

A long-time research on alpine water mites

(Acari - Actinedida - Hydrachnellae)

C. Bader

The water mites of a rivulet in the Swiss National Park (alt. 2300 m) have been examined on three occasions.

	1956		1979		1981
	582 mites		794 mites		405 mites
	8 species		12 species		11 species
Sperchon mutilus	86 ex. = 14,8%		110 ex. = 13,9%		26 ex. = 6,4%
Lebertia zschokkei	155 ex. = 26,6%		30 ex. = 3,8 %		4 ex. = 1,0 %
Lebertia tuberosa	269 ex. = 46,2 %		548 ex. = 69,0 %		247 ex. = 61,0 %

The difference in the percentage of the three dominant species are significant statistically.

1970/71 two alpine springs at 2000 m were checked regularly every month during one year for the presence of water mites. Thus it was possible to clarify some problems e.g. the duration of life span, the percentage of males and females (Bader, 1974, 1980).

Some years later, one of these springs was the object of another investigation concerning the composition of water mite-populations: The spring of the "Ova dals Buogls" is situated in a alpine pine forest (*Pinus mugo*) at 2000 m. Temperature (4,4⁰ C) and water level are constant during the whole year.

Since 1977, every October, a big quantity of water moss (12 liters) has been taken from the rivulet about 3 meters below the spring. The moss contains some detritus and has to be washed out with a Thienemann's net, then the remaining material spread out in a water dish. An innumerable quantity of animals (Turbellaria, Crustacea, larvae of Insecta etc.) still remain in the washed-out material. Most of the very small water mite-nymphs remain in the mud. It is not possible to find all of them, and to evaluate this material, but all the water mite "imagines", adults can be discovered. Here are the results of one sample from the period of 1977 - 1989:

Table 1

For the determination of the species it is important to know the stage of development (nymphs and adults) and the sex of the adults. Ny2: Deutonymphs, N3: Tritonymphs (only for Sp. violaceus). The number of the species is variable, but a stock of 10 species has been found in all the 13 years, the remaining 23 species are the so called "visitors".

Table 2

This table is a summary of all samples: 41'041 specimen have been examined! 8 species, present in large quantities, are very interesting for an evaluation.

The classification (in 4 classes) of dominance after Schatz (1979) can be used:

eudominant	>	10 %
dominant	5 - 10 %	
recedent	1 - 5 %	
subrecedent	<	1 %

Table 3

The distribution of the 8 important rheophilous species has changed during the 13 years:

<u>Sperchon violaceus</u>	eudominant
<u>Lebertia zschokkei</u>	eudominant
<u>Sperchon thienemanni</u>	eudominant - dominant
<u>Feltria setigera</u>	eudominant - recedent
<u>Lebertia tuberosa</u>	dominant - recedent
<u>Lebertia robusta</u>	dominant - recedent
<u>Atractides glandulosus</u>	dominant - subrecedent
<u>Sperchon mutilus</u>	recedent - subrecedent

There are only 2 species which are constantly dominant during 13 years:

1. Sperchon (Scuto) violaceus Walter, 1914.
This species has been found not only in the Alps (700 - 2500 m), but also in the Pyrenees and in Czechoslovakia. The vividly red mite lives exclusively in the moss of the springs and rivulets. It is an excellent indicator of unpolluted water. Sp. violaceus is closely related with Sp. denticulatus Koenike, 1895, which is a wide spread species in the plains and mountains (up to 1000 m) all over Europe (Bader, 1974)

