

The arachnid fauna of different stages of succession in the Schütt rockslip area, Dobratsch, southern Austria (Arachnida: Scorpiones, Opiliones, Araneae)

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ABSTRACT

The arachnid fauna of the Schütt area in the southern part of the Dobratsch mountain in Carinthia, near the Italian border, was investigated. The Schütt area was formed from both prehistoric and historic rockslips and the area is covered with limy rocks and tali, characterized by their own plant communities and cover.

Barber traps, sweep netting and capture by hand recovered 95 species of arachnids. The order Scorpiones is represented by a single species, *Euscorpius germanus* and 11 species of Opiliones and 83 species of Araneae were recorded. The range of Opiliones consisted of euryoecious species, i.e. those able to survive temporarily in arid conditions, as well as heliophilous and thermophilic species, e.g. the endemic phalangiid *Leiobunum roseum*. The Araneae showed a remarkable number of thermophilic taxa, particularly stenotopic inhabitants of tali. Gnaphosids and salticids were especially diverse. Nine species of spiders are new to Carinthia and the presence of the rare agelenid *Coelotes anoplus* is of zoogeographical significance. The arachnid fauna of these different structured and vegetation covered tali is compared and discussed.

INTRODUCTION

The southern part of the Dobratsch mountain in Carinthia, near the Italian border, was formed by two great rockslips. There was a prehistoric one at the end of the last glaciation period, in which about 200 million m³ of rock broke off and filled the valley of the river Gail ('Alte Schütt'). In January of 1348 the greatest historical landslip of the eastern Alps formed the so called area 'Junge Schütt', covered with carbonitic boulders and tali. 30 million m³ of rock came down as a consequence of the geological and

meteorological conditions and a large earthquake (Till 1907). These tali, with their different characteristics, plant communities and cover, led the famous botanist Erwin Aichinger (1951) to create his dynamic plant sociology. However curiously zoologists have previously shown little interest in this area, prompting these present arachnological investigations into this remarkable xerothermic locality.

MATERIAL AND METHODS

Tab. 1. Area of investigation and its divisions.

Area of investigation:		Schütt, Dobratsch S, Gailtaler Alps, Carinthia, Austria 46°34-35'N, 13°43-44'E, 540 - 920 m NN					
divisions:							
nr.	characterisation	moved tali					
I	upper western talus: moved, without vegetation						
IV	upper eastern talus: moved, without vegetation						
		tali					
II	upper central talus: with <i>Pinus nigra</i>						
VI	lower talus: with <i>Pinus silvestris</i>						
		<i>Pinus-Picea-Erica</i> forests					
V	upper <i>Pinus silvestris</i> - <i>Picea abies</i> - <i>Erica carnea</i> forest with rock debris						
VII	lower <i>Pinus silvestris</i> - <i>Picea abies</i> - <i>Erica carnea</i> forest with rock debris						
		<i>Fagus</i> forest					
III	<i>Fagus sylvatica</i> with rock debris						

Faunistic investigations were carried out by means of Barber traps (2 traps per division I to VII from the 12th of April to the 20th of November), sweep nets, light traps and capture by hand in the 1995 season. All specimens were collected and preserved in formaldehyde (4 %) and ethanol (70 %) respectively.

LIST OF RECORDED SPECIES

Tab. 2. Results of pitfall traps and capture by hand in the Schütt showing the number of scorpion-specimens in the divisions I to VII.

Species	moved tali		tali		Pinus-f.		Fag.
	I	IV	II	VI	V	VII	III
Chactidae							
<i>Euscorpium germanus</i> (Schaeff.)		4	4	4	6	4	6

Tab. 3. Results of pitfall traps and capture by hand in the Schütt showing the number of **harvestmen**-specimens in the divisions I to VII. Systematics with the exception of *T. closanicus* after Martens (1978).

