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Ryszard HAITLINGER

Arthopods *(Acari, Anoplura, Siphonaptera, Coleoptera)* of small mammals of the Babia Góra Mts.

Stawonogi *(Acari, Anoplura, Siphonaptera, Coleoptera)* drobnych ssaków Babiej Góry

Abstract. 6769 arthropods were obtained from 15 species of small mammals (6024 *Acari*, 479 *Anoplura*, 255 *Siphonaptera* and 11 *Coleoptera*). *Sessiluncus cavensis* and *Hyperlaelaps amphibia* are new to the fauna of Poland. The richest arthropod fauna was found on the small mammals from upper subalpine forest. The highest infestation of arthropods was noticed on *Pitymys tatricus* — the average intensity of infestation 41.1.

I. INTRODUCTION

The arthropod fauna occurring on mammals living in Polish mountains is not satisfactorily examined and the data refer to few areas. The *Siphonaptera* are known best; they were studied in Karkonosze, Beskid Żywiecki, Góry Sowie, Pieniny, Gorce, Beskid Wyspowy, Pasmo Radziejowej, Wzgórza Niemczańskie (HAITLINGER 1970 a, b, 1973, 1974 b, 1975, 1978 a, 1981 a, 1984 a) and also in Tatra and Łysogóry (BARTKOWSKA 1973, 1981). The data on *Anoplura* are far more and limited only to Pieniny, Góry Sowie, Wzgórza Niemczańskie (HAITLINGER 1974 a, 1976 a, 1981 a, 1984 a, c), Bieszczady (SZCZĘŚNIAK 1963) and Tatra (CAIS 1977). The most scant knowledge refers to the fauna of mites. The data on mites occurring on mammals in montane areas of Poland covers only Góry Sowie, Wzgórza Niemczańskie and Pieniny (HAITLINGER 1976 b, 1981 a, 1983 d) that means refer only to the low mountains void of upper subalpine forst, dwarf mountains pine forest and alpine layer as well. The only paper on the mite fauna of mammals of the dwarf mountain pine zone in Tatra Mts is fragmentary (HAITLINGER 1980 b). Of course, there can be found the Czech and Slovak works on *Acari* of some border mountain ranges mainly the Tatra and Karkonosze (MRCIAK, 1958, MRCIAK, DANIEL, ROSICKY 1966, KOČIANOVA 1980) but they are limited only to the southern slopes of these mountains with a little different climate conditions. The detailed studies on *Anoplura*

and *Siphonaptera*, in particular, were provided in Tatra, Wielka Fatra and Orawa (ROSICKY 1955, SMETANA 1962, DUDICH 1982, 1983).

Babia Góra, the highest range of Beskid Żywiecki is distinctly separated from the other part of Beskidy Mts, and thanks to the considerable elevation the vegatal layers are well shaped, contrary to the other parts of Beskid Żywiecki. The situation of Babia Góra in the western part of Carpathian Mts influences its fauna. In alpine layer and the dawrf mountain pine forest it resembles the fauna of the respective layers in Tatra Mts, and in the subalpine forest it reflects the composition of elements in the Carpathian forest from before several hundreds years (PAWŁOWSKI 1963). The individual character of Babia Góra, presence of the upper subalpine forest of almost primeval character, and the well developed layers above the forest range together with the practical lack of data on arthropods connected with mammals of this massif were the reason to take up these studies. The only, contributory information about the arthropods occurring on mammals of Babia Góra was given in the works of HAITLINGER (1982, 1983 b).

