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Altitudinal and biotopic distribution of the spider family Gnaphosidae in North Ossetia (Caucasus Major)

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Abstract
An analysis of the spider fauna, its distribution and zoogeography of the family Gnaphosidae of North Ossetia is provided. More than 2100 specimens were collected in 1985 by pitfall trapping. A total of 40 species is reported from the area studied, which includes 29 biotopes in 4 mountain ranges. A biotopical arrangement of the species found is given and dominant species are indicated. Most of the species have Euro-Siberian and Euro-Kazakhstanian ranges. Several new species (as yet undescribed) were found.

Key words: Araneae, Gnaphosidae, Caucasus Major, altitudinal distribution, biotopic distribution

INTRODUCTION

Up-to-date detailed quantitative studies of Caucasian spiders have not yet been conducted properly. The aim of this project is to study herpetobiont spiders of model plots on the northern macroslope of the Caucasus Major including several parallel ridges with decreasing altitude and increasing xerophytization (Fig. 1). All these plots are situated in the North Ossetian State Reserve and its surroundings.

Three main stages of the project are planned:
(1) a study of the spider fauna at the family level (already made),
(2) analysis of the fauna, distribution, and zoogeography of separate spider families,
(3) a definitive analysis of spider species distribution.

METHODS

All the material was collected by pitfall traps during April–November 1985 in several parallel ridges of the Caucasus Major: Bokovoy, Tsei, Skalistiy, Pastbishchniy, and Kabardino-Sunzhenskiy Mt. Ridges (Fig. 1). Traps were placed in lines of 10 jars with formaldehyde in the following biotopes: 2 in Bokovoy Mt. Ridge (V series), 9 (8 for gnaphosids) in Tsei Mt. Ridge (Ts series), 6 in Skalistiy and Pastbishchniy mt. ridges (G series), 6 in Unal Kettle (nr. Skalistiy Mt. Ridge, K series), and 6 in Kabardino-Sunzhenskiy Mt. Ridge (S series). As a result, 29 biotopes including 5 steppe, 11 forest, 11 meadow, and 2 bushy ones were examined (Table 1). All biotopes are situated in low, middle, and high montane areas.

RESULTS

A total of ca. 18000 spider specimens of 26 families was collected. More than 2100 specimens of Gnaphosidae were captured (ca. 12.1% of the total) making it the second most abundant family after the Lycosidae.

Gnaphosids are most abundant in mountain steppes and in middle & high montane xerophytous communities (up to 38%), as well

Fig. 1. (A-C) Map of collecting sites in North Ossetia, Caucasus Major, Russia, 1985. **(B)** Rectangle in A enlarged. **(C)** rectangle in B enlarged. Sample series are indicated. Abbreviations: BK — Bokovoi Mt. Ridge, CM — Caucasus Major, LS — Lesistiy ("Woody") Mt. Ridge, PB — Pastbishchniy ("Pasturable") Mt. Ridge, SK — Skalistiy ("Rocky") Mt. Ridge, SN — Kabardino-Sunzhenskiy Mt. Ridge.

