

Diversity and distribution of spiders (Arachnida: Araneae) in dry ecosystems of North Rhine-Westphalia (Germany)

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Abstract: The present study provides a robust data set for ecological planning and conservation of dry ecosystems in western Germany in general and North Rhine-Westphalia in particular. We summarised all available data from recent publications that dealt with spiders in dry ecosystems of North Rhine-Westphalia. Additionally, so far unpublished results of a detailed investigation regarding spiders in sand habitats of the Westphalian Bay that was conducted between 2006 and 2008 are presented. The analysis focussed on the habitat types according to Annex I of the EU Habitats Directive and related habitats. The investigation areas were scattered in the federal state of North Rhine-Westphalia. The data set comprised a total of 84436 individuals from 371 species and 28 families. Overall, an endangerment status is assigned to 68 species. Of these, 12 spiders are in imminent danger of becoming extinct. Two species, *Erigonoplus globipes* and *Meioneta simplicatarsis*, are believed to be extinct in North Rhine-Westphalia. Seven species (*Dictyna major*, *Mastigusa arietina*, *Micaria formicaria*, *Styloctetor romanus*, *Thanatus striatus*, *Theridion uhligi* and *Xysticus ferrugineus*) are new to the arachnofauna of North Rhine-Westphalia.

Keywords: biodiversity research, dry grassland, Flora-Fauna-Habitat directive, heathland, *Juniperus communis* heath, semi-dry grassland

In Germany, dry ecosystems, such as nutrient-poor sandy grasslands, dry heaths and semi-natural dry grasslands and scrubland facies on calcareous substrates are highly endangered (RIECKEN et al. 2006) and are listed in Annex I of the European Habitats Directive as priority habitat types (BALZER & SSYMANEK 2005). Due to increasing cultivation, especially during the past 50 years, and the lack of disturbance (drifting sand, grazing, fire) the area of dry ecosystems has decreased considerably in northern and western Germany (DRACHENFELS 1996, VERBÜCHELN & JÖBGES 2000, JENTSCH et al. 2002, KRATOCHWIL 2004, PARDEY 2004).

Within the framework of conservation and ecological planning, updated and effective data sets concerning species inventories of endangered habitat types as well as distribution and ecology of habitat specialists are imperative. For example, stenotopic species are useful for the evaluation of the nature conservation status of a habitat and biotic communities and may render profuse management guidelines (cf. SCHNITTER et al. 2003). Furthermore, diversity studies and in particular diversity studies of arthropods

generally provide a wide spectrum of biogeographical and ecological probes for use in monitoring challenges (GARDNER 1991, KREMEN et al. 1993). In this context, spiders can play an important role since they are abundant, easy to record, occupy a wide array of spatial and temporal niches and respond immediately to habitat changes. Spiders provide robust data sets and statistical rigor within various kinds of ecological surveys (e.g. NEW 1999, SKERL 1999, SCHARFF et al. 2003, SCHMIDT et al. 2005, 2008, FINCH et al. 2007).

Information about the diversity and distribution of spiders in dry ecosystems of western Germany is poor (KREUELS et al. 2008). Thus, the aim of this study is to present a first complete catalogue of spiders that occur in dry ecosystems of North Rhine-Westphalia. For this purpose, we have summarised all available data from the recent literature and added previously unreleased results of detailed investigations concerning the ecology of spiders in sand habitats of the Westphalian Bay.

Study area

The investigation areas were scattered in the federal state of North Rhine-Westphalia that makes up part of the west and north-west of Germany (Fig. 1). The longest distance between areas was about 210 km (W-E) and 220 km (N-S). Most of the study areas were situated in the lowlands of North Rhine-Westphalia (Lower Rhine Valley, Westphalian Bay) with altitudes between 40 and 100 m a.s.l.. The climate

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Fig. 1: Location of the investigation areas in North Rhine-Westphalia Geographical explanations: 1 = Bockholter Berge (TK25 3912-1), 2 = Boltenmoor (3912-1), 3 = Dahlberg (4419-3), 4 = Die Spey (4606-3), 5 = Dorbaum (3912-3); 6 = Drover Heide (5205-3), 7 = Elter Sand (3711-3), 8 = Emsaue (3912-4), 9 = Heiliges Meer (3611-2), 10 = Hohenhorster Berge (4105-4), 11 = Holtwicker Wacholderheide (4208-2), 12 = Hülstener Wacholderheide (4208-2), 13 = Kaninchenberge (4306-3), 14 = Klattenberge (3912-4), 15 = Kooksheide (4013-2), 16 = Kregenberg (4519-3), 17 = Letter Wacholderheide (4109-1), 18 = Loosen Berge (4306-2), 19 = Moosheide (4118-1/3), 20 = Münster (4011-4), 21 = Osterklee (3712-4), 22 = Schirlheide (3913-3), 23 = Stolzenburg (5405-3), 24 = Talgraben (4014-1), 25 = Teverener Heide (5002-1/3), 26 = Venner Moor (4111-1), 27 = Vinnenberg (3913-4), 28 = Wacholderheide Hörsteloe (3907-1), 29 = Wahner Heide (5108/5109-1), 30 = Westruper Heide (4209-3), 31 = Wisseler Dünen (4203-2), 32 = Wulsenberg (4519/3).

is sub-Atlantic with a mean annual temperature of 9.5 to 10 °C and mean annual precipitation of 700 to 750 mm. Further study areas were located in the geographic region of the Eifel (Stolzenburg) and the Süder mountains (Hochsauerland: Dahlberg, Kregenberg, Wulsenberg) at an elevation of 450 m a.s.l.

and about 345 m a.s.l., respectively. Both regions are characterised by mean annual temperatures below 7 °C and more than 1000 mm of annual precipitation. For further detailed information on the landscape and natural regions of North Rhine-Westphalia see DINTER (1999) and LÖBF (2005).

Methods

All available data from recent publications that dealt with spiders in dry ecosystems of North Rhine-Westphalia were condensed into this study. Here, we analyse mainly the investigation sites representing the habitat types according to Annex I of the EU Habitats Directive (2310 - Dry sand heaths with *Calluna* and *Genista*; 2330 - Inland dunes with open *Corynephorus* and *Agrostis* grasslands; 4030 - European dry heaths; 5130 - *Juniperus communis* formations on heaths or calcareous grasslands; 6210 - Semi-natural dry grasslands and scrubland facies on calcareous substrates) (cf. BALZER & SSYMANK 2005) and related habitats like semi-dry grasslands, dry *Avenella*-grasslands as well as ruderalised dry grasslands and heathlands. Investigation sites that could not be clearly assigned to one of the above listed habitat types were excluded from the analysis. Furthermore, so far unpublished results of a detailed investigation of spiders in sand habitats of the Westphalian Bay that was conducted between 2006 and 2008 are presented. A detailed overview of the investigated sites, study periods and methods is given in Tab. 1. Due to the differences in methodology, sampling intensity and investigation period, this study should only provide a qualitative description of the species inventories. All information on distribution and status of endangerment spiders of North Rhine-Westphalia were taken from KREUELS & BUCHHOLZ (2006) and KREUELS et al. (2008).