II. MATERIALS AND METHODS

In 1980—1983 in the lower and upper subalpine forest dwarf mountain pine zone and the alpine layer, the 357 mammals of 15 species were caught (Table I) from which, 6024 *Acari* of 69 species were collected (Table IV, V, VI), 479 *Anoplura* of 4 species (Table II), 255 *Siphonaptera* of 12 species (Table III) and 11 *Coleoptera* of 1 species (Table VI). The catchings were carried on in spring (V, VI), summer (VII, VIII) and autumn (IX, X) in all layers of the massif except the alpine one and the areas under cultivation. This has limited the group of hosts excluding particularly *Microtus arvalis* (PALL.), *Mus musculus* L. and *Apodemus agrarius* (PALL.) (only 4 specimens). In the layer of the lower subalpine forest ranging on Babia Góra from the foot up to 1150 m a.s.l, the catchings were carried on within the belt from 600 to 800 m a.s.l, only exceptionally at 900 m a.s.l. In the upper subalpine forest (1150—1390 m a.s.l) the mammals were caught at 1050—1390 m a.s.l, mostly a little below 1250 m a.s.l. and in the dwarf mountain pine zone, first of all among herbs, grasses, willow current and rowan bushes, mostly at 1400—1500 m a.s.l. and occasionally up to 1650 m a.s.l. The studied arthropods are, in a great deal, connected with hosts which composition in separate layers is distinctly different. The considerable elevation of Babia Góra is a reason of the serious qualitative and quantitative reduction of mammals mainly above the forest limit. It can already be observed in upper parts of upper subalpine forest. The fauna of mammals of Babia Góra resembles the fauna of the remaining ranges of Beskid Żywiecki and other parts of Karpaty. The characteristic is the presence of *Pitymys tatricus*, very common here from upper parts of the lower subalpine forest up to the top parts

Table I

Numbers of arthropods collected on small mammals of Babia Góra and numbers of small mammals collected in three zones of Babia Góra

Species	Lower subalpine forest (lsf)	Upper subalpine forest (usf)	Dwarf mountain pine zone (dmp)	Total of mammals	Number of arthropods
1. *Clethrionomys glareolus* (SCHREBER, 1780)	38	87	11	136	3241
2. *Pitymys tatricus* KRATOCHVIL, 1952		25	8	33	1357
3. *Pitymys subterraneus* (DE SELYS LONGCHAMPS, 1835)	15	13		28	213
4. *Microtus agrestis* (LINNÉ, 1761)	9	10	6	25	669
5. *Arvicola terrestris* (LINNÉ, 1758)	1			1	70
6. *Apodemus tauricus* (PALLAS, 1811)	7	13		20	327
7. *Apodemus sylvaticus* (LINNÉ, 1758)	4			4	71
8. *Apodemus agrarius* (PALLAS, 1771)	4			4	7
9. *Muscardinus avellanarius* LINNÉ, 1758		2		2	2
10. *Sorex araneus* LINNÉ, 1758	27	42	3	72	717
11. *Sorex alpinus* SCHINZ, 1837	1	3		4	26
12. *Sorex minutus* LINNÉ, 1766	1	19	4	24	46
13. *Neomys fodiens* (PENNANT, 1771)	2			2	14
14. *Crocidura suaveolens* (PALLAS, 1814)	1			1	5
15. *Talpa europaea* LINNÉ, 1758	1			1	4
Total	111	214	32	357	6769

(HAITLINGER 1981 c) and occurring in Poland only in Tatra Mts. and on the top of Pilsko, and the absence of *Neomys anomalus* known from whole Carpathian Massif and even in Beskid Żywiecki occurring relatively numerously.

III. REVIEW OF FAUNA

Anoplura

Hoplopleuridae FERRIS, 1951

Hoplopleura acanthopus (BURMEISTER, 1839). Localities in mountains: Pieniny, Góry Sowie, Wzgórza Niemczańskie, Gorce (HAITLINGER 1974 a, 1976 a, 1981 a); 1984 a, c; Tatra (CAIS 1977). A most common species of louse occurring on small mammals in Poland.

Host: *Arvicolidae*; widespread in Poland on rodents of the genus *Microtus*, *Pitymys* and *Arvicola*; also occasional on other small mammals. In Poland known from 16 species (WEGNER 1966). *H. acanthopus* occurs commonly throughout the entire range of Babia Góra. It was most numerous on *Microtus agrestis* (85% of the collection; the mean intensity of infestation 2.6).

