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**On a recent record of *Astrobunus laevipes* and
Nemastoma dentigerum in Bavaria, Germany
(Opiliones: *Phalangiidae*, *Nemastomatidae*)**

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RIASSUNTO

Nel 1991 è stata citata per la prima volta (ÖKON, 1991 e BAUMANN *et al.*, 1992) la presenza di due specie di Opilioni, *Astrobunus laevipes* e *Nemastoma dentigerum* (Opiliones: *Phalangiidae*, *Nemastomatidae*) in Baviera, Germania. Gli AA. presentano i risultati delle loro ricerche, condotte nel 1992, nei medesimi siti e discutono la distribuzione attualmente nota e lo stato di rischio delle suddette specie in Germania.

Parole chiave: Opilioni, Reperto faunistico, Espansione dell'areale.

SUMMARY

The occurrence of the two harvestman species *Astrobunus laevipes* and *Nemastoma dentigerum* (Opiliones: *Phalangiidae*, *Nemastomatidae*) in Bavaria, Germany, was first recorded in the year 1991 (ÖKON, 1991; BAUMANN *et al.*, 1992). We studied the site of record again in 1992. The results of this investigation are presented. The present known situation of the distribution and the state of endanger of *A. laevipes* and *N. dentigerum* in Germany are discussed.

Key words: Harvestmen, Faunistic record, Expansion of distribution area.

Introduction

The two harvestman species *Astrobinus laevipes* and *Nemastoma dentigerum* were found relatively seldom in Germany in the past (MARTENS, 1978). Consequently they were listed as threatened species in the "Red Data Book" of West-Germany: *A. laevipes* as "endangered by extinction" and *N. dentigerum* as "potentially endangered" (MARTENS, 1984). However, in recent years records of both harvestmen are increasing in Germany (BLISS & HIEBSCH, 1984; BLISS & TIETZE, 1984; MÜLLER, 1989; BLISS, 1991a, 1991b; SCHNITTER, 1991; BAUMANN *et al.*, 1992; RAUH, 1993; BLISS 1993; ADLER pers. comm.; MALTEN pers. comm.).

In Bavaria, southern Germany, *A. laevipes* and *N. dentigerum* were first recorded in the year 1991 (ÖKON, 1991 and BAUMANN *et al.*, 1992; but see RAUH, 1993 for *N. dentigerum*). The two species were found at two sites on the bank of the river Main near the town Klingenberg, northern Bavaria. However, due to the little number of pitfall traps and the short investigation period BAUMANN *et al.* (1992) could only find few specimen of *A. laevipes* and *N. dentigerum*.

Therefore we investigated the site of record at Klingenberg and several adjacent places again in 1992 in order to see, whether larger and stable populations of *A. laevipes* and *N. dentigerum* exist and in which habitats they do occur.

Based on our results and further yet unpublished records we discuss the present known situation of the distribution and the state of endanger of *A. laevipes* and *N. dentigerum* in Germany.

Methods

The investigated area lies along the river Main at Klingenberg about 20 km south of Aschaffenburg, which is located in northern Bavaria near the border to Hessen. Harvestmen were collected on both sides of the Main: at eleven sites by pitfall traps (sites 1-11) and at ten sites by hand collections (sites A-J). The distance of the sites to the river Main ranged in general from 5-50 m, one site, a vineyard, was at a distance of 500 m away. The sampled habitats include narrow river accompanying woods consisting of *Populus*, *Salix*, *Alnus*, a.o., with herb underlayer (site 2, 4, 5, 7, B, C), bushes far and near to the river with *Salix*, *Crataegus*, *Rubus*, *Sambucus*, *Viburnum*, a.o. (site 8, A, D, E, H, I), areas along the river covered with shrub plants including *Urtica*,

Crysanthemum, *Chaerophyllum*, a.o. (site 9, 10, 11, G), parks in and near the town (site 1, 3, F, J) and an abandoned vineyard (site 6). In general the soil consisted of sand mixed with humus or clay. For a more detailed description of study sites see LANG *et al.* (1992).

The pitfall traps were exposed from July 19 to August 3 1992. The weather during the study period was hot and dry. Ten traps, partly filled with ethylene glycol and detergent, were placed at each pitfall sampling site. The traps had a diameter of 7 cm and were protected against rain with a transparent 10 x 10 cm large roof.

The hand collections were made on August 3 1992. Each site was sampled for approximately 15 to 20 min. These collections were conducted in three different strata: Litter was taken from the ground, spreaded out on white tissue and detected harvestmen were removed; the field layer was swept with a net, 40 cm in diameter; where trees or bushes were present in the habitat harvestmen were collected by beating the branches up to a height of 2 m and collecting the resulting animals in an umbrella.

All caught animals were taken into the laboratory, the material was sorted, stored in ethanol (70%) and the harvestmen determined according to MARTENS (1978). Only adult specimen were determined and further analysed.

Results

In pitfall traps 644 harvestmen were caught, 349 (= 54%) of them adult and 296 (= 46%) juvenile. These harvestmen belonged to 11 species (see table 1). The most dominant species with 253 adult individuals (= 73%) was *Lacinus ephippiatus*. *A. laevipes* was the second dominant species with 35 individuals (= 10%). Of *N. dentigerum* only 7 specimen (= 2%) were caught.