Results

A total of 84436 individuals from 371 species and 28 families were summarised (Table 2). Altogether, for 67 species a status of endangerment is given. Apart from 22 species of category V (endangerment may be assumed), 22 endangered (category 3) and 9 highly endangered (category 2) species, 12 spiders are in imminent danger of becoming extinct (category 1). Furthermore, the linyphiid spiders *Erigonoplus globipes* and *Meioneta simplicatarsis* are now considered extinct in North Rhine-Westphalia (category 0). The records of seven species (*Dictyna major*, *Mastigusa arietina*, *Micaria formicaria*, *Styloctetor romanus*, *Thanatus striatus*, *Theridion uhligi* and *Xysticus ferrugineus*) new to the arachnofauna of North Rhine-Westphalia are noteworthy. Further faunistically interesting species discovered during this study were *Agyphantes expunctus*, *Diplocephalus connatus*, *Halorates reprodus*, *Hypselsites jacksoni* and *Linyphia tenuipalpis*, all of which are extremely rare in North Rhine-Westphalia and Germany.

Discussion

Seven species have been recorded for the first time for the arachnofauna of North Rhine-Westphalia:

According to STAUDT (2009), the rare *Dictyna major* is mainly distributed in northern Germany, for example in dune habitats (HEYDEMANN 1964, SCHULTZ & PLAISIER 1995) and dry grasslands (BOCHMANN 1941, MERKENS 2002). This species also seems to inhabit dry *Pinus* forests (SCHAEFER 1980, SIMON 1995).

Mastigusa arietina has so far only been recorded in southern and eastern Germany (STAUDT 2009). The biology and ecology of this rare species is rather unclear. According to MARTIN (1983) *Mastigusa arietina* is a myrmecophil spider that occurs exclusively in nests of *Formica rufa* ants. However, SIMON (1995) and KIELHORN & BLICK (2007) found this species at trees and on treetops, respectively. These records may explain the scarcity of this spider since pitfall traps seem to be an inappropriate method to study these strata.

The gnaphosid *Micaria formicaria* is classified as a xerophilous species that inhabits mainly dry and semi-dry grasslands and *Juniperus* heaths (HAUK 1996, PLATEN et al. 1999) but also occurs in open pastures (HÄNGGI & BAUR 1998) and dry forest edges (BAUCHHENS 2002). According to BAUCHHENS (1995) and BAUR et al. (1996), *Micaria formicaria* inhabits sandy substrates as well as calcareous soils. This species is distributed mainly in the south-western regions of Germany (LEIST 1978, BAEHR & BAEHR 1984, HAUK 1996) but is also found in eastern Germany (PLATEN et al. 1999, STAUDT 2009).

The linyphiid *Styloctetor romanus* was recorded mainly in southern and eastern Germany (STAUDT 2009) but also seems to be distributed in northern Germany (MERKENS 2002). According to MARTIN & UHLIG (1986), SACHER & BREINL (1999), PLATEN et al. (1999), RATSCHKER (2001), SACHER (2001) and SCHNITTER et al. (2003), this species is a typical inhabitant of dry grasslands or dry ecosystems in general (for example dry fallow land), respectively. In contrast, GÖTZE (1992) found a single individual in a salt marsh of northern Germany.

On the other hand, up to now, *Thanatus striatus* has been found in a variety of different habitat types, such as dry and semi-dry grassland (HÖREGOTT 1958, HEYDEMANN et al. 1994, KUSCHKA 2004, AL HUSSEIN & LÜBKE-AL HUSSEIN 2007), heathlands (SCHMIDT & MELBER 2004), humid habitats (NENTWIG 1983, PLATEN et al. 1999, STAUDT 2000), salt

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Tab. 1: Overview of investigated sites, study periods and study designs. (*1) = 20 % glycerin and 1% thymol added. (*2) = according to RENNER (1982): ethanol + acetic acid + glycerin + water. (*3) = hitherto unpublished data. Habitat types: A = bare sand, B = dry sand heaths with *Calluna* and *Genista* (FFH-code 2310), C = inland dunes with open *Corynephorus* and *Agrostis* grasslands (FFH-code 2330), D = European dry heaths (FFH-code 4030), E = *Juniperus communis* formations on heaths or calcareous grasslands (FFH-code 5130), F = semi-natural dry grasslands and scrubland facies on calcareous substrates (FFH-code 6210), G = *Avenella* dominated dry grassland, H = semi-dry grassland, I = ruderalised semi-dry and dry grassland.

no	area	Habitat types	TK25	N	E	M asl	sites	traps per site	Investigation period	Preservation fluid	reference
1	Bockholter Berge	C	3912-1	52°03'30.21"	07°39'39.05"	50	3	4	08.2006-07.2008	4% formalin	coll. Buchholz (*3)
2	Boltenmoor	C	3912-1	52°01'18.58"	07°41'10.12"	55	2	4	08.2006-07.2008	4% formalin	coll. Buchholz (*3)
3	Dahlberg	F	4419-3	51°30'10.76"	08°54'19.24"	275	2	5	04.1991-10.1996	4% formalin	Kreuels (1998a)
4	Die Spey	I	4606-3	51°20'10.01"	06°42'03.49"	25	4	3	06.1992-09.1992	80% ethanol (*1)	Grigo (1997) (*3)
5	Dorbaum	B, C, H	3912-3	52°01'23.06"	07°42'48.17"	50	5	5	04.2002-04.2003	3% formalin	Buchholz & Hartmann (2008)
6	Drover Heide	D	5205-3	50°43'58.07"	06°31'41.08"	205	5	1	05.2006-05.2007	unknown	coll. Kreuels (*3)
7	Elter Sand	A, B, C, E	3711-3	52°13'27.45"	07°32'02.04"	55	5	3	05.2005-10.2005	4% formalin	Buchholz (2008)
8	Ensaue	C	3912-4	52°01'03.87"	07°46'22.35"	45	1	4	08.2006-07.2008	4% formalin	coll. Buchholz (*3)
9	Heiliges Meer	A, B	3611-2	52°21'12.11"	07°38'02.91"	45	4	4	08.2006-07.2008	4% formalin	coll. Buchholz (*3)
10	Hohenhorster Berge	C	4105-4	51°49'55.52"	06°39'17.98"	30	1	4	08.2006-11.2006	4% formalin	coll. Buchholz (*3)
11	Holtwicker Wacholderheide	E	4208-2	51°45'00.04"	07°07'36.68"	90	1	4	08.2006-07.2008	4% formalin	coll. Buchholz (*3)
12	Hülstener Wacholderheide	E	4208-2	51°47'52.03"	07°06'30.24"	80	1	4	08.2006-07.2008	4% formalin	coll. Buchholz (*3)
13	Kaninchenberge	A, B	4306-3	51°37'39.13"	06°41'46.52"	25	4	3	06.1992-09.1992	80% ethanol (*1)	Grigo (1997) (*3)
14	Klatenberge	C	3912-4	52°00'16.73"	07°47'02.70"	60	1	4	08.2006-07.2008	4% formalin	coll. Buchholz (*3)
15	Kooksheide	A	4013-2	51°58'13.99"	07°59'03.28"	60	1	5	05.1992-08.1992	unknown	Kreuels et al (2008)
16	Kregenberg	F	4519-3	51°26'25.64"	08°51'51.45"	330	4	5	04.1991-10.1996	4% formalin	Kreuels (1998a)
17	Letter Wacholderheide	B, C	4109-1	51°53'12.09"	07°10'05.81"	75	1	4	08.2006-07.2008	4% formalin	coll. Buchholz (*3)
18	Loosen Berge	A, I	4306-2	51°40'07.82"	06°46'40.70"	35	3	3	06.1992-09.1992	80% ethanol (*1)	Grigo (1997) (*3)
19	Moosheide	A, B, C, H	4118-1/3	51°51'18.71"	08°40'58.69"	130	5	4	08.2006-07.2008	4% formalin	coll. Buchholz (*3)
20	Münster	A, C, I	4011-4	51°55'59.75"	07°39'48.13"	60	7	3	04.2000-07.2000	brine	Kreuels et al (2008)
21	Osterklee	F	3712-4	52°13'17.86"	07°45'38.81"	110	1	4	04.2008-07.2008	4% formalin	coll. Buchholz (*3)
22	Schirtheide	D	3913-3	52°00'37.30"	07°51'14.58"	60	1	5	06.2008-10.2008	Renner (*2)	coll. Kreuels (*3)
23	Stolzenburg	F	5405-3	50°30'55.82"	06°34'00.57"	450	1	10	04.1971-09.1971	4% formalin	Becker (1977)
24	Talgraben	A	4014-1	51°57'15.53"	08°01'36.96"	50	1	5	05.1992-08.1992	unknown	Kreuels et al (2008)
25	Teverener Heide	A, C, D	5002-1/3	50°57'35.05"	06°04'08.22"	90	5	5	2004	5% acetic acid	Kreuels (2006)
26	Venner Moor	D	4111-1	51°51'51.16"	07°32'14.25"	65	1	4	05.2007-10.2007	4% formalin	coll. Buchholz (*3)
27	Vinnenberg	I	3913-4	52°01'33.96"	07°58'01.35"	55	1	5	05.1992-08.1992	unknown	Kreuels et al (2008)
28	Wacholderheide Hörsteloe	C, E	3907-1	52°05'45.50"	06°54'43.20"	50	2	4	08.2006-07.2008	4% formalin	coll. Buchholz (*3)
29	Wahner Heide	A, C, D	5108/5109-1	50°52'19.48"	07°10'06.46"	100	4	5	01.1994-10.1994	70% ethanol	Jäger (1996)
30	Westruper Heide	B, E, G	4209-3	51°44'07.03"	07°14'16.47"	45	7	4	08.2006-07.2008	4% formalin	coll. Buchholz (*3)
31	Wisseler Dünen	A, C	4203-2	51°46'03.44"	06°17'57.39"	15	3	3	06.1992-09.1992	80% ethanol (*1)	Grigo (1997) (*3)
32	Wulsenberg	F	4519-3	51°26'44.13"	08°51'59.72"	345	4	5	04.1991-10.1996	4% formalin	Kreuels (1998a)