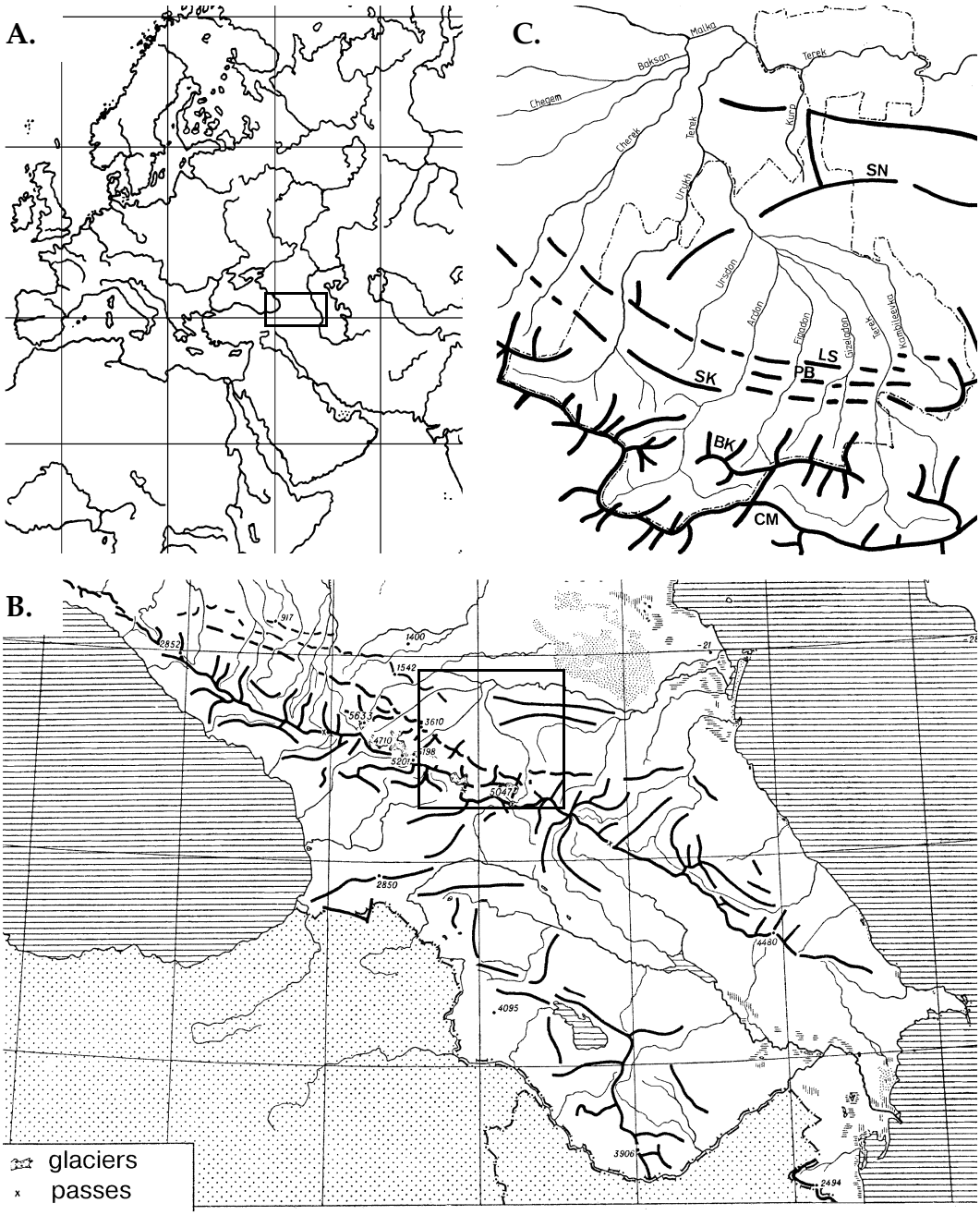

Table 1. List of biotopes studied (North Ossetia, Caucasus, Russia, 1985)

Basic regions Subregions	Biotope	Pitfall trap series	Altitude m a.s.l.
LOW MONTANE (Kabardino-Sunzhenskiy Mt. Ridge)			
	Steppe:	S6	450
		S5	500
		S3	880
	Forest:		
	Quercus (young)	S4	500
	Quercus	S1	600
	Fagus	S2	570
MIDDLE MONTANE (Unal Kettle, Pastbishchniy, Tsei, Bokovoy Mt. Ridges)			
	Xerophytous open communities: Mountain steppes	K3	1170
		K2	1200
	Other xerophytous open communities	K6	1000
		K4	1100
		K1	1200
	Forest:		
	Quercus	G1	900
	Quercus (young)	K5	1050
	Quercus (sparse)	Ts9	1400
	Broadleaved	V1	1500
	Mesophytous meadow	Ts10	1350
		V2	1500
HIGH MONTANE (Skalistiy, Tsei Mt. Ridges)			
Forest belt			
	Forest:		
	Pinus	Ts8	2000
	Pinus (young)	Ts7	2300
	Pinus	Ts6	2300
	Betula	G6	2000
	Mesophytous meadow	Ts5	2550
Subalpine/Alpine belt			
	Mesophytous subalpine meadow	G5	2300
		G2	2550
		Ts4	2750
	Small bushes	G4	2500
		Ts2	3000
	Xerophytous community	G3	2500
	Alpine meadow	Ts3	3000

as on alpine meadow. To a lesser extent they are also represented in low montane steppes, on meadows of the forest belt, and in subalpics. Gnaphosids are not abundant in forests (0–9 %, or 14–25 % in young forests). They are not found in low montane *Fagus* forest (where Linyphiidae and Dysderidae are dominant), or in high montane *Betula* forest (where Agelenidae is dominant). Generally, the Gnaphosidae and Lycosidae prefer open communities.

A total of 40 gnaphosid species belonging to 12 genera were found (Table 2). Of them, 13 species are connected with the low montane belt, 31 with middle-height mountains, and 20 with high mountains. Seven species were found in all belts, and 11 species in two belts.