Hand collections yielded 42 harvestmen, 23 (= 55%) of them were adult and 19 (= 45%) juvenile. These harvestmen belonged to 4 species (see table 1). The most dominant species with 16 adult individuals (= 38%) was *N. dentigerum*. Of *A. laevipes* only 3 specimen (= 7%) were found.

So, pitfall traps and hand collections combined, 372 adult harvestmen and 11 species were caught. The most frequent species were *Lacinus ephippiatus* (253 individuals = 68%), *A. laevipes* (38 individuals = 10%), *Opilio saxatilis* (32 individuals = 9%) and *N. dentigerum* (23 individuals = 6%).

A. laevipes was caught at 7 out of 11 pitfall sampling sites and 2 out of 10 hand collection sites (see table 1). This species was most abundant in the river accompanying woods (especially site 5), but some individuals were also caught in more open habitats like bushes, shrub covered sites and a park. *A. laevipes* was found only on the ground. The ratio males: females was 1 : 1,8.

N. dentigerum was caught at 4 out of 11 pitfall sampling sites and at 4 out of 10 hand collection sites (see table 1). One juvenile was found at site D. This species was found in all types of habitats except the vineyard and always on the ground, though never very abundant. The ratio males: females was 1,6 : 1.

Discussion

We caught *A. laevipes* and *N. dentigerum* partly at the same locations as BAUMANN *et al.* in the year before. Moreover, we found these two species in adjacent areas in higher abundances, especially *A. laevipes*. *N. dentigerum* was not that abundant, but hand collections yielded more specimens compared to pitfall traps. This might indicate that *N. dentigerum* is generally not well represented in pitfall traps due to its hidden life in the ground litter and that therefore a much larger population exists around Klingenberg. The record of both species in two subsequent years, partly in higher abundances, the occurrence of males and females and the finding of one juvenile *N. dentigerum* provide strong evidence that both harvestman species possess stable and reproducible populations in the area around Klingenberg. The fact that no juvenile of *A. laevipes* was found might be caused by the life cycle of this species, as the majority of *A. laevipes* individuals are mature by August (MARTENS, 1978). Admittedly the relatively short investigation period and the limited range of our study restrict our interpretation possibilities to some extent.

Around Klingenberg both species inhabit various habitat types. Comparing the habitats of occurrence around Klingenberg *A. laevipes* was found in more shaded and relatively damp areas, while *N. dentigerum* occurred closer to the river and in more open places as long as damp litter was present (e.g. borders of bushes with herb underlayer). These observations agree with MARTENS (1978), who reported various and different habitats of the "thermophil" *A. laevipes*, mainly deciduous forests, with a preference for more open habitats. Other authors found

Table 1 - Number of collected harvestmen. Klingsberg/Germany, 1992 (leg. et det KLEIN M. & LANG, A.)

pitfall traps	site											Σ	
	1	2	3	4	5	6	7	8	9	10	11		
<i>Nemastoma dentigerum</i>	Main-km->	113.25	112.8	112.45	112.6	111.4	112.0	112.6	112.4	112.9	112.65	112.25	4
	male	1		1						2			3
	female					3							2
<i>Anelasmacephalus cambridgii</i>													2
<i>Trogulus nepaeformis</i>		1	1	6		2	1		3				14
<i>Trogulus tricarinatus</i>									1				1
<i>Astrobinus laevipes</i>		2	4	2		8		1					11
<i>Opilio cf. canestrinii</i>						14	2		1	1			24
<i>Opilio saxatilis</i>		12			5								17
<i>Phalangium opilio</i>		10	1	1									12
<i>Lacinius ephippiatus</i>		1				126	2		15		1		181
<i>Mitopus morio</i>						24			17		27		72
<i>Leiobunum rotundum</i>					4					22			5
Σ adults	1	30	5	12	179	7	3	33	9	51	19	1	349
juveniles	1	7	1	9	238	2	0	13	14	7	4		296
hand collections													
<i>Nemastoma dentigerum</i>	site->	A	B	C	D	E	F	G	H	I	J	Σ	
	Main-km->	113.0	113.3	113.4	112.9	113.0	112.8	112.6	112.71	114.5	114.5	112.45	10
	male	4	1	1		2		5				6	
	female	2				1		2				2	
<i>Astrobinus laevipes</i>						1		1				1	
	male	1										1	
	female			1							1	2	
	female									1		1	
<i>Leiobunum rotundum</i>						4	0	0	8	1	1	23	
Σ adults	0	7	2	0	4	0	0	8	1	1	1	23	
juveniles	0	0	3	10	0	0	2	0	4	4	0	19	

A. laevipes in quite different habitats, e.g. in a pine forest (BLISS & TIETZE, 1984), in a poplar forest situated amidst agricultural land (BLISS, 1991a, 1991b), in xerophil grassland (SCHNITZER, 1991) and in various other habitats (BLISS, 1993). The habitat of *N. dentigerum* is described by MARTENS (1978) as "damp humus stratum of deciduous forests, north of the Alpes preferable in open and park like habitats like forests, bushes [...], with grass underlayer, sometimes even in unshaded places". This habitat description is confirmed by MARTENS (1987), MÜLLER (1989), SCHNITZER (1991), BAUMANN *et al.* (1992), RAUH (1993), ADLER (pers. comm.), MALTEN (pers. comm) and our results.