meadows (SPARMBERG & SACHER 1997, BARNDT 2007, FINCH et al. 2007) and dunes (HEYDEMANN 1964, SCHULTZ 1992). *T. striatus* is distributed all over Germany (STAUDT 2009).

MARTIN (1973a) described the theridiid spider *Theridion ubligi*. He found specimens during an investigation of the nature reserve Rietzer See (cf. MARTIN 1973b). Since then, this species has only been recorded in very few studies in dry grasslands of eastern Germany (PLATEN et al. 1999, JAKOBITZ 2003, STAUDT 2009). Conversely, *T. ubligi* was recorded in dry grasslands and heathlands in the Netherlands and Belgium (JOCQUÉ 1977, KEER & VANUYTVEN 1993, PRINSEN 1996, HELSDINGEN 1999) so that the distribution gap is closed now. One further record refers to DUMA (2008) who found *T. ubligi* in a dry and sandy place of south-eastern Romania. According to HERZOG (1968), BAUCHHENSS (1995), PERNER (1997), PLATEN et al. (1999) and SACHER (2002), the thomisid *Xysticus ferrugineus* is stenotopic of dry and calcareous grasslands. This species is known from only few locations in central and eastern Germany (STAUDT 2009).

The linyphiid spiders *Erigonoplus globipes* and *Meioneta simplicitarsis* are now considered to be extinct in North Rhine-Westphalia:

E. globipes was last recorded by KREUELS (1998b). Due to destruction of the former locations caused by land-use, this population has disappeared. Since then, this species has been considered to be extinct in North Rhine-Westphalia (KREUELS & BUCHHOLZ 2006). *E. globipes* is distributed mainly in higher altitudes of central and southern Germany (BRAUN 1960, BAEHR & BAEHR 1984, BAUCHHENSS & SCHOLL 1985, JOGER 1997) and seems to be absent in the lowlands (STAUDT 2009). According to all the previous records, this species is stenotopic for dry calcareous grasslands (BAEHR 1988, KÖHLER et al. 1989, PERNER 1997). *Meioneta simplicitarsis* is a rare species that has until now been found in eastern Germany (e.g. SACHER & BREINL 1999), Rhineland-Palatinate (WEBER 1999) and North Rhine-Westphalia (CASEMIR 1982). It seems to prefer dry grasslands (BRAUN 1969, BUCHAR & RŮŽIČKA 2002) but also occurs in wet meadows and pastures (HEIMER & NENTWIG 1991, KREUELS & BUCHHOLZ 2006).

Agnyphantes expunctus, *Diplocephalus connatus*, *Halorates repositus*, *Hypselites jacksoni* and *Linyphia tenuipalpis* are rarely distributed to North Rhine-Westphalia in particular and Germany in general

(KREUELS et al. 2008, STAUDT 2009). *Agnyphantes expunctus* seems to be restricted to humid habitats in low mountain ranges and mountains, e.g. in the Eifel (CASEMIR 1976, 1982), Harz (HEIMER 1980, SACHER 1997, 1998) and the Alps (KREUELS & LÜCKMANN 1998, MUSTER 2001). *Diplocephalus connatus* apparently prefers humid habitats as well (HÄNGGI et al. 1995, KREUELS & BUCHHOLZ 2006) and was hitherto sporadically recorded in western and central Germany (MORITZ 1973, ALBRECHT et al. 1994, ESSER 1997). Furthermore, *Halorates repositus* was rarely found in the northern part of North Rhine-Westphalia (BUCHHOLZ & KREUELS 2005) and single locations along the Rhine (BRAUN 1960) and the North Sea coast (HELSDINGEN 2003, STAUDT 2009). Apart from southern Germany, *Hypselites jacksoni* was sampled in northern (SCHAEFER 1970, 1972), western (CASEMIR 1960, 1976, RASKIN 2000) and eastern (HERZOG 1974, HIEBSCH 1985, OTTO et al. 2001) parts of the country. According to previous records, both, *Halorates repositus* and *Hypselites jacksoni* apparently prefer humid habitats (cf. HÄNGGI et al. 1995). Finally, *Linyphia tenuipalpis* is mainly distributed to the lowlands (e.g. NW-Germany: MERKENS 2002, SCHMIDT & MELBER 2004; NE-Germany: PLATEN et al. 1999, SCHNITTER et al. 2003, BARNDT 2005; Netherlands: TUTELAERS 2000, 2001) with southernmost records in Thuringia (MALT & PERNER 2002).