Twenty-seven (67.5%) species were found in steppic and xerophytous biotopes, and 15 (37.5%) species were found only in them. In the alpine/subalpine zone, a mixture of species with wide ranges and endemics is found.

The altitudinal and biotopical distribution of Gnaphosidae is poorly studied in the Caucasus Major northern macroslope. Only Ovtsharenko (1979) provides data on 13 species. But he studied the wider area (from North Ossetia to Black Sea coast) and did not collect in the steppes or in *Quercus* and *Pinus* forests. Of his list, only *Zelotes hermani* (Chyzer, 1897) and *Drassyllus vinealis* (Kulczynski, 1897) were not found by us. Both species were reported from *Fagus* forests poorly represented in North Ossetia.

Distributional data were compiled from different sources united in a handwritten card catalogue partly published by Mikhailov (1997). From the viewpoint of zoogeography (Table 3), most of the gnaphosids (35%) are represented by Euro-Siberian (in a wide sense) and Euro-Kazakhstanian species. Twenty-five percent of species belong to Holarctic and trans-Palaearctic patterns. There was also a large proportion of European species (12.5%). The exact percentage of endemics is not clear, but it could be as high as 12.5%.

REMARKS ON ECOLOGY

As usual, males predominate in most of the samples. Only in low montane habitats (both in forests and in steppe) is the prevalence of females in summer time (June–August) recorded. The activity peaks of males are mainly in spring and autumn. Such a phenomenon can

Table 2. List of Gnaphosidae of North Ossetia (Caucasus Major) caught in pitfall traps. Abbreviations:
Main belts: L low montane, M middle montane, H high montane;
Biotopes: (forests) Br broadleaved forest, P *Pinus* forest, P_j young *Pinus* forest, Q *Quercus* forest, Q_j young *Quercus* forest, Q_{sp} sparse *Quercus* forest; (open communities) alp alpine/subalpine belt, md meadows in forest belt, st steppes and xerophytous communities;
Range: (geographically) Alt Altaian (Altai Mts.), Baik Baikalian (Baikal Lake), Cauc Caucasia, EEu East European, Eu European, Hol Holarctic, Kaz Kazakhstanian, Kopetd Kopetdaghian (Kopetdagh Mts.), MAs Middle Asian, Med Mediterranean, Mong Mongolian, NCauc North Caucasian, Sib Siberian, trPal trans-Palearctic; (zonally) bor boreal, des deserticolous, nem nemoral, polyz polyzonal, st steppic; endem endemic.