Species	moved tali		tali		Pinus-f.		Fag.
	I	IV	II	VI	V	VII	III
Nemastomatidae							
<i>Carinostoma carinatum</i> (Roew.)					1		7
<i>Mitostoma chrysomelas</i> (Herm.)						1	
Trogulidae							
<i>Trogulus tricarinatus</i> Linne							2
<i>Trogulus nepaeformis</i> (Scopoli)	1				2		2
<i>Trogulus closanicus</i> Avram					1	1	
Phalangiiidae							
<i>Opilio dinaricus</i> Silhavy							13
<i>Lophopilio palpinalis</i> (Herbst)			2			3	
<i>Lacinius dentiger</i> (C. L. K.)	2		1		4	1	4
<i>Amilenus aurantiacus</i> (Simon)							1
<i>Astrobumus helleri</i> (Ausserer)				1	2		19
<i>Leiobunum roseum</i> C. L. K.	5		1				

Tab. 4. Results of pitfall traps and capture by hand in the Schütt showing the number of **spider**-specimens in the divisions I to VII. Species marked with a star (*) are new to Carinthia. Systematics after Platnick (1993).

Species	moved tali		tali		Pinus-f.		Fag.
	I	IV	II	VI	V	VII	III
Atypidae							
<i>Atypus</i> sp.						1	
Pholcidae							
<i>Pholcus opilionoides</i> (Schrank)		1	6	7			
Segestriidae							
<i>Segestria senoculata</i> (Linne)							1
Dysderidae							
<i>Dasumia canestrinii</i> (L. K.)					1		
<i>Dysdera ninnii</i> Canestrini	1		1				1
<i>Harpactea lepida</i> (C. L. K.)			2	5	2	9	1
Mimetidae							
<i>Ero</i> cf. <i>furcata</i> Villers		1	1	4		1	
Theridiidae							
<i>Crustulina guttata</i> Wider							
* <i>Dipoena tristis</i> (Hahn)	2		1				
<i>Episinus truncatus</i> Latr.		1			1		
* <i>Pholcomma gibbum</i> (Westr.)					1		
<i>Theridion pinastri</i> L. K.		1					

Tab. 4 cont.

Species	moved tali		tali		Pinus-f.		Fag.
	I	IV	II	VI	V	VII	III
Linyphiidae							
<i>Centromereus incilium</i> (L. K.)					1		
<i>Ceratinella brevis</i> (Wider)				1			
<i>Lepthyphantes flavipes</i> (Black.)						1	1
<i>Lepthyphantes mansuetus</i> (Thor.)				1			
<i>Lepthyphantes notabilis</i> Kulcz.		1	2	2			2
<i>Linyphia hortensis</i> (Sund.)					2	2	
<i>Meioneta rurestris</i> (C. L. K.)				1		1	
* <i>Micrargus apterus</i> (O. P.-C.)						2	
<i>Saaristoa firma</i> (O. P.-C.)						1	
Nesticidae							
<i>Nesticus</i> cf. <i>cellulanus</i> (Clerck)						2	
Tetragnathidae							
<i>Tetragnatha</i> cf. <i>pinicola</i> L. K.						1	
Araneidae							
<i>Araneus diadematus</i> Clerck	1						
<i>Araniella alpica</i> (L. K.)							1
<i>Araniella cucurbitina</i> (Clerck)	1						
cf. <i>Atea sturmi</i> (Hahn)					1		
Lycosidae							
<i>Alopecosa accentuata</i> (Latr.)	1		1				
<i>Alopecosa</i> cf. <i>pulverulenta</i> (Clerck)						1	
<i>Aulonia albimana</i> (Walck.)	1						
<i>Pardosa alacris</i> (C. L. K.)			1	5	29	35	17
* <i>Pardosa morosa</i> (L. K.)	1	2		5			
<i>Trochosa terricola</i> Thor.					3	15	
<i>Xerolycosa nemoralis</i> (Westr.)			3	10			
Pisauridae							
<i>Pisaura mirabilis</i> Clerck			1			6	
Agelenidae							
* <i>Coelotes anoplus</i> Kulcz.	1	2	7	9			
<i>Coelotes inermis</i> (L. K.)						1	
<i>Histopona torpida</i> (C. L. K.)					2		1
<i>Tegenaria silvestris</i> L. K.				1	1	1	
* <i>Tegenaria tridentina</i> L. K.	1			2			
<i>Textrix denticulata</i> (Olivier)	1						
Hahniidae							
<i>Hahnia ononidum</i> Simon		1		4	2	4	1
Dictynidae							
<i>Dictyna</i> sp.						3	
Amaurobiidae							
<i>Amaurobius jugorum</i> L. K.					1	1	4
<i>Amaurobius obustus</i> L. K.						1	5
Anyphaenidae							
<i>Anyphaena accentuata</i> (Walck.)			1				
Liocranidae							
<i>Apostenus fuscus</i> Westr.	11	2	2	5			1
<i>Liocranum rupicola</i> (Walck.)	2	2	3	2	3		

Tab. 4 cont.