When working with the present data one has to consider several taxonomical problems. For example, *Alopecosa accentuata* and *Alopecosa barbipes* are closely related species that were once considered to be synonyms. However, several studies have confirmed the separation of both species (DAHLEM et al. 1987, CORDES & HELVERSEN 1990, CORDES 1995, VINK & MITCHELL 2002). On the other hand, at least the identification of female specimens is very difficult, while males can be clearly distinguished by the hair coat on Tibia I. Furthermore, both species show a different phenology and distribution (CORDES & HELVERSEN 1990, STAUDT 2009). Nevertheless, SCHMITT (2008) stated that several authors might have ignored the differences between both species found during previous studies, which makes the current status of *A. accentuata* and *A. barbipes* questionable. Consequently, we checked specimens from most of the lowland sites (2, 5, 7, 9, 10, 19, 21, 30) and one highland site (16). As a result of this, we state that all lowland records belong to *Alopecosa barbipes* while individuals from the low mountain ranges belong

to *A. accentuata*. Thus, former data on *A. accentuata* that were published by BUCHHOLZ & HARTMANN (2008) and BUCHHOLZ (2008) have to be transferred to *A. barbipes*.

Further taxonomic questions arise concerning *Dicymbium nigrum brevisetosum* which was first described by LOCKET (1962) and WIEHLE (1965) as a form and recognised as a species by LOCKET et al. (1974). Later, THALER (1986) discussed the existence of further forms of *Dicymbium nigrum* s. str. in the southern Alps. Finally, ROBERTS (1987) downgraded *D. n. brevisetosum* back to a form. This taxonomical problem is not completely solved yet, but differences in the hair coat of Tibia I which is considerably shorter in *D. n. brevisetosum* might justify the separation of both as valid species. Both have been recorded from Germany (WIEHLE 1965, HARMS 1987) but it is assumed that numerous records of *Dicymbium nigrum* s. str. might belong in fact to *D. n. brevisetosum* since, for example, drawings of the first one given in the reference guide of NENTWIG et al. (2003) in truth refer to *D. n. brevisetosum* (cf. WIEHLE 1960, 1965). Hence, we checked all available material and exclusively found specimens with short hair coats on Tibia I which according to ROBERTS (1987) indicated the occurrence of only *Dicymbium nigrum brevisetosum* within the study area. Consequently, records for *Dicymbium nigrum* published by BUCHHOLZ & HARTMANN (2008) and BUCHHOLZ (2008) have to be adjusted to *D. n. brevisetosum*.

Finally, we have to keep in mind the fact that several parts of North Rhine-Westphalia are hitherto poorly investigated. Especially for the eastern and southern parts of the federal state (e.g. Sauerland, Weserbergland), as well as for the mountains of the Eifel, faunistic records are almost entirely missing (KREUELS et al. 2008). This is a drawback for this study since large parts of the semi-natural dry grasslands and scrubland facies on calcereous substrates are situated in these regions and thus remained under-sampled yet. As opposed to this, the coverage level for dry and sandy heathlands and grasslands has been thoroughly improved within detailed studies during the last years.

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Tab. 2: Species list (nomenclature follows Platnick 2009). Abbreviations: End = status of endangerment in North Rhine-Westphalia (according to KREUELS & BUCHHOLZ 2006). * = not endangered, V = endangerment may be assumed, R = extremely rare, not declining species, 3 = endangered, 2 = highly endangered, 1 = in imminent danger of becoming extinct, 0 = extinct, nr = new record for North Rhine-Westphalia. ? = hitherto not assessed; Dis = Distribution: C = species that exclusively occurred on calcareous substrates.

family [no species]/ species	End	Dis	study area [no of sites]																																sum
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
			[3]	[2]	[2]	[4]	[5]	[5]	[5]	[1]	[4]	[1]	[1]	[1]	[4]	[1]	[1]	[4]	[1]	[1]	[3]	[5]	[7]	[1]	[1]	[1]	[1]	[5]	[1]	[1]	[2]	[4]	[7]	[3]	[4]
Atypidae [2]	*												32								2														
<i>Atypus affinis</i>	1																							4											
<i>Atypus piceus</i>																																			
Segestrinidae [1]																																			
<i>Segestria senoculata</i>	*	1			2										1	1							4		2										
Dysderidae [3]																																			
<i>Dysdera erythrina</i>	*		12						6						146								1		2									89	256
<i>Harpactea bombergi</i>	*														4																		15	11	
<i>Harpactea rubicunda</i>	*																						1										1		
Mimetidae [1]																																			
<i>Ero furcata</i>	*																																	10	
Nesticidae [1]																																			
<i>Nesticus cellulanus</i>	*	C																															2	2	
Theridiidae [20]																																			
<i>Asagena phalerata</i>	*		19	39	28		30	51			9	1	5		55	22	6	42								3		5	99			15	429		
<i>Crustulina guttiata</i>	V	1									4				6																		11		
<i>Diploca coracina</i>	2		6												46																	3	77	132	
<i>Enoplognatha latimana</i>	3	1		1																												2	2		
<i>Enoplognatha ovata</i>	*																				1	2										1	4		
<i>Enoplognatha thoracica</i>	*	40	7	4	111		13	21			13	17				17	6									1		9	11			9	313		
<i>Episinus angulatus</i>	*	C				1										2																	1	3	
<i>Episinus truncatus</i>	*						1																												
<i>Euryopsis flarcomaculata</i>	*	4	1	4			13	1			5	33			3	29	1	1									2						98		
<i>Neottiura bimaculata</i>	*				6																												6		
<i>Pardiscura pallens</i>	*	C													7																	17	24		
<i>Pholcomma gibbum</i>	*				1						1																			1		1	4		
<i>Phylloneta impressa</i>	*																												2				2		
<i>Phylloneta sisypbia</i>	*	C																													1	1	1		
<i>Robertus arundineti</i>	*		1			9					1																						11		
<i>Robertus iredius</i>	*	2	6	6	15	27	6	1			7				1	1	1									1		7			2	83			
<i>Robertus neglectus</i>	*	C		1											1																	2	4		
<i>Seycelloessa vittatus</i>	*				1																											1	2		
<i>Steatoda albomaculata</i>	3																	48							3					4		55			
<i>Theridion ubligi</i>	nr																1												1		2		2		
Linyphiidae [160]																																			
<i>Abacoproces saltuum</i>	R						3																										3		
<i>Acartiauentius scurritus</i>	2							1																								1	1		

