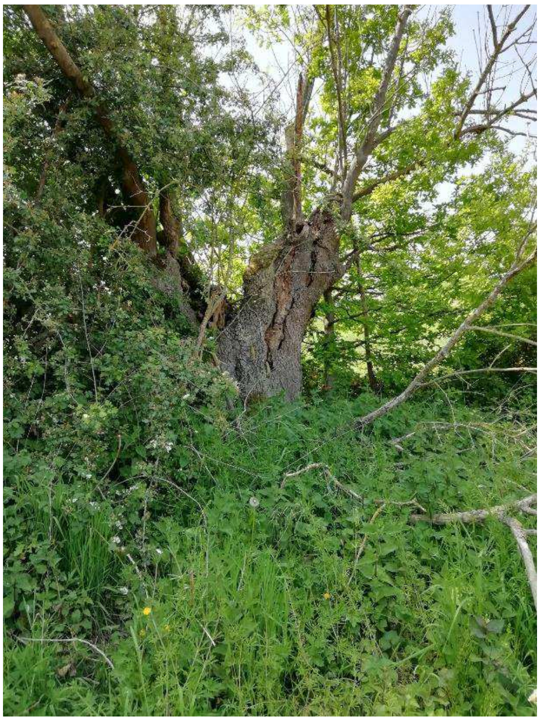

Figure 1: *Habitat of* Midia midas *around the Ash tree. (Picture: M. Janssen)*

The whole area at Voeren is characterized by charming villages with various sloping landscapes, old orchards, meadows and forests (Fig. 2).

Figure 2: *View of the neighbouring area at Teuven. (Picture M. Janssen)*

Due to the National promulgation-regulations concerning Covid 19 we were not able to investigate the ash tree thoroughly until late spring. From May 20 to 15 June 2020 we placed four traps in different hollows, resulting in a catch of only four species: *Ballus chalybeius* (Walckenaer, 1802); *Clubiona pallidula* (Clerck, 1757); *Histopona torpida* (C.L.Koch, 1837) and *Tenuiphantes mengei* (Kulczynski, 1887), all of them frequently found on trees. No more *Midia midas* were found.

In the past several thoroughly carried out investigations in different forests in Flanders and especially Voeren (Limburg) using several sampling techniques, did not reveal any *M. midas* (DE BAKKER *et al*. 2011, LAMBRECHTS *et al.* 2007, 2013).

Distribution and Ecology

Midia midas is rarely recorded in Europe and it has already been mentioned for the following countries: Czech Republic; Denmark; France; Germany; Italy; Poland; Romania; Slovakia; Spain; Asian Turkey and United Kingdom (NENTWIG *et al.*, 2020).

The species is associated with hollows in ancient trees at ground level and in cavities of pollard trees (BARRIENTOS *et al.,* 2020, MACHAČ *et al.*, 2018, Russell-Smith et al. 2013). In Britain *M. midas* is one of the rarest species, listed as nationally endangered and a Priority Species for conservation (RUSSELL-SMITH *et al.*, 2013).

Our find of a female specimen in February is remarkable. According to the literature, females were collected from May to August, and males from May to July (NENTWIG *et al.*, 2020).