Species	moved tali		tali		Pinus-f.		Fag.
	I	IV	II	VI	V	VII	III
Liocranidae - cont.							
<i>Liocranum rutilans</i> (Thor.)		2	2	1			
<i>Phrurolithus festivus</i> (C. L. K.)	2					3	
<i>Phrurolithus minimus</i> C. L. K.						1	
Clubionidae							
<i>Clubiona similis</i> L. K.							1
<i>Clubiona trivialis</i> C. L. K.						1	
Gnaphosidae							
<i>Callilepis schuszteri</i> (Herman)				1			
<i>Drassodes lapidosus</i> (Walck.)	1			3			
<i>Drassodes pubescens</i> Thor.	1						
<i>Gnaphosa bicolor</i> (Hahn)					1	1	
<i>Haplodrassus kulczynskii</i> Lohmander		1	2				
<i>Haplodrassus silvestris</i> (Black.)							4
<i>Zelotes aeneus</i> (Simon)	2		1				
<i>Zelotes apricorum</i> (L. K.)					4	3	
<i>Zelotes erebeus</i> (Thor.)	1	1	1	1	3	3	
<i>Zelotes petrensis</i> (C. L. K.)						1	
<i>Zelotes pumilus</i> (C. L. K.)	7						
<i>Zelotes similis</i> (Kulcz.)	4	7	9	6			
<i>Zelotes subterraneus</i> (C. L. K.)	1						
<i>Zelotes villicus</i> (Thor.)	2		1		1		
Zoridae							
<i>Zora spinimana</i> (Sund.)						4	
Heteropodidae							
<i>Micrommata virescens</i> (Clerck)				1		1	
Philodromidae							
<i>Philodromus collinus</i> C. L. K.				1			
<i>Philodromus</i> cf. <i>corticinus</i> Simon	1						
<i>Thanatus sabulosus</i> (Menge)			2				
Thomisidae							
<i>Diaea</i> cf. <i>dorsata</i> (Fabr.)		1				1	
* <i>Xysticus audax</i> (Schrank)			2				
Salticidae							
<i>Euophrys frontalis</i> (Walck.)							
* <i>Euophrys</i> cf. <i>herbigrada</i> (Simon)						1	
<i>Evarcha</i> sp.						1	
<i>Heliophanus</i> sp.		1					
* <i>Marpissa muscosa</i> (Clerck)	1						
<i>Philaeus chrysops</i> (Poda)		2	2	1			
<i>Phlegra fasciata</i> (Hahn)			1				
<i>Sitticus pubescens</i> (Fabr.)			1	2			
<i>Sitticus rupicola</i> (C. L. K.)	1			1			

DISCUSSION

In the area of investigation 95 arachnid species in three orders were recognised:

Scorpiones:	1 species (36 specimens)
Opiliones:	11 species (82 specimens)
Araneae:	83 species (447 specimens)
Arachnida:	95 species (565 specimens)

REMARKABLE SPECIES

Scorpiones

Euscorpius germanus: widespread in the southern parts of Carinthia (Scherabon 1987); characteristic species of the tali.

Opiliones

Carinostoma carinatum: the Schütt *Fagetum* is the highest altitude in the Alps from which this species been recorded.

Trogulus nepaeformis: on the one hand taxonomical problems with the *nepaeformis*-group (some species have been described and redescribed in the last years), on the other hand it is not possible to identify the niche partitioning between *nepaeformis* and *closanicus*.

Trogulus closanicus: a less well known species, first recorded for Austria by Chemini (1984).

Opilio dinaricus: a nocturnal species of phalangiid, which is therefore hard to record during the day; the application of light-traps brought many specimens in the *Fagetum*.

Leiobunum roseum: a stenotopic endemic harvestman from the south-eastern lime-Alps.

Araneae

Atypus sp.: the determination of the juvenile *Atypus* is impossible; Kropf *et al.* (1994) published a record of *A. muralis* next to this locality.