family [no species] / species	End	Dis	study area [no of sites]																												sum			
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28		29	30	31
[3]	[2]	[2]	[4]	[5]	[5]	[5]	[1]	[4]	[1]	[1]	[1]	[4]	[1]	[1]	[1]	[4]	[1]	[4]	[1]	[3]	[5]	[7]	[1]	[1]	[1]	[5]	[1]	[1]	[2]	[4]	[7]	[3]	[4]	
<i>Agryphantes expunctus</i>	*										1											1								1				
<i>Agyneta cauta</i>	3																						1											
<i>Agyneta conigera</i>	*																						1											
<i>Agyneta decora</i>	*									2																								
<i>Agyneta subtilis</i>	*											4																						
<i>Allomengea vidua</i>	R																																	
<i>Anguliphantes angulipalpis</i>	R	C																						1										
<i>Araconus crassiceps</i>	*											1																						
<i>Araconus humilis</i>	*		36	98	11	20				58	13	17	1				44	10	12	37	4					3	17	206					4	591
<i>Asthenargus paganus</i>	*																																	
<i>Baryphyna pratense</i>	*																																	
<i>Bathypantes approximatus</i>	*		10	1		5				3						1				2	1													23
<i>Bathypantes gracilis</i>	*		13	9	42	27	7	1	7	2	10				2		1	1	62	3	10	1		1			2	2	2	13	2	73	293	
<i>Bathypantes nigrinus</i>	*					7												6													5	4	22	
<i>Bathypantes parvulus</i>	*		13	9									1				10	1													2		36	
<i>Bolyphantes aliceps</i>	*	C																1															1	
<i>Centromerita bicolor</i>	*		31	27	52		4			10	78			1	1		1	11	34												3	210	9	613
<i>Centromerita concinna</i>	*		8	16	589	20	2	3	126					2			23	1	963	8	70	19		1			1		1	423	140	665	3081	
<i>Centromerus breviculcatus</i>	*													1	1							1											3	
<i>Centromerus caevannarum</i>	R	C																1															1	
<i>Centromerus dilutus</i>	*		3				3			2				1	4																		1	
<i>Centromerus incilium</i>	*		12	17	4		2	22	67								11	21													1	4	210	429
<i>Centromerus levitarsis</i>	R																3														1		4	
<i>Centromerus pabulator</i>	*		40	1	5				6	7				1	4			465	5	10			3				5	2	2	238	792			
<i>Centromerus prudens</i>	*													1																	1		2	
<i>Centromerus sylvaticus</i>	*		65	19	11	2	2	16	15				49	48			2	38	5	16	8					6	9	12	62	383				
<i>Ceratinella brevipes</i>	*					1												1			1							1		1	5			
<i>Ceratinella brevis</i>	*		1			1								1								1						1	3			8		
<i>Ceratinella scabrosa</i>	*				6																	1									1		8	
<i>Cnephalocotes obscurus</i>	*					44				3								9		2	2		97				13	19		5	212			
<i>Collinsia distincta</i>	*					152																											152	
<i>Collinsia inerrans</i>	*		2							3	1	1					2				3							1		1			14	
<i>Dicymbium nigrum brevisetosum</i>	V		1	1	10	1	3		1	2			8					8	1				3	10			6	2	21	78				
<i>Dicymbium tibiale</i>	*		2			4							27	7			9												1			50		
<i>Diplocephalus connatus</i>	R																														1		1	
<i>Diplocephalus cristatus</i>	*					6							2					6														152	166	
<i>Diplocephalus latifrons</i>	*																	9													32	1	43	
<i>Diplocephalus pinus</i>	*					2																									6	1	10	
<i>Diplostyla concolor</i>	*		1	2		177	2		4				1				1	5	2		2	1					6			1	205			
<i>Dismodicus bifrons</i>	*						1											3				3									2		9	
<i>Entelecara congenera</i>	*	C																														3	3	

Spiders in dry ecosystems of North Rhine-Westphalia

family [no species] / species	End	Dis	study area [no of sites]																												sum					
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28		29	30	31	32	
			[3]	[2]	[2]	[4]	[5]	[5]	[5]	[1]	[4]	[1]	[1]	[1]	[4]	[1]	[4]	[1]	[3]	[5]	[7]	[1]	[1]	[1]	[1]	[1]	[5]	[1]	[1]	[2]	[4]	[7]	[3]	[4]		
			2			5	4			1					1	2	1								3					9						
<i>Miconela viaria</i>	*			1		2		2	12			3	9					1											1							
<i>Minyriolus pusillus</i>	*																1																			
<i>Mioxena blanda</i>	V			4				2	1								1																	48	56	
<i>Monocephalus fuscipes</i>	*							2																										2	2	
<i>Neriene clatrata</i>	*				1			1							1																8			11		
<i>Neriene furtiva</i>	R																					1									1			2	3	
<i>Neriene montana</i>	*											1															2								2	3
<i>Neriene peltata</i>	*															1							3				12							16		
<i>Nusonius nasutus</i>	*											1																						1	1	
<i>Oedoborax agrestis</i>	3																													1				1	1	
<i>Oedoborax apicatus</i>	*		1	1	3	4	3	3	313	19		2	7	6	1						3	1								42		8	4	421		
<i>Oedoborax fuscus</i>	*				21	3			17					2	1															2	1	1	1	50		
<i>Oedoborax gibbosus</i>	*																										2							2	2	
<i>Oedoborax retusus</i>	*		17	5	1141	2	103	20	3			11						5	1										290			1	1599			
<i>Osteartius melanopygius</i>	*																	1															1	2		
<i>Palliduphantes ericaeus</i>	*							1																										15	15	
<i>Palliduphantes pallidus</i>	*		1	1	2	1	1	2	1						1	12					1	22	11							2			38	95		
<i>Panamomops inconspicuus</i>	2	C			2		2								373																		192	567		
<i>Parapeleceps nemoralis</i>	R																																	2	2	
<i>Peleceps elongata</i>	R																				1												3	10		
<i>Peleceps mengi</i>	R						1				1										1													3		
<i>Peleceps parallela</i>	*		334	10	55	1	34	83	22			1	5	1	1															82	31	3	1	817		
<i>Peponocranium ludicrum</i>	*	C				1																												1	1	
<i>Peponocranium orbiculatum</i>	*	C															9																38	47		
<i>Pocadicnemis juncea</i>	V																																1	1		
<i>Pocadicnemis pumila</i>	*		2	1	5	2	15	37	25	64	91																			1	7	20	3	79	389	
<i>Peponhonna campbelli</i>	*								3																						2			5	5	
<i>Peponhonna microareense</i>	R																																		1	1
<i>Peponhonna microphthalnum</i>	*		3	6								2			1																	15	2	4	43	
<i>Primerigone vagans</i>	*																																		4	4
<i>Saarietola abnormis</i>	*																																		9	9
<i>Saarietola firma</i>	R																																	1	1	
<i>Silometopus bonessi</i>	1			12												26																		84	122	
<i>Silometopus elegans</i>	*	C														1																		1	1	
<i>Silometopus reussi</i>	*	C																																	27	27
<i>Sintula corniger</i>	*	C			2																													2	2	
<i>Stemonophantes lineatus</i>	*		2	5	7		11			1	5																					6	7		65	
<i>Stylocetor romanus</i>	nr																																		3	3
<i>Stylocetor staticus</i>	*																																		21	21
<i>Syedra gracilis</i>	R																																		6	6
<i>Tallusia experta</i>	*		5				2																									4			14	14