	Main belt	Altitude m a.s.l.	Biotope		Range
			Forest	Open	
1. *Berlandina cinerea* (Menge, 1868)	M	1170-1350		st	Eu-Kaz nem
2. *Callilepis nocturna* (Linnaeus, 1758)	H	2300	P_j		trPal polyz
3. *Drassodes lapidosus* (Walckenaer, 1802)	L, M, H	500-1200	P	st,md	trPal polyz
4. *Drassodes pubescens* (Thorell, 1856)	L, M, H	500-3000	Br, P	st, md, alp	Eu-Sib bor-nem
5. *Haplodrassus kulczynskii* Lohmander, 1942	L, M	450-1400	Q	st, md	Eu nem-st
6. *Haplodrassus signifer* (C.L. Koch, 1839)	M, H	1100-3000	P	st, md, alp	Hol polyz
7. *Haplodrassus cf. silvestris* (Blackwall, 1833)	L, M, H	500-2750	Q, Br	st, alp	endem?
8. *Haplodrassus umbratilis* (L.Koch, 1866)	M, H	1050-2750	Q_j	md, alp	Eu-Kaz nem-st
9. *Nomisia aussereri* (L. Koch, 1872)	M	1000-1200		st	Med-Mas st-des
10. *Poecilochroa conspicua* (L. Koch, 1866)	L, M	880-1050	Q_j	st	trPal nem
11. *Poecilochroa variana* (C.L. Koch, 1839)	M	1050-1350	Q_j	md	Eu-Mong nem
12. *Scotophaeus* sp. 1	M	1500		md	endem?
13. *Drasyllus praeficus* (L. Koch, 1866)	M	1170-1500		st, md	Eu-Kaz nem
14. *Drasyllus pumilus* (C.L. Koch, 1839)	L, M	450-1200		st	Eu nem
15. *Drasyllus pusillus* (C.L. Koch, 1833)	L, M, H	880-3000	Br, P	st, md, alp	trPal nem
16. *Zelotes aeneus* (Simon, 1878)	M	1000		st	Eu nem
17. *Zelotes atrocaeruleus* (Simon, 1878)	L	450-880		st	Eu-Kaz st
18. *Zelotes declinans* (Kulczynski, 1897)	M	1000		st	Eu-Kaz st
19. *Zelotes electus* (C.L. Koch, 1839)	H	2500		alp	Eu-Kaz nem
20. *Zelotes* cf. *erebeus* (Thorell, 1871)	L, M, H	600-2300	Q, P	st	endem?
21. *Zelotes gracilis* (Canestrini, 1868)	L	450		st	Eu st
22. *Zelotes longipes* (L. Koch, 1866)	L, M	450-1500	Br	st	Eu-Alt nem-st
23. *Zelotes petrensis* (C.L. Koch, 1839)	L, M, H	500-2750	Q_j, P	st, md, alp	Eu-Kaz nem
24. *Zelotes subterraneus* (C.L. Koch, 1833)	M, H	1050-2300	Q_j, Q_{sp}, Br, P	st	trPal polyz
25. *Zelotes* sp. 1	L, H	450-2500		st, alp	endem?
26. *Parasyrisca alexeevi* Ovtsharenko et al., 1995	M	ca. 1000-1200		st?	endem
27. *Gnaphosa caucasica* Ovtsharenko et al., 1992	H	2300-3000	P	alp	NCauc[1]
28. *Gnaphosa leporina* (L. Koch, 1866)	M, H	1500-2750		md, alp	Eu-Baik nem
29. *Gnaphosa lucifuga* (Walckenaer, 1802)	M	1000-1170		st	Eu-Kaz-MAs nem-st
30. *Gnaphosa lugubris* (C.L. Koch, 1839)	M, H	1200-2750		st, alp	Eu nem-st
31. *Gnaphosa mongolica* Simon, 1895	M	1000-1170		st	trPal st
32. *Gnaphosa montana* (L. Koch, 1866)	H	2300	P		Eu-Baik bor-nem
33. *Gnaphosa steppica* Ovtsharenko et al., 1992	M	1000-1200		st	EEu-Kaz st
34. *Gnaphosa taurica* Thorell, 1875	M	1350		md	EEu-MAs st
35. *Micaria dives* (Lucas, 1846)	M	1200		st	trPal nem-st
36. *Micaria formicaria* (Sundevall, 1831)	M, H	1100-2300	P_j	at, md	trPal nem-st
37. *Micaria fulgens* (Walckenaer, 1802)	L, M, H	500-2000	Q_j, Q_{sp}, P	st, md	Eu-Baik nem
38. *Micaria kopetdaghensis* Michailov. 1986	H	2000-2750	P	md, alp	Cauc-Kopetd
39. *Micaria pulicaria* (Sundevall, 1831)	H	2300		alp	Hol bor-nem
40. *Micaria silesiaca* L. Koch, 1875	M	1350		md	Eu-Baik bor

Table 3. Zoogeography of Gnaphosidae of North Ossetia (Caucasus Major).

	Range pattern	No. of species	%	∑%
Widely distributed	Holarctic	2	5	25
	Trans-Palearctic	8	20	
Moderately-widely distributed	Euro-Siberian[1]	7	17.5	37.5
	Euro-Kazakhstanian	7	17.5	
	Euro-(Mediterranean)-Middle Asian	1	2.5	
Moderately distributed	European species	5	12.5	17.5
	East European[2]	2	5	
Locallydistributed	Caucaso-Kopetdaghian	1	2.5	17.5
	Caucasian	1	2.5	
	Endemics	1+4?	12.5	
TOTAL		40	100	100

[1]In a wide sense, including Euro-Baikalian, Euro-Mongolian and Euro-Altaian ranges.
[2]East European-Kazakhstanian etc.

be explained by the fact that a combination of dry and hot climatic conditions in summer is not very favourable for active males.

REMARKS ON TAXONOMY

1. *Zelotes aeneus* (Simon, 1878) may constitute a separate subspecies in the Caucasus differing by small details of embolus structure. Females are not distinguishable. A West European/ Caucasian disjunction can be proposed for this species (the closest records are in Byelorussia; a record in Crimea is rather doubtful).

2. *Zelotes* sp.1: males are closer to *Z. atrocaeruleus* (Simon, 1878), whereas females — to *Z. apricorum* (L. Koch, 1876). This species found both in low and high montane habitats can be widely distributed in the Caucasus Major.

3. *Scotophaeus* sp. A single male found is close to *S. quadripunctatus* (Linneaeus, 1758) and *S. scutulatus* (L. Koch, 1866) differing by the details of male palp structure.

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