Pholcomma gibbum: in Styria it is known from *Quercus pubescens* and *Pinus*-forests (Horak 1987, 1988, 1989).

Leptyphantès notabilis: the hitherto scarcity of finds of this species results from the very low degree of investigation of the rock debris fauna (Růžička 1989).

Pardosa morosa: this rare lycosid spider could be found only in the two moving tali at the top.

Coelotes anoplus: in the investigation area it inhabited all unwooded tali; this very rare agelenid spider is known from 'Yugoslavia' and Italy, Veneto-Dalmazia (Maurer 1992) as well as from lower Austria (Malicky 1972); second record from Austria.

Tegenaria tridentina: a rare species, appears only in the open tali.

Haplodrassus kulczynskii: in Austria this uncommon gnaphosid is known only from a few xerothermic localities

Thanatus sabulosus: a xerothermophilic spider of the tali.

Marpissa muscosa: this cryptic jumping spider was found on *Pinus* bark.

Phlaeus chrysops: a stenotopic species of sunny limy rocks and tali of xerothermic localities; Kühnelt (1942) published the single record for Carinthia.

Sitticus rupicola: this poorly known jumping spider lives in open tali; Růžicka *et al.* (1994) considered this species to be lithobious, i.e., never occurring outside stony debris.

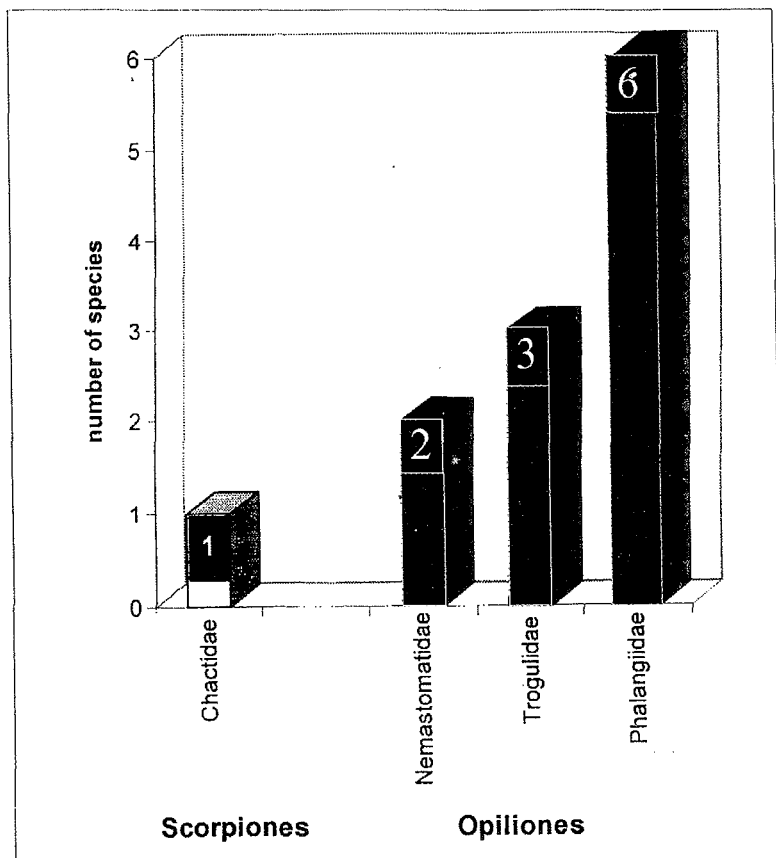


Fig. 1: Species-number of scorpion and harvestman families.

The **scorpions** are represented by the single species *Euscorpitus germanus* (Fig. 1). This common species shows no significant preference to any one stage of succession, living in open tali as well as in deciduous and coniferous

forests. *E. carinthicus*, already known from the Dobratsch mountain (Scherabon 1987), could not be found in the investigated area.

The extreme microclimatic factors explain the presence of just under one fifth of the known Carinthian **harvestmen** in the Schütt area (Fig. 1): some eurytopic and a few stenotopic heliophilous and thermophilic taxa survive exclusively in these arid tali. The occurrence of the phalangiid *Leiobunum roseum*, sitting on sunny vertical limy rocks, is remarkable. This species is restricted to the open tali and the record of one male on the 12th November is the latest known seasonal occurrence. Wooded divisions clearly have a higher number of both species and specimens (nemastomatids and trogulids could only be found here) than open ones. Understandably the humid *Fagetum* division is the one with the highest species and individual richness (Figs. 3, 4).