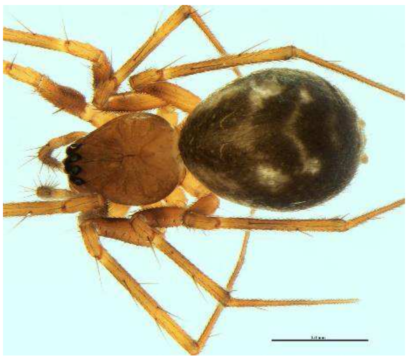

Figure 3. Midia midas*: habitus, dorsal view. (Picture P. Oger)*

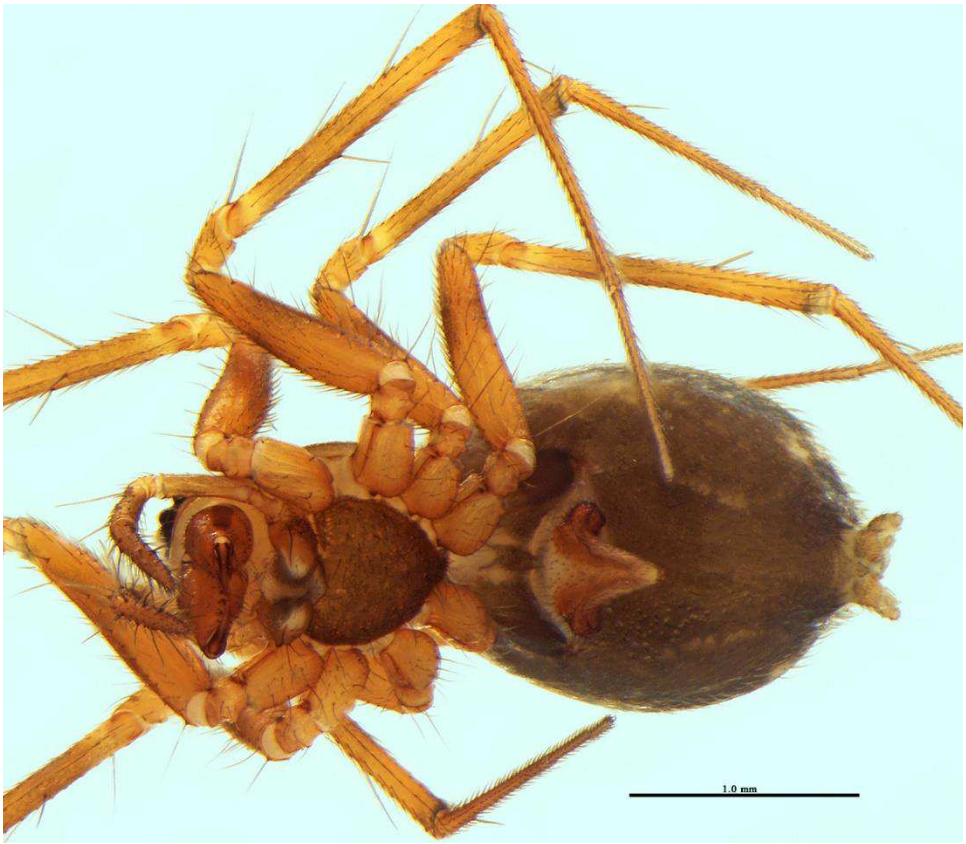

Figure 4. Midia midas*: Habitus, ventral view. (Picture P. Oger)*

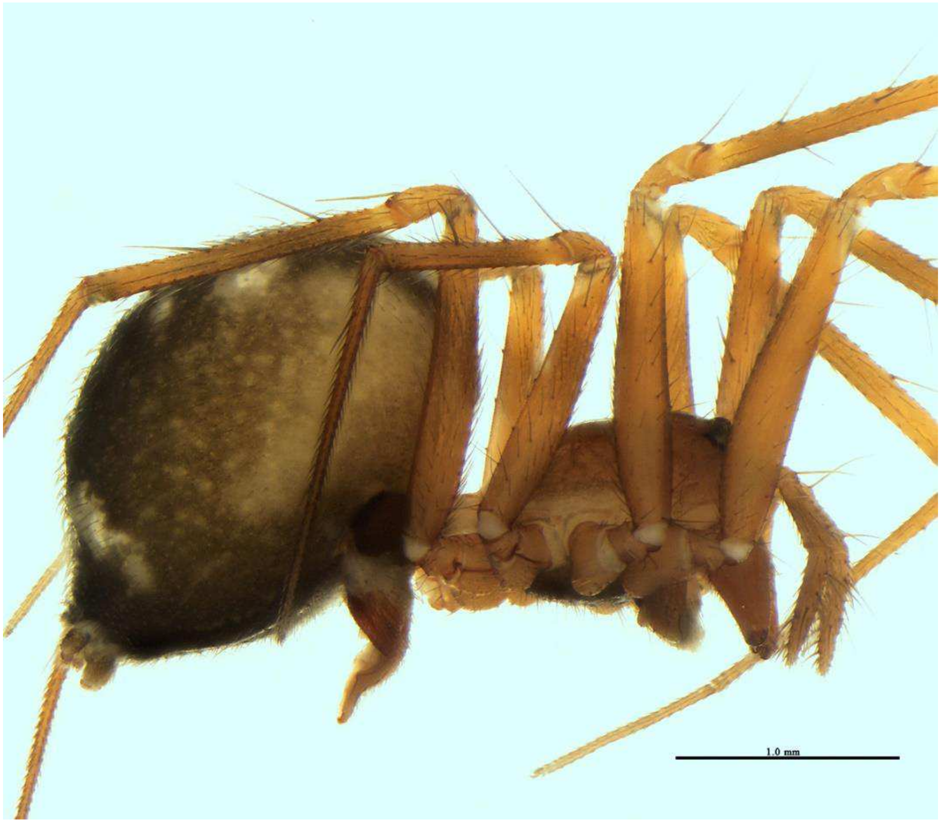

Figure 5. Midia midas: *habitus, lateral view. (Picture P. Oger)*

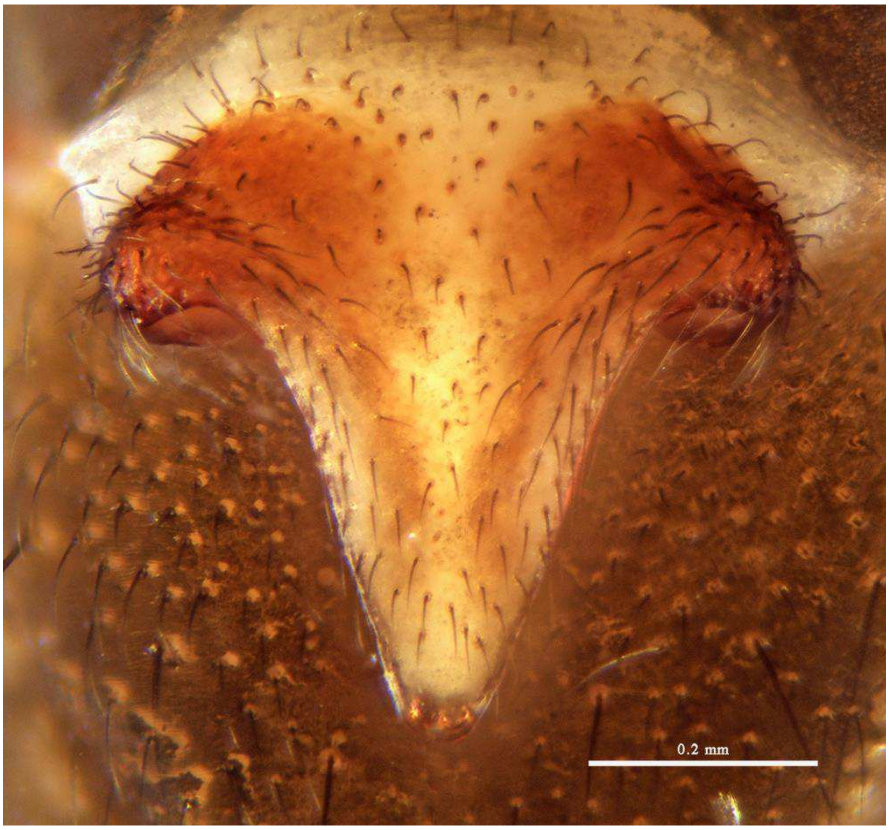

Figure 6. Midia midas: *epigyne, ventral view. (Picture P. Oger)*

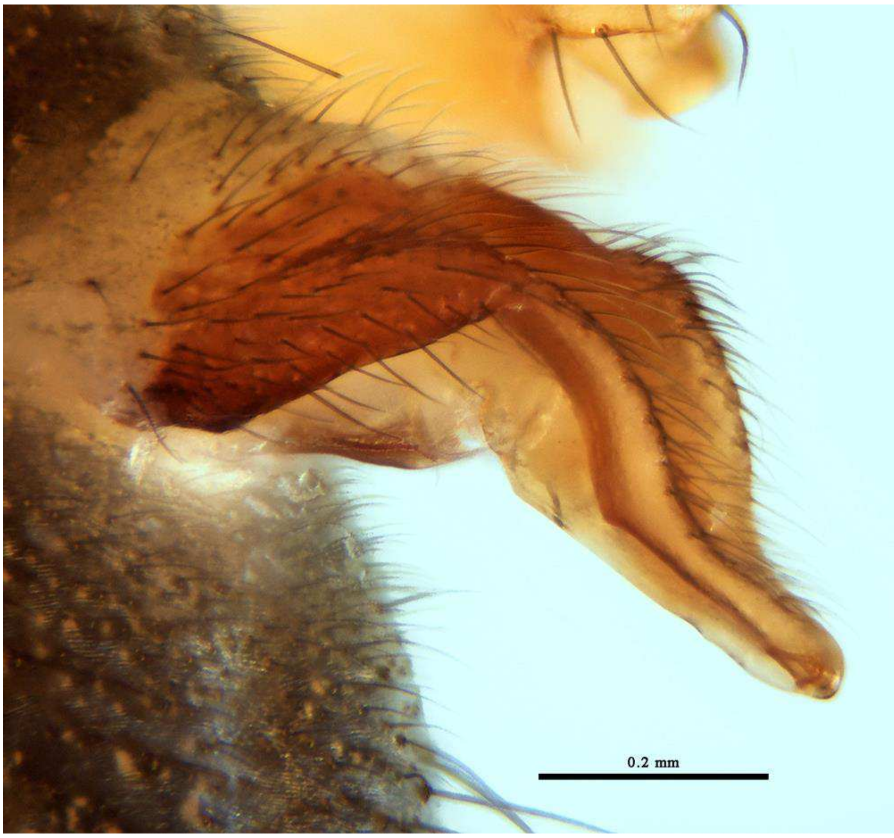

Figure 7. Midia midas: *epigyne, lateral view. (Picture P. Oger)*

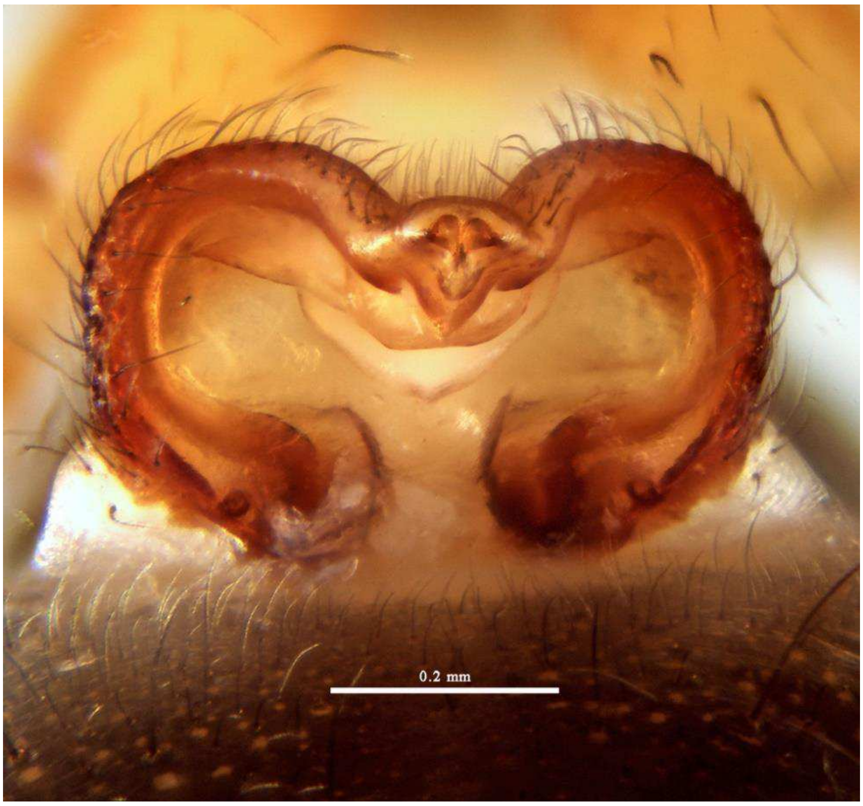

Figure 8. Midia midas: *epigyne, posterior view. (Picture P. Oger)*

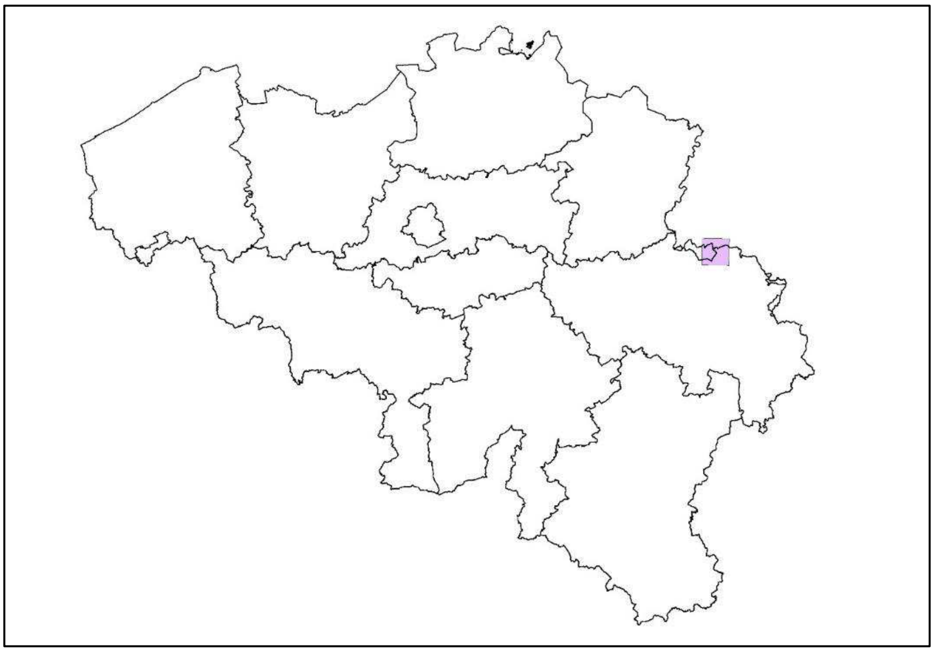

Figure 9*. Location of* Midia midas *in Belgium.*