family [no species] / species	End	Dis	study area [no of sites]																															sum	
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		32
			[3]	[2]	[2]	[4]	[5]	[5]	[5]	[1]	[4]	[1]	[1]	[1]	[4]	[1]	[1]	[4]	[1]	[3]	[5]	[7]	[1]	[1]	[1]	[1]	[5]	[1]	[1]	[2]	[4]	[7]	[3]	[4]	
<i>Tapinocyba insecta</i>	*																	1													23		3	27	
<i>Tapinocyba praecox</i>	V		9	68		28		1		6		3			1	48					10										5	75	1	45	300
<i>Tapinocyboides pygmaeus</i>	2			5												1	23							2										322	353
<i>Tapinopa longidens</i>	*		1														2	2																5	
<i>Tenuiphantes cristatus</i>	*																																		1
<i>Tenuiphantes flavipes</i>	*		2					4					8	5		2	1			1			2						7		3		7	42	
<i>Tenuiphantes mengi</i>	*		1			1		2		3			19	10			1			2	1	1			8		1			2	6	1		59	
<i>Tenuiphantes tenebricola</i>	*							1					2	1		1																		5	
<i>Tenuiphantes tenuis</i>	*		74	30	134	203	43	13	15	4	12		12	1	10	1	395	7	4	6	3		1	2	1	2	1	1	1	9	29	46	149	1205	
<i>Tenuiphantes zimmemanni</i>	*						3			3			1							1				1										10	
<i>Thyreosthenius parasiticus</i>	*	C																																1	1
<i>Tiso vagans</i>	*		8	2		125		1		23			126		1	2	1	1	15	32	2													3	381
<i>Trichoncus affinis</i>	1	C																							1									2	3
<i>Trichoncus saxicola</i>	1	C			4																														4
<i>Trichopterna cito</i>	2								10						2					8	96	1										123	13	253	
<i>Trichopterna thorelli</i>	*														1																				2
<i>Troxochrus scabrillus</i>	*		2		8	81				1							1	17																37	147
<i>Typhlobrestus digitatus</i>	2									2																									328
<i>Walckenaeria acuminata</i>	*		7	1		1		5		26			1			2	52	2	3	1	1								1		8	2	35	148	
<i>Walckenaeria altheops</i>	*		2	1		2								3			1				6								1	16	10	6	48		
<i>Walckenaeria antica</i>	*			4	5		12						3	6			46				3	5								23	10	53	170		
<i>Walckenaeria atroibialis</i>	*		18	1		6		37		3		67	51			1	3	6	30	2		2						6	1	25	13	2	2	276	
<i>Walckenaeria capito</i>	*									1																									1
<i>Walckenaeria corniculans</i>	*									1			1											63								21		89	
<i>Walckenaeria cucullata</i>	*		5				7	5					2	10			1				1				3									34	
<i>Walckenaeria cuspidata</i>	*				2												1								8								2	13	
<i>Walckenaeria dysderoides</i>	*		1	1		12		1		5			6		2		1	1			1				1				2	1	19	21	75		
<i>Walckenaeria furcillata</i>	*		13	2			8		7				7	3		1	5	6		1					3				15	3	35	109			
<i>Walckenaeria mitrata</i>	*		1					1															5											7	
<i>Walckenaeria monoceros</i>	*									1							24				4	2	4									11	40	86	
<i>Walckenaeria nodosa</i>	*																																1		1
<i>Walckenaeria nudipalpis</i>	*					1	2			3				1			1														3	1		12	
<i>Walckenaeria obtusa</i>	*		3					2		16			3	3			3		1										2	3			36		
<i>Walckenaeria unicornis</i>	*					2		1																										3	
<i>Walckenaeria vigilax</i>	*			1					1					1																		2		5	
Tetragnathidae [7]																																			
<i>Metellina mengi</i>	*						2																											3	
<i>Metellina segmentata</i>	*														1																			1	2
<i>Pachygnatha clercki</i>	*		1	3		98	3		2		1		1						1		3									1	8		1	124	
<i>Pachygnatha degeeri</i>	*		63	33	16	1	131		38	18	15		53	28		16	4	7	9		215	94		4					5	13	2	19	2	8	794
<i>Pachygnatha listeri</i>	*		2			1							1																				31		37

family [no species] / species	End	Dis	study area [no of sites]																												sum					
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32		
			[3]	[2]	[2]	[4]	[5]	[5]	[5]	[1]	[4]	[1]	[1]	[1]	[4]	[1]	[1]	[4]	[1]	[3]	[5]	[7]	[1]	[1]	[1]	[1]	[1]	[5]	[1]	[1]	[2]	[4]	[7]	[3]	[4]	
Tetragnatha montana	*					1																												1		
	*																																	1		
Tetragnatha pinicola																																				
Araneidae [12]																																				
Agelenidae redii	3				2											2					1												5			
Araneus diadematus	*		1	5	1	1			2						1																1		12			
Araneus quadratus	*																			1										1		2				
Araniella opisthographa	*		1			1																											2			
Argiope bruennichi	*																				1											1	2			
Cercidia prominens	*		1										6				1													4	1	38				
Hyposisinga albocittata	3											1				38				2		2								11	12	66				
Hyposisinga pygmaea	*						17													2												19				
Hyposisinga sanguinea	*		1		6											28													1		5	41				
Larinioides cornutus	*					1	1																									2				
Mangora acalypha	*			1												1														1		15				
Neoscona adianta	*										1																					1				
Lycosidae [36]																																				
Alopecosa accentuata	V	C			59											46																	26	131		
Alopecosa aculeata	*																															23				
Alopecosa barbipes	?		46			16	10	277	2			2		3					1	6	1									298	1	663				
Alopecosa cuneata	*		5	253		798	44	2	12				1	1	212					604	130	11	27	3	25	2	1	1		18	1	70	2221			
Alopecosa fabrilis	*											15																			4	19				
Alopecosa inquilina	I	C																						2									2			
Alopecosa pulchellenta	*		64	29	175	308	13	285	2	272		50	58		8	117	6	11	21	388	136	12			6		13	51	103	36	234	2398				
Alopecosa striatipes	3	C														19																65	84			
Alopecosa trabalis	3			1								1			465								31							1		499				
Arctosa figurata	1														5									5						2		12				
Arctosa leopardus	*					1			13														24			5							43			
Arctosa luteitana	*			30					1			2			21														2	1	129	202				
Arctosa perita	*		73	1				57	21	256				2	41	1	1	22	2	170	4					2	1	66	2	12	2		736			
Aulonia albimana	*			133		1										1635									5	1			35		1670	3480				
Hydrolycosa rubrofasciata	*											13																					36			
Pardosa agrestis	*		1		174		4					6							2	17											4	4	212			
Pardosa amentata	*				81	9		1	7					15	2														3	2		1	136			
Pardosa bortensis	3				283																												289			
Pardosa lugubris s. str.	*		394	174	10	149	117	125	39		199	128		3	2	4	27	2	2	147	50				10		10	16	27	178	3	60	1876			
Pardosa monticola	*		1		3	3341		18	1				2						93						7	133				5168		2	8769			
Pardosa nigriceps	V			3		65	9	58					2		193				5	1					6	30				38	195	610				
Pardosa palustris	*		10	9	417	1675		22	49	19	1		3	23	50	22	1	173	87	579							112			452	2	17	3836			
Pardosa pratensis	*		8	6		16	69	6	9	2	15	2					15								34	19				1	1		203			
Pardosa proxima	R																															18	18			
Pardosa pullata	*		2	1	693	1	172	6	2	1	335	381	195		2	2	521	86	35	175	97			233	1						85	12	112	7	653	4080