Besides the record in hand and BAUMANN *et al.* (1992) both harvestmen species were detected several times in Germany since MARTENS (1978) (see fig. 1).

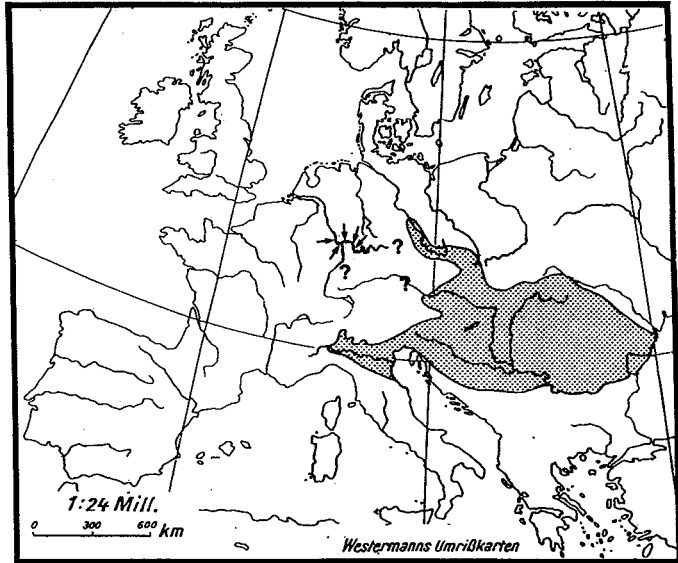


Fig. 1 - Distribution area of *Astrobinus laevipes* (modified from MARTENS, 1978).

MALTEN (pers. comm.) found *A. laevipes* north-west of Rüdeshelm near Lorch at the bank of the Middle Rhein, in the botanic garden of Frankfurt a. M. and at the bank of the Main near Mainhausen at the

border of Hessen to Bavaria, which is approximately 30 km north of our investigation site. One record is known from Baden-Württemberg (RAUSCH, cited in BAUMANN *et al.*, 1992). New records in Sachsen und Sachsen-Anhalt, the main distribution area of *A. laevipes* in Germany, were published by BLISS & TIETZE (1984) and by BLISS (1991a, 1991b, 1993). This might indicate that besides the expansion of the areal in eastern Germany (BLISS, 1993) the "south-east-european" species *A. laevipes* (MARTENS, 1978) is expanding its areal in Middle Europe further north-westwards (see Fig. 1). The new records seem to confirm BLISS (1993) in that the "valleys of great river systems are apparently post-glacial dispersal corridors of this thermophil species". Another interpretation would be of course that these occurrences were not noticed in the past, which is also not unlikely when considering the poor faunistic knowledge concerning Opiliones.

N. dentigerum was found in Hessen in the Wetterau north-east of Frankfurt a. M. (MÜLLER, 1989), in Baden-Württemberg in a park in Stuttgart (ADLER pers. comm.), in southern Bavaria in the Wetterstein massif near Mittenwald (RAUH, 1993) and in Sachsen-Anhalt near Halle/Saale (SCHNITTER, 1991). MALTEN (pers. comm.) found *N. dentigerum* several times in the Rhein-Main-area including the Upper Rhein, in the Wetterau up to Rockenberg in the North and near Lorchhausen at the border of Hessen to Rheinland-Pfalz. *N. dentigerum* occurred at the above mentioned localities partially in high abundances. In the past, records of this "adriato-mediterranean" species were mainly known from the west of Germany (Baden-Württemberg, Rheinland-Pfalz, Hessen) with the most northern record in Nordrhein-Westfalen at the mouth of the river Sieg at Bonn (MARTENS, 1978). The new records show that *N. dentigerum* is more spread than previously assumed. Perhaps *N. dentigerum* is expanding its area of distribution at the moment as well.

Considering the above mentioned facts our conclusion is that *A. laevipes* can not be regarded any longer as "endangered by extinction" for the entire area of Germany. Not only the new records, but also the occurrence in man made, different and not threatened biotope types should lead to a modified endanger classification of *A. laevipes*. But what we need for this purpose are additional faunistic and ecological investigations, especially because *A. laevipes* seems to be expanding its area of distribution in Middle Europe at the moment. The border of the

area of distribution to the North would therefore be of special interest in our view.

Following strictly the definition "potentially endangered" by BLAB *et al.* (1984) it is doubtful, whether this endanger classification still fits for *N. dentigerum* in all parts of Germany. At least the classification of "endangered" in Baden-Württemberg (HARMS, 1986) is no longer appropriate in our opinion. Apart from that further faunistic and ecological studies would be desirable as well, especially the clarification of the border of the distribution area to the North.

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