Acknowledgements
We would like to thank the editor Léon Baert and two anonymous reviewers for valuable comments on the manuscript. Also many thanks to Pierre Oger for the photographs of the habitus and genitalia.

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Web size variation in *Mangora acalypha* (Araneae, Araneidae), a snapshot

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Abstract
During the Kalmthout heathland monitoring study on spiders, a single timed sample was taken of 20 Mangora acalypha *webs in each of two adjacent* Calluna *dominated plots with different exposition. In the sheltered plot, the webs were not only much more common but significantly larger (15.6 cm diameter) than in the wind exposed plot (13.2 cm).*

Samenvatting
Tijdens een studie van de invloed van beheer op de spinnenfauna van de Kalmthoutse Heide, werd een gechronometreerd staal van 20 Mangora acalypha *webben genomen in elk van twee aan elkaar grenzende gebieden met een verschillende blootstelling. In het beschutte habitat waren de webben niet alleen veel algemener maar ook significant groter (15.6 cm diameter) dan in het gebied dat meer onderhevig was aan wind (13.2 cm).*

Résumé
Durant une étude sur l'influence de la gestion de la Réserve Naturelle de Kalmthout sur l'arachnofaune, un échantillon chronométré de 20 toiles de Mangora acalypha *fut pris dans chacun de deux habitats adjacents avec une exposition différente. Les toiles n'étaient pas seulement beaucoup plus abondantes mais aussi nettement plus larges (diamètre 15.6 cm) dans l'habitat protégé que dans l'habitat exposé au vent (13.2 cm).*

Introduction

Intraspecific size variations in spiders have been documented (JOCQUÉ, 1981a) and even the link to the quality of the habitat has been shown (JOCQUÉ, 1981b; VOLLRATH, 1985, 1988) but such studies remain rare. Studies linking habitat quality and spider web size are equally rare (WITT & BAUM, 1960; VOLLRATH et al., 1997) but will be useful in evaluation of habitat quality and the impact of urbanization and climate change as shown in DAHIREL *et al.* (2018). Characteristic for these few studies is that they compare habitats with great extremes or a large range of abiotic and biotic factors.