family [no species]/ species	End	Dis	study area [no of sites]																												sum			
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28		29	30	31
			[3]	[2]	[2]	[4]	[5]	[5]	[5]	[1]	[4]	[1]	[1]	[1]	[4]	[1]	[1]	[4]	[1]	[3]	[5]	[7]	[1]	[1]	[1]	[1]	[5]	[1]	[1]	[2]	[4]	[7]	[3]	[4]
<i>Pardosa salians</i>	*							3																										3
<i>Pirata hygrophilus</i>	*		34	16		1	1	21		24	86	76	2	2	2	2	1		2	1			1		1	1	1	1	1	36	1		306	
<i>Pirata latians</i>	*					1				2				1												1				1			6	
<i>Pirata piraticus</i>	*					1	1			1											1	2				2					1		9	
<i>Pirata tenuitarsis</i>	R																									2							2	
<i>Pirata uliginosus</i>	*		3			3	9				38	54	5																	1			113	
<i>Trochosa ruricola</i>	*		2		20	196	2		10	3	1			1	1	1				3	23	1	14			3	5		8	2	2		297	
<i>Trochosa spinipalpis</i>	*									1																							1	
<i>Trochosa terricola</i>	*		246	162	400	263	59	171	9	453	116	199	1	96	22	210	35	20	512	139	15	34	14	30	12	97	255	247				632	4449	
<i>Xerolycosa miniata</i>	V		236	338		219		125		4			16	59	1			3	20	633				113		12	185	3				1967		
<i>Xerolycosa nemoralis</i>	*		320	7	2					3	3		1	35	11	6	60			11	4			5	26	33					27	554		
Pisauridae [2]																																		
<i>Dolomedes fimbriatus</i>	*																																	
<i>Pisaura mirabilis</i>	*		7	4		6	6		20		8	1	1	1	1	1	1	1	1	1	6	1	1	1	1	1	1	2	8	10	1		87	
Agelenidae [6]																																		
<i>Agelena labyrinthica</i>	*		7		2							1	13		49				22	1	2			3	2	2	3				52	157		
<i>Histiopona torpida</i>	*								1		4	12			6			2							2	2	1					23	51	
<i>Malthonica picta</i>	*							10																5								15		
<i>Malthonica silvestris</i>	*		3	1	3	1								2	1																	99	110	
<i>Tegenaria agrestis</i>	*					2		7	1				12	9	1			3	3	26			1			3	4	5	8			8	85	
<i>Tegenaria atrica</i>	*							1	3						8												1					13		
Hahniidae [6]																																		
<i>Antistea elegans</i>	*		2						1	9														2	5							19		
<i>Habnia beiveola</i>	*		15	7				5	3		1	8	18	1	1				21					1	16	10					7	114		
<i>Habnia montana</i>	*		9	5				7	1			34	4				1	5	2	1				4				1				74		
<i>Habnia nava</i>	*		1		54	378	4				1	1			262						1				6	9					269	986		
<i>Habnia ononidum</i>	*					49		2																		7					58			
<i>Habnia pusilla</i>	*					3	2				4	16			4				8		17		9		3	30					142	238		
Dictynidae [7]																																		
<i>Atella biuncata</i>	1	C																														1	1	
<i>Argenna subnigra</i>	1																		5													8		
<i>Cicurina cicur</i>	*		7	21	16			10	2		1	2			149	2			2	2			1		6	4	10				51	286		
<i>Dictyna major</i>	nr																		1													1		
<i>Dictyna pusilla</i>	*						1												1													2		
<i>Lathys humilis</i>	*		1					2																			1					4		
<i>Mastigusa arietina</i>	nr			1																												1		
Anaurobiidae [3]																																		
<i>Anaurobius fenestralis</i>	*					1		2																									3	
<i>Ceolotes terrestris</i>	*			13							5	6				26			1				6		1							48	106	
<i>Eurocoelotes inermis</i>	*										51	70														4	3					7	135	

family [no species] / species	End	Dis	study area [no of sites]																												sum				
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28		29	30	31	32
			[3]	[2]	[2]	[4]	[5]	[5]	[5]	[1]	[4]	[1]	[1]	[1]	[4]	[1]	[1]	[1]	[4]	[1]	[3]	[5]	[7]	[1]	[1]	[1]	[5]	[1]	[1]	[2]	[4]	[7]	[3]	[4]	
Titanocidae [1]																																			
<i>Titanocia quadrigitata</i>	3	C																4															24	28	
Miturgidae [1]																																			
<i>Cheiracanthium erraticum</i>	*			2				1										2						1									1	7	
<i>Cheiracanthium oncognathum</i>	R																1																1		
<i>Cheiracanthium virescens</i>	3		3	4	2		6	1	3	5								6		1	2					1			1		2		37		
Anyphaenidae [1]																																			
<i>Anyphaena accentuata</i>	*		3														1																4		
Liocranidae [6]																																			
<i>Agroeca brunnea</i>	*		48	12			2	29	22	20			1	18		8	1	2	4			5	1		2					1	9	29	6	1	221
<i>Agroeca cuprea</i>	3				1													54				1			16								85	157	
<i>Agroeca lusitica</i>	1																					22											22		
<i>Agroeca proxima</i>	*			4			53	23		9			13	15		3	2	16		2	6			1		2			26	3	16		26	220	
<i>Apostenus fuscus</i>	*	C		3														77															800	881	
<i>Scotina celans</i>	*			33														75															94	202	
Clubionidae [14]																																		0	
<i>Clubiona brevipalpis</i>	*																			1													1	2	
<i>Clubiona comita</i>	*		5	1		3		2					2								1					1			1				16		
<i>Clubiona diversa</i>	*			3					7									6			2				1				3	1		4		32	
<i>Clubiona frutetorum</i>	3						3		1																				2				3		
<i>Clubiona lutescens</i>	*					3																								1			4		
<i>Clubiona neglecta</i>	*			6		6		1		3								1		1		1							6	1			26		
<i>Clubiona pallidula</i>	*					1																											1		
<i>Clubiona phragmitis</i>	*					5																											5		
<i>Clubiona pseudoneglecta</i>	R									1																							1		
<i>Clubiona reclusa</i>	*		2	3		2	2		1			2																					12		
<i>Clubiona subdilatans</i>	*		1																														3		
<i>Clubiona subtilis</i>	*							1																									3		
<i>Clubiona terrestris</i>	*		1					1					2				2																6		
<i>Clubiona trivialis</i>	*							3																				1		1			5		
Corinnidae [2]																																			
<i>Phrurolithus festivus</i>	*		10	2		5	21	23	3		2		2	18	3	2	3	4	1	5	2	5		3									164	302	
<i>Phrurolithus minimus</i>	*		1	3	39				3									74							9								209	338	
Zodariidae [1]																																			
<i>Zodariion italicum</i>	1																					9											9		
Gnaphosidae [26]																																			
<i>Callilepis nocturna</i>	*							3															5				1				7			16	
<i>Drassodes cupreus</i>	*		1		83			7	9								109													1			135	347	
<i>Drassodes lapidosus</i>	*		3						1					3	2			55		4	1	3	9						3				15	99	
<i>Drassodes pubescens</i>	*			12	60		39	1	3	6					3	3		114		3		2				3	2			14	1		93	359	
<i>Drassyllus luteitarsus</i>	*						17																				2			1				20	