2. Lebertia (Pseudo) zschokkei (Koenike, 1902)
Like Sp. violaceus this is a typically alpine form, found in the Alps (600 - 2460 m), in Germany (850 m), Czechoslovakia, Yugoslavia and Spain (900 m).
3. Sperchon (s.str.) thienemanni Koenike, 1907
This species has also been described formerly as Sperchon (s.str.) glandulosus (Koenike, 1886), but the author could separate these two species (Bader, 1974): Sp. thienemanni is a typically alpine form (up to 2460 m), whereas the other species has been reported only from the European plains and mountains up to 1000 m.
4. Feltia (s.str.) setigera Koenike, 1986 has several synonyma. It is not possible to identify all the indicated locations, but the species is certainly an alpine form.
5. Lebertia (Pseudo) tuberosa Thor, 1914 has been found in the Alps (900 - 2500 m), in Central Europe (Germany and Czechoslovakia), in the Pyrenees, in Hungary, Yugoslavia, Romania and Russia (Kaukasus). It is a rheophilous form.
6. Lebertia (Hexa) robusta Walter, 1922. The locations of this alpine rheophilous species are limited. It has only been found in the Alps (Switzerland, Italy, up to 2000 m).
7. Atractides glandulosus (Walter, 1918) has been reported at first from the Swiss plains (400 m) and later discovered in Austria (800 m), Germany, France (Midi) and Spain.
8. Sperchon (s.str.) mutilus Koenike, 1895 lives in the middle regions of the alpine rivers and can migrate upwards the springs. Locations reported also from Germany, Czechoslovakia, Hungary, Yugoslavia and Romania.
9. Paniscus michaeli Koenike, 1986 and
10. Hygrobates (Rivobates) norvegicus (Thor, 1897).
These two species have been found in minimal quantities during all the 13 years. They usually are inhabitants of springs with low temperatures, some specimen of these species have drifted downwards.

With one exception the rest of the 33 species are "visitors". They accidentally immigrated the locality of the Ova dals

Buogls from other biotops.

32. Aturus (s.str.) scaber Kramer, 1875 is a rheophilous species, wide spread in cold rivulets all over Europe, it has never been found in the Swiss Alps. The author found one unique male of this species. The nearest locality where the species has been found is situated in the Dolomit-Mountains (Italy, 1700 m) in a distance of about 100 km from the Oval dals Buogls.

The diagrams: At the moment it is not possible to recognize significant regularities or trends in the 8 diagrams. A cycle of 10 - 12 years could be supposed (sun spot cycle?). This research will be continued in the next years!

Adress: Dr. Carl Bader
Museum of Natural History
Department of Acarology
Augustinergasse 2
CH-4002 Basel/Switzerland

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Ova dals Buogls 1977 - 1989 (Total: incl. Nymphs)

	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Total
Sperchon violaceus	882	738	968	1'007	1'027	968	1'206	1'210	1'438	1'672	1'999	703	1'102	14'920
Feltria setigera	1003	871	858	637	538	220	416	398	129	616	455	597	483	7'221
Lebertia zschokkei	565	418	320	358	598	428	490	553	609	463	578	761	717	6'858
Sperchon thienemanni	305	330	416	477	697	736	429	545	452	250	247	202	299	5'385
Lebertia robusta	235	94	188	88	124	126	217	140	157	186	142	199	249	2'145
Lebertia tuberosa	233	233	132	108	109	138	97	125	95	62	78	251	302	1'963
Atractides glandulosus	67	13	17	65	50	147	121	73	50	14	66	98	140	921
Sperchon mutilus	38	8	45	36	40	64	17	29	68	25	37	65	81	553
Atractides adnatus	3	5	12	36	20	7	7	16	3	35	14	4	75	237
Atractides loricatus			6	26	10	8	26	3	11		6	20	58	174
Atractides vaginalis	3	11	3	24	6	5	4	2		34	2	2	55	151
Feltria rubra	24	3	38	17	6	5	3	8	3	6			7	120
Rivobates norvegicus	4	1	5	2	6	15	8	7	2	2	2	13	22	89
Paniscus michaeli	1	1	3	3	2	4	3	2	3	3	4	24	16	69
Atractides walteri				1	25					2	7		5	40
Sperchon squamosus	3		4	4	1	11	1	4		1		1	9	39
Lebertia rufipes		3	9	1	3	2	2	2			2		3	27
Lebertia gracilipes			11			10			1		4			26
Hydrovolzia placophora	1	2	3	1	4	5	3	1					1	21
Partunisia steinmanni	3	1	4		1	2		3				1	1	16
Lebertia stigmatifera					1		3	1			1		6	12
Atractides mitisi	1					2			1	4	3	1		12
Feltria raetica	2	6										3		11
Feltria handschini			3						3	1	1	1		9
Sperchon brevisrostris			3		1								2	6
Atractides gibberipalpis													4	4
Atractides panniculatus		2					2							4
Sperchonopsis verrucosa		2						1						3
Thyas rivalis								1						1
Lebertia sefvei			1											1
Feltria inconstans										1				1
Aturus scaber										1				1
Lebertia cuneifera													1	1
Total 33 species	3'373	2'742	3'049	2'891	3'269	2'903	3'056	3'123	3'025	3'378	3'648	2'946	3'638	41'041