The present study has focused on spider populations from very similar, adjacent habitats with an identical vegetation in order to show that even small differences and their implicit abiotic factors, may have a great impact on the living circumstances.

Material and methods

The study is part of a four-year investigation into the influence of heathland management measures on the spider fauna in the Nature Reserve 'Kalmthoutse Heide' (51°23'N 4°25'E) in northern Belgium (MAELFAIT *et al.*,1990). Apart from a pitfall sampling campaign (JOCQUÉ, 1986), sweepnet samples were taken during 15 months from April 1976 to June 1977 in order to monitor the shrub layer spider populations (JOCQUÉ, 2009). The samples were taken in five habitats, two of which are important for the present study: an area with old heath and a second one with mowed heath, both dominated with *Calluna vulgaris* exclusively.

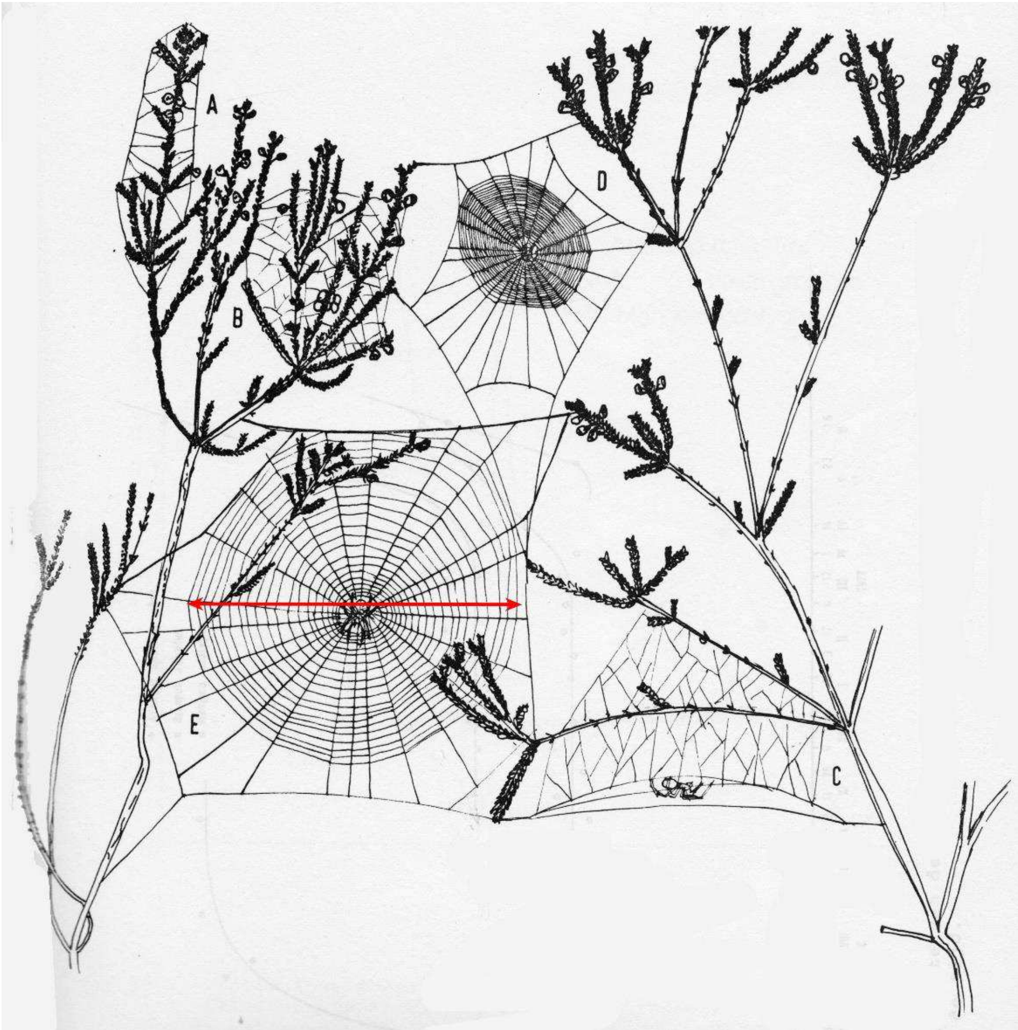
The first (Old Heath Drielingenven, OHD) (51°24'21.53"N 4°25'41.52"E) is a plot with a mature *Calluna* vegetation (± 14 years old in 1976) covering an area of about 2 ha. The shrubs are on average 65 cm high (s = 13.8, n = 50). I sampled a narrow stretch 20 to 40 meter wide, parallel to the path that separates the area from the second one. Due to its NE exposition and the presence of small pine groves on that NE side, it is sheltered from the prevailing winds.