family [no species] // species	End	Dis	study area [no of sites]																sum																
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
			[3]	[2]	[2]	[4]	[5]	[5]	[5]	[1]	[4]	[1]	[4]	[1]	[1]	[4]	[1]	[4]	[1]	[3]	[5]	[7]	[1]	[1]	[1]	[1]	[5]	[1]	[1]	[2]	[4]	[7]	[3]	[4]	
<i>Drassyllus praeficus</i>	V																387																82	727	
<i>Drassyllus pusillus</i>	*		12	51	84	296	4	21	2	23			1	197	9	1	133	2	6	6						59	14		2	9	127	66	1131		
<i>Drassyllus villicus</i>	1	C															1															1		13	
<i>Haplodrasus dalmanensis</i>	R																																		
<i>Haplodrasus vignifer</i>	*		38	37	83	149	4	22	28	1	20	3	1	2	164	8	4	14	20							3	7	1	10	70	123	812		4	
<i>Haplodrasus silvestris</i>	*															1					2	1												5	
<i>Haplodrasus soereneni</i>	R							4															1												
<i>Haplodrasus umbratilis</i>	*		3		21	2	5						1	163				1		3	2	6										65	272		
<i>Micaria formicaria</i>	nr																																		
<i>Micaria fulgens</i>	V		25				14				1	12	2		108	2	4																	8	176
<i>Micaria guttulata</i>	R	C																															7	7	
<i>Micaria pulcra</i>	V		7			3	31	1			17	10		1	1	1	1													14	10	2	1	99	
<i>Micaria silésiaca</i>	3														1											10				9		20		6	
<i>Trachyzelotes pedestris</i>	3						4	1																		1									
<i>Zelotes aeneus</i>	V			4	3										128	1																	136		
<i>Zelotes apricorum</i>	*										1						1																3		
<i>Zelotes dletus</i>	V		5	25		41	12		29	3	5	1				2	5	28	119							8			1	29	99	8		420	
<i>Zelotes latreillei</i>	*		24	37		68	7		28	12	34				54		2	3	12	5					2			12	14	39	173	526			
<i>Zelotes longipes</i>	V					2					131	3			3			19	21						79	3		1		3	35	297			
<i>Zelotes perrisii</i>	*		24		73	35	2	85	81	2	11	6	22	1	205	5	28	183	62	59	10				44			5	11	48	319	1321			
<i>Zelotes subterraneus</i>	*		42	2		1	4	3		17	11	1	1	6	3	2	1							2	1	1	1	4	4			103	209		
Zoridae [3]																																			
<i>Zora nemoralis</i>	*	C																			2													2	
<i>Zora silvestris</i>	*		1			3	1				1				28		15														1	26	76		
<i>Zora spinimana</i>	*		13	1	2	1	26	15	13	16	70			2	1	14	2	2	5	11	3	3			2			1	47	2	32	286			
Sparassidae [1]																																			
<i>Micrommata vucensens</i>	3																						1						1				2		
Philodromidae [8]																																			
<i>Philodromus aureolus</i>	*		2																															2	
<i>Philodromus cepitum</i>	*			2		1	2				1		1	1	1	1	1	2	272							100				1			383		
<i>Philodromus collinus</i>	*												1	1							1							1				5			
<i>Philodromus dispar</i>	*		1																										1			2			
<i>Philodromus bistrio</i>	*								5									4	15											2		26			
<i>Philodromus margaritatus</i>	R																	1														1			
<i>Thanatus formicinus</i>	1	C																		7												7			
<i>Thanatus striatus</i>	nr																													2		2			
Thomisidae [18]																																			
<i>Coriarachne depressa</i>	R							2																										2	
<i>Diaea dorsata</i>	*		1																													1			
<i>Oxyptila atomaria</i>	*		24		36										140																	28	232		
<i>Oxyptila clavigera</i>	V	C		3											1022																	2	1047		

family [no species] / species	End	Dis	study area [no of sites]																																sum
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
			[3]	[2]	[2]	[4]	[5]	[5]	[5]	[1]	[4]	[1]	[1]	[1]	[4]	[1]	[1]	[4]	[1]	[3]	[5]	[7]	[1]	[1]	[1]	[1]	[1]	[5]	[1]	[1]	[2]	[4]	[7]	[3]	[4]
*		*	2			5	4					2	2										1							1				17	
<i>Oxyptila praticola</i>	V															271						6									1		110	816	
<i>Oxyptila pullata</i>	2	C														3																		17	
<i>Oxyptila scabricola</i>	V																											2						5	
<i>Oxyptila trux</i>																		1									2							20	
<i>Xysticus acerbus</i>	3		1	3		15		1									1																	8	
<i>Xysticus audax</i>	*					3	2										57								4									41	
<i>Xysticus bifasciatus</i>						12																												114	
<i>Xysticus cristatus</i>	*		8	1	18	67	3	36	191		3	10	2	6	1	20	31					41	36	16	1	2	2	2	20	4	43	22	584		
<i>Xysticus eremicus</i>	*				95				1							214				1	22			3							111	46	493		
<i>Xysticus ferrugineus</i>	nr																										27				5		32		
<i>Xysticus kempeleni</i>	*		2																															2	
<i>Xysticus kochi</i>	*		74	40		32		51	17	35	1			103				26		57	89	1	1			2		3	3	109			644		
<i>Xysticus robustus</i>	2	C														36																34	70		
<i>Xysticus ulmi</i>	*										1												1											2	
Salicidae [20]																																			
<i>Aelurillus v.-insignitus</i>	V		12					82	16			14				1						9	2	13					1		21		171		
<i>Ballus chalybeius</i>	*		3										1																					4	
<i>Euophrys frontalis</i>	*		13	5	5	2	5	18	6		5	10	1	1	1	80	4	5	8	2		1		1		1		1	2	6	5	132	319		
<i>Evarcha arcuata</i>	3										1																			2				3	
<i>Evarcha falcata</i>	*		1			1	2		2		1	2	1			5	3	3	1	1						1		1		6		2	33		
<i>Evarcha lactabunda</i>	R			4												7																	13		
<i>Heliophanus auratus</i>	3					1																												1	
<i>Heliophanus cupreus</i>	*		3								1		1			8																	9	22	
<i>Heliophanus flavipes</i>	*					7	1	1	1	1	1	1	1			5	1	3														1	22		
<i>Myrmarche formicaria</i>	3																												1				1		
<i>Neon reticulatus</i>	*		2	1				1			1	1	1			4		1															39		
<i>Pellenes tripunctatus</i>	V							16	25			1				14		13	51	8						7	6	2	10			7	160		
<i>Phlegra fasciata</i>	V		3	9	4	12	2				2	5				13		9	7	4						1		1	6	1	2	81			
<i>Pseudenophrys lanigera</i>	*	C														1																	1		
<i>Salicicus senicus</i>	*	C														2																	1	3	
<i>Sibianor aurocinctus</i> s. str.	*						1	2								1		1															4		
<i>Sitiscus pubescens</i>	*															1	3																4		
<i>Sitiscus saltator</i>	2																				2								2	1	3		8		
<i>Talavera aequipes</i>	V			42	2				4			3	1	148				5	6	9									1	5	1	124	351		
<i>Talavera petrensis</i>	V		1			1	1							4	1			1		1	43						3			5		61			

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