Tabel 2

Dominance (in %) of the eight important species

	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Sperchon violaceus	26,5	23,0	24,4	31,8	32,1	26,8	38,5	37,5	43,7	50,3	45,8	21,7	30,0
Sperchon thienemanni	10,1	11,8	16,1	17,0	22,0	28,2	15,0	18,4	16,5	8,0	7,9	6,4	7,9
Sperchon mutilus	1,2	0,3	1,7	1,4	1,1	2,6	0,6	0,9	2,3	0,7	1,7	2,2	2,3
Lebertia tuberosa	7,5	9,7	4,6	2,9	2,8	4,3	3,1	3,6	3,0	1,8	2,2	7,8	7,8
Lebertia zschokkei	12,2	13,2	10,6	12,8	15,0	14,6	14,6	17,8	21,3	13,0	18,0	26,1	20,2
Lebertia robusta	6,5	3,4	5,7	2,9	3,8	4,9	6,9	4,0	5,4	6,0	4,0	5,7	6,4
Atractides glandulosus	2,2	0,6	0,7	2,5	1,7	6,2	4,3	2,5	1,8	0,4	2,2	3,7	4,0
Feltria setigera	32,5	36,7	32,9	24,3	18,6	9,4	14,8	13,5	4,7	19,5	15,1	22,6	13,9