The second one (Mowed Heath, MH) (51°24'21.53"N 4°25'41.52"E) is a plot with a fairly young pure and dense *Calluna* vegetation with an area of 1.5 ha. It is separated from the first by a path of 2 m wide . The

Calluna shrubs had been mowed early 1970. The shrubs are on average 46.7 cm high (s = 5.79, n = 50) in 1976. The plot has a slight SW slope and is thus exposed to the prevailing SW winds.

The triangular sweep net used had a base of 50 cm, a height of 30 cm, depth of 50 cm and mesh size of 0.2 mm. A sweep net sample consisted of the collection in ten sweeps. In each sampling plot ten samples were taken alternatively in the plots. The results show the total number of specimens in the complete sampling period as catch per unit of effort (CUE): the total number of specimens caught, divided by the number of samples.

On 28 and 29 May a timed catch was carried out for 20 webs of *Mangora acalypha* in both plots. Of these webs, the horizontal diameter of the sticky spiral was measured (see Fig. 1).



***Figuur 1**. Principal webspiders on* Calluna *heath in May. A.* Dictyna arundinacea*; B.* Simitidion simile*; C.* Microlinyphia pusilla*; D.* Neoscona adianta*; E.* Mangora acalypha*. Red arrow shows measurement of sticky spiral as .*

Results

The most important web spiders were *Microlinyphia pusilla* (Sundevall, 1829)

Dictyna arundinacea (Linnaeus, 1758), *Simitidion simile* (C.L. Koch, 1836), *Mangora acalypha* (Walckenaer, 1802) and *Neoscona adianta* (Walckenaer, 1802).

Whereas the number of species and the Shannon-Wiener diversity was slightly higher in M, the CUE was almost twice as high in OHD as in M (Table 1).

Table 1. Average catch per unit of effort, number of species and Shannon-Wiener diversity index of a 15 months sweep net sampling cycle in Old Heath Drielingenven and Mowed Heath.