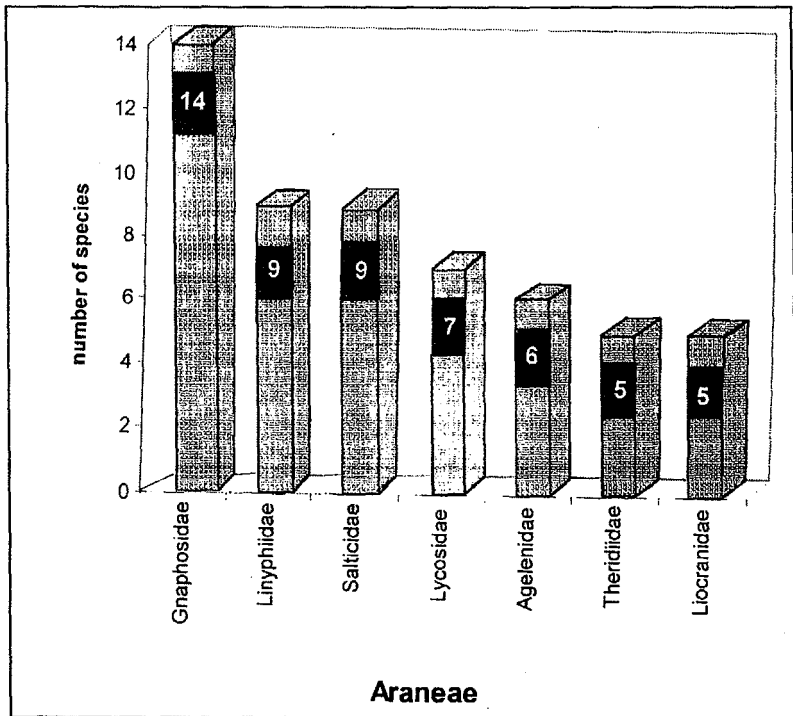


Fig. 2: Species-number of spider families.

Compared to similar investigations (Rabitsch 1995; Steinberger 1988, 1989, 1990), the **spider** fauna is represented by a high number of species (83). Miller and Valesova (1964) recorded 154 spider species in the Bohemian rocky area called 'Kalksteinsteppe des Radotiner Tales', but they investigated five very different biotope types. Noticeably high is the number of gnaphosids (Fig. 2), especially of

the genus *Zelotes*; there is no other Carinthian locality with eight syntopic species of this genus. The family Salticidae is also highly diverse in this area, this fact is due to the intensive capture by hand. Linyphiids seem to be poorly recorded.