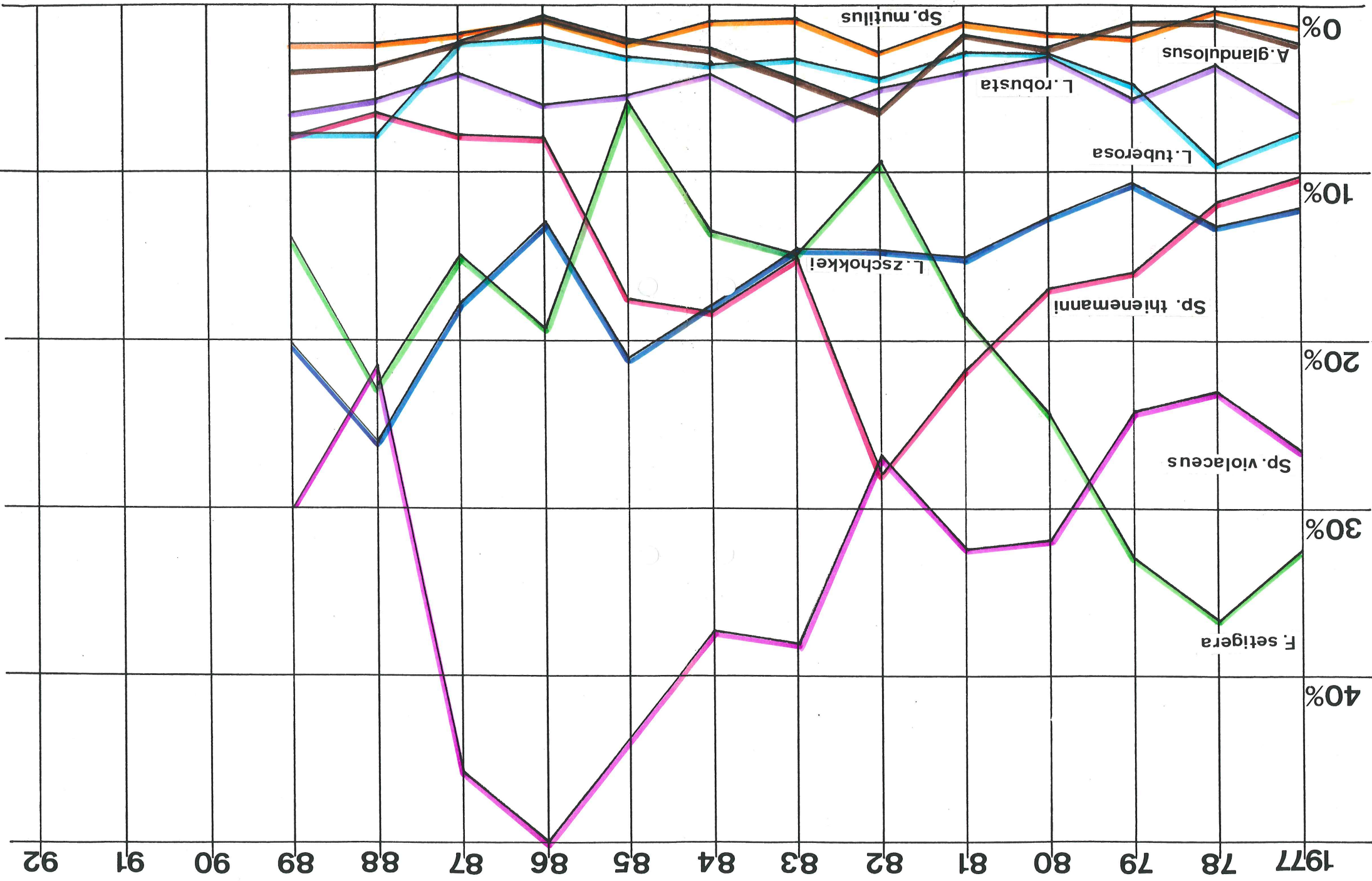
Tabel 3

Ova dals Buogls 07.10.1989

	♂	%	♀	Im	%	Ny ²	Ny ³	Ny	%	Total	%
Hydrovolzia placophora			1	1						1	
Paniscus michaeli	2		10	12		4		4		16	
Partnunia steinmanni			1	1						1	
Sperchon violaceus	318	30,5	723	1041	30,0	10	51	61	5,5	1102	30,3
thienemanni	155	56,6	119	274	7,9	25		25	8,4	299	8,2
mutilus	39	52,0	36	75	2,3	6		6	7,4	81	2,2
brevirostris						2		2		2	
squamosus	4		5	9						9	0,2
Lebertia tuberosa	132	48,3	141	273	7,8	29		29	9,6	302	8,3
zschokkei	427	61,0	273	700	20,2	17		17	2,3	717	19,7
robusta	44	19,7	179	223	6,4	26		26	11,6	249	6,8
cuneifera	1			1						1	
stigmatifera	6			6						6	
rufipes						3		3		3	
Hygrobates norvegicus	8		14	22	0,6					22	0,6
Atractides glandulosus	55	39,3	85	140	4,0					140	3,8
vaginalis	17		38	55	1,6					55	1,5
walteri	1		4	5							5
adnatus	14		61	75	2,2					75	2,0
gibberipalpis			4	4						4	
loricatus	15		43	58	1,6					58	1,6
Feltria setigera	36	7,5	446	482	13,9	1		1		483	13,2
rubra	3		4	7						7	
Total (23 species)				3464				174		3638	

Tabel 1

7abel 4



Ova dals Buogls
Dr. C. Bader 1989