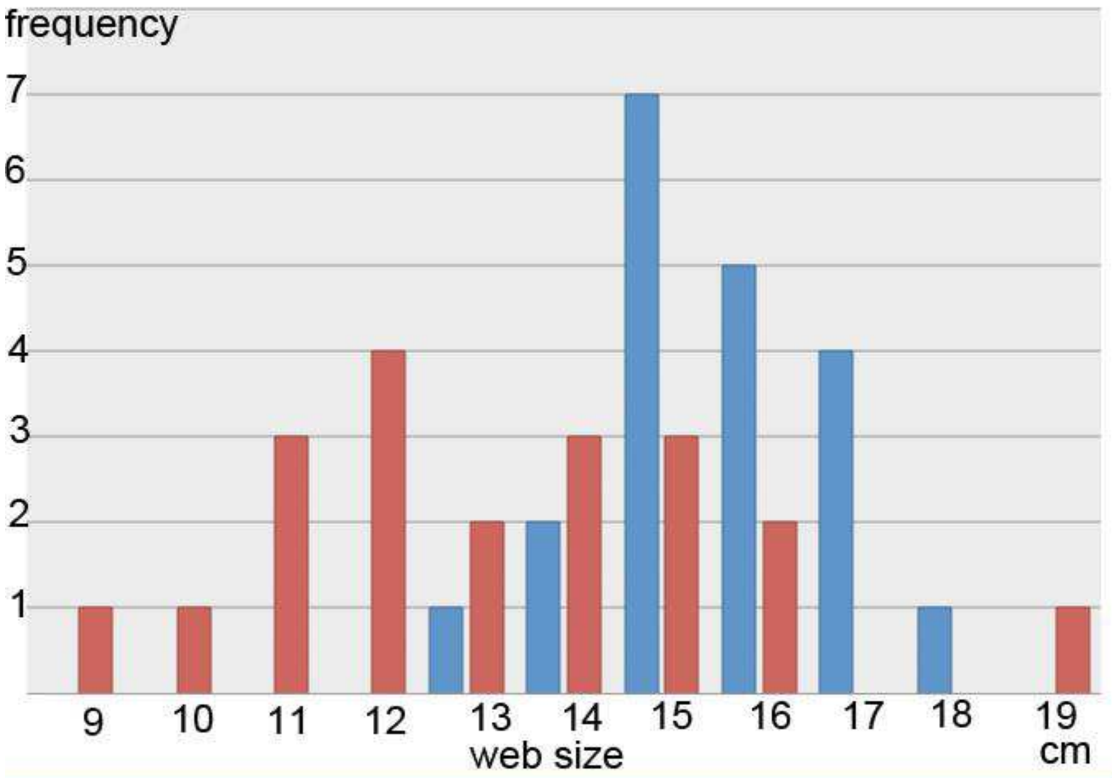
	OHD	M
CUE	39.01	20.10
Nr species	49	51
H'	2.09	2.31

The results for the Araneidae were remarkably different (Table 2). Over the entire sampling period and with the same CUE, a few more specimens of *N. adianta* were caught in M (105) than in OHD (90) but many more *M. acalypha* in OHD (130) than in M (5). It is the latter discrepancy that prompted for a closer look at the webs of *M. acalypha.* It took only 9 minutes to find and measure 20 webs of *M. acalypha* in OHD whereas 71 minutes were needed to do the same in M. The order of magnitude of the difference (8 times) is probably an underestimate as in OHD hardly any time was needed to find the webs and the nine minutes were mostly spent at measuring the webs and note the results. In OHD the webs are significantly larger

Table 2. Total sweep net catch in 15 months of the main weelweb spiders in the heathland sample sites.

	OHD	M
Mangora acalypha	130	5
Neoscona adianta	90	105

The webs (sticky spiral) of *Mangora acalypha* were significantly (t-test, P<0.01) larger in OHD (diameter of 15.6 cm) than in M (diameter 13.2 cm) in M (Fig. 2).



Figuur 2. *Web size frequency of* Mangora acalypha *in M (red) and OHD (blue).*

Discussion

The remarkable observation of this short-term study is the discrepancy between the results for these two araneids. Whereas *N. adianta* thrives in both habitats, *M. acalypha* is underrepresented in M. The fact that

N. adianta is even more abundant in M, indicates that there is likely another reason for the rarity of *M. acalypha* in that plot than prey availability. The majority of the webs of *Mangora* were found in the lower 20 cm of the *Calluna* shrub layer as shown in Fig. 1 in M, whereas they were distributed at all levels in OHD. They were not only more abundant there but also much easier to be found as many of them were in the top layer in OHD. The enormous difference in sweep net yields may also be influenced by the position of the spiders. Apparently there is a factor that impairs *Mangora* but not *Neoscona*. The main difference between the two stands is the exposure. The literature on spider silk and its properties is vast and it has been shown many times that the resistance of spider silk is very variable between species (KULLMANN & STERN, 1975, MADSEN *et al.*, 1999). However, only a few studies have emphasized the consequential importance of shelter versus exposition for webbing spiders (VOLLRATH *et al.*,1977, HERBERSTEIN & HEILING, 2001). They show that the resistance to exposition to wind plays an important role in the web site choice of spiders. We assume that *Neoscona* has a much more resistant web than *Mangora* and the latter is therefore rare in M.

Conclusion

Although it is only a snapshot illustrating the importance of small-scale habitat differences, the present study emphasizes that microclimatic factors may play an important role for the abundance and condition of spiders. Care should be taken to take these into account for future studies relating to spider condition and web quality.

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