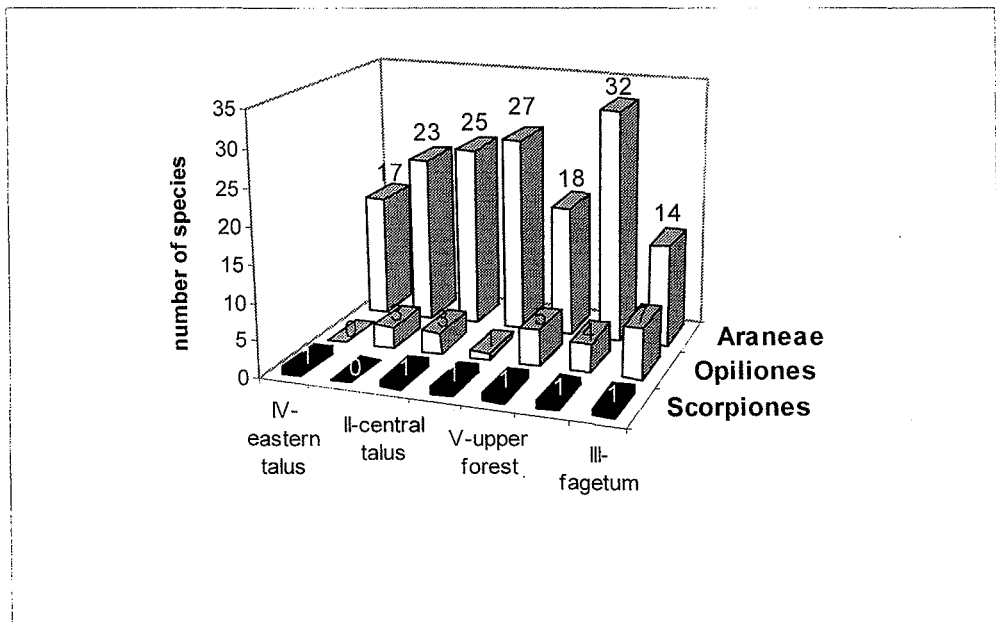


Fig. 3: Species-number of arachnids of the particular divisions.

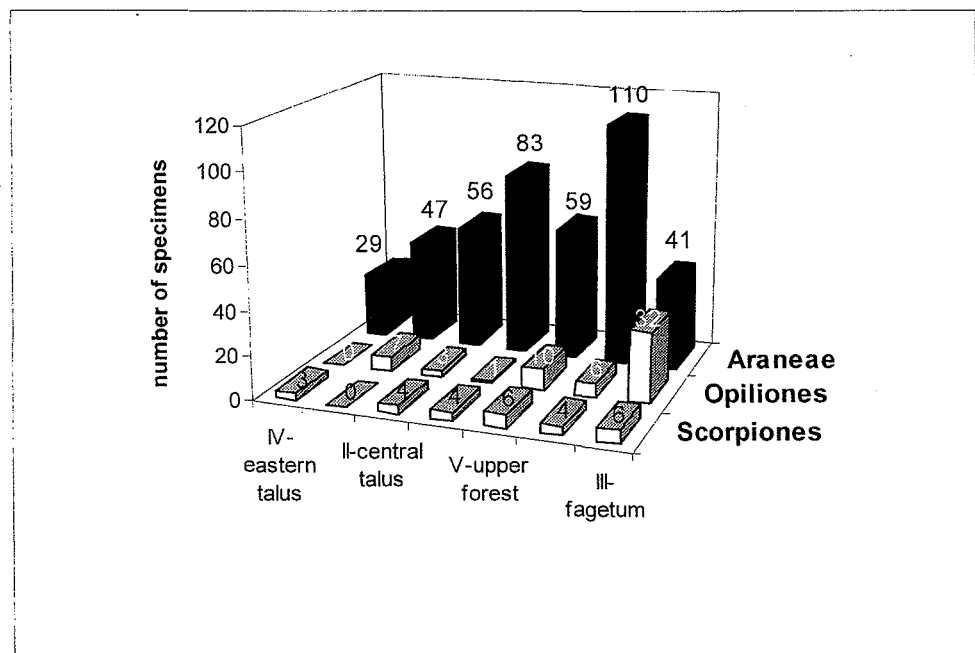


Fig. 4: Specimens-number of arachnids of the particular divisions.

The wooded divisions are dominated by eurytopic spiders, whereas the open tali are inhabited by many stenotopic thermophilic and rare species: for example *Pardosa morosa*, *Tegenaria tridentina*, *Liocranum rutilans*, *Haplodrassus kulczynskii*, *Philaeus chrysops* and *Sitticus rupicola*. In spite of many pitfall trap-investigations in similar localities in Carinthia, nine species could be recorded for the first time in this country.

CONCLUSIONS

The species record of the Schütt (95 scorpions, harvestmen and spiders) is clearly incomplete as there are many more biotope types (poor and arid grasslands, wetlands, karst-springs, rockfaces, caves, etc.) than the tali explored in this investigation. Besides recording faunistic data, the aim of the project was to investigate the micro spatial distribution and the ecological separation of the arachnid-species. Concerning *Euscorpius germanus* no habitat preference is evident, whereas among harvestmen and spiders there are many specialists inhabiting exclusively open tali, wooded tali, *Pinus-Picea* or *Fagus* forests respectively.

Other zoological data from Lepidoptera, Auchenorrhyncha, Coleoptera and Reptilia in the Schütt indicate the specialized nature of this xerothermic rockslip area.

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REFERENCES

- Aichinger E. 1951. Lehrwanderungen in das Bergsturzgebiet der Schütt am Südfuß der Villacher Alpe. *Angew. Pflanzensoziol.*, 4: 67-118.
- Chemini C. 1984. Sulla presenza di *Trogulus closanicus* Avram in Austria, Baviera e Slovenia (Arachnida: Opiliones). *Ber. nat.-med. Ver. Innsbruck*, 71: 57-61.
- Horak P. 1987. Faunistische Untersuchungen an Spinnen (Arachnida, Araneae) pflanzlicher Reliktstandorte der Steiermark, I: Die Kanzel. *Mitt. naturwiss. Ver. Steiermark*, 117: 173-180.
- Horak P. 1988. Faunistische Untersuchungen an Spinnen (Arachnida, Araneae) pflanzlicher Reliktstandorte der Steiermark, II: Weizklamm und Raabklamm. *Mitt. naturwiss. Ver. Steiermark*, 118: 193-201.

- Horak P. 1989. Faunistische Untersuchungen an Spinnen (Arachnida, Araneae) pflanzlicher Reliktstandorte der Steiermark, III: Der Kirchkogel. Mitt. naturwiss. Ver. Steiermark, **119**: 117-127.
- Kropf C., Komposch C. & Raspotnig G. 1994. Erstnachweise von vier Spinnenarten für Österreich (Arachnida, Araneae). Mitt. Abt. Zool. Landesmus. Joanneum, **48**: 69-72.
- Kühnelt W. 1942. Zusammensetzung und Gliederung der Landtierwelt Kärntens. Schriften zu den Hochschulwochen in Klagenfurt, 28 pp., Klagenfurt.
- Malicky H. 1972. Spinnenfunde aus dem Burgenland und aus Niederösterreich (Araneae). Wiss. Arbeiten Bgld., **48**: 101-108.
- Martens J. 1978. Spinnentiere, Arachnida: Weberknechte, Opiliones. In: Senglaub F., Hanneman H. J. & Schumann (eds.), Die Tierwelt Deutschlands, **64**: 464 pp., Jena.
- Maurer R. 1992. Checkliste der europäischen Agelenidae nach der Roewerschen Systematik 954 - unter Berücksichtigung angrenzender östlicher Gebiete. I, II. 28 pp + 99 Tafeln.
- Miller F. & Valesova E. 1964. Zur Spinnenfauna der Kalksteinsteppen des Radotiner Tales in Mittelböhmen. Cas. Cs. Spol. Ent. (Acta Soc. ent. Cechoslov.), **61**: 180-188.
- Platnick N. I. 1993. Advances in Spider Taxonomy 1988-1991. With Synonymies and Transfers 1940-1980. New York Entomological Society, 846 pp.
- Rabitsch W. 1995. Barberfallenfänge in der Marktgemeinde Arnoldstein (Kärnten, Österreich). (Arachnida, Myriapoda, Insecta). Carinthia II, **185./105.**: 645-661.
- Růžička V. 1989. On the lithobionts *Lepthyphantes notabilis*, *Rugathodes bellicosus* and on *Rugathodes instabilis* (Araneae: Linyphiidae, Theridiidae). Acta Ent. Bohemoslov., **86**: 432-441.
- Růžička V. & Zacharda M. 1994: Arthropods of Stony Debris in the Krkonose Mountains, Czech Republic. Arctic and Alpine Research, **26**: 332-338.
- Scherabon B. 1987. Die Skorpione Österreichs in vergleichender Sicht, unter besonderer Berücksichtigung Kärntens. Carinthia II, Sonderheft Nr. 45, pp. 77-154.
- Steinberger K.-H. 1988. Epigäische Spinnen an 'xerothermen' Standorten in Kärnten (Arachnida: Aranei). Carinthia II, **178./98.**: 503-514.
- Steinberger K.-H. 1989. Ein Beitrag zur epigäischen Spinnenfauna Kärntens (Arachnida: Aranei). Carinthia II, **179./99.**: 603-609.
- Steinberger K.-H. 1990. Beitrag zur epigäischen Spinnenfauna Kärntens (Arachnida: Aranei): Barberfallenfänge an weiteren Xerotherm- und Waldstandorten. Carinthia II, **180./100.**: 665-674.
- Till A. 1907. Das große Naturereignis von 1348 und die Bergstürze des Dobratsch. Mitt. geogr. Ges. Wien, **50**: 534-645.