Hoplopleura edentula FAHRENHOLZ, 1916. Localities in mountains: Pieniny, Góry Sowie, Wzgórza Niemczańskie, Gorce, Beskid Wyspowy, Kotlina Sądecka (HAITLINGER 1974 a, 1976 a, 1984 a, b, c); Tatra (BEAUCOURNU 1966, CAIS 1977), Łysogóry, Bieszczady (CAIS 1977). A common species in Poland.

Hosts: *Clethrionomys glareolus*, accidental other rodents and insectivorus. In the Babia Góra common species, occurs mainly on *C. glareolus*; single specimens were collected on occasional hosts. The mean intensity of infestation

Table II

Anoplura collected on small mammals of Babia Góra

	zone	1	2	3	4	6	7	8	10	13	Total in zones	Total
Hoplopleura acanthopus	lsf		2	1	25				1		27	79
	usf		2	6	30						38	
	dmp		3		11						14	
H. edentula	lsf	30					1			1	32	346
	usf	212							2		214	
	dmp	96	4								100	
Polyplax serrata	lsf	1				2	7	1			11	16
	usf					5					5	
P. hannswrangeli	lsf	2									2	38
	usf	25		1							26	
	dmp	10									10	
Number of lice		376	9	8	66	7	8	1	3	1	479	479
Number of mammals		136	33	28	25	20	4	4	72	2		

of *C. glareolus* — 2.5; specimens infected in the upper subalpine forest 2.4, dwarf mountain pine zone — 8,7; in lower subalpine forest zone only — 0.8.

Polyplax hannswrangeli EICHLER, 1952. Localities in mountains: Wysicza (West Sudety) (EICHLER 1960), Góry Sowie (HAITLINGER 1976 a), Tatra (CAIS 1977); known from Czech Karkonosze (ČERNY 1959).

Also in belorussian part of Białowieża Forest near border of Polish territory (BEAUCOURNU, ARZAMASOV 1967), known from one locality in lowland: Krośnice n. Milicz (EICHLER 1960).

Hosts: *C. glareolus*, occasionally *Pitymus subterraneus*.

In the Babia Góra common species but in lower subalpine forest zone rare; collected two specimens only. It was most numerous in upper subalpine forest and dwarf mountain pine zones. The mean intensity of infestation (all zones) was low — 0.3.

Polyplax serrata (BURMEISTER, 1839). Localities in mountains: Śnieżnik Kłodzki (EICHLER 1960), Pieniny, Góry Sowie, Wzgórza Niemczańskie, Dolina Popradu, Gorce (HAITLINGER 1974 a, 1976 a, 1984 b, c). Known from Slovak Tatra (SMETANA 1962) and Czech Karkonosze (ČERNY 1959). Common species probably occurs throughout the country in accordance with the distribution of mice of the genus *Apodemus*.

Hosts: mainly *Apodemus tauricus* *A. sylvaticus* and *A. agrarius*; accidentally other rodents and insectivorous (WEGNER 1966, HAITLINGER 1976).

On Babia Góra this species is not very numerous in both subalpine forest zone more often collected in lower subalpine forest zone mainly from *A. sylvaticus* and *A. tauricus*.

Siphonaptera

Hystrichopsyllidae TIRABOSCHI, 1904

Ctenophthalmus agyrtes (HELLER, 1896). Localities in mountains: Karkonosze (SKURATOWICZ 1954, HAITLINGER 1970 b) Śnieżnik Kłodzki (MASCHKE 1935, PAX 1937), Góry Kaczawskie (NAWROCKA 1967), West Beskid, East Beskid, Bieszczady (SKURATOWICZ 1954, 1964), Tatra (SKURATOWICZ 1964; BARTKOWSKA 1973), Góry Izerskie, Ślęża, Beskid Żywiecki, Pieniny, Góry Sowie, Gorce, Beskid Wyspowy, Pasmo Radziejowej, Kotlina Sądecka, Dolina Popradu, Beskid Niski, Wzgórza Niemczańskie (HAITLINGER 1970 b, 1971, 1973, 1974 b, 1978 a, 1981 a), Łysogóry (BARTKOWSKA 1981).

A very common species in entire lowland Poland (SKURATOWICZ 1964).

Hosts: *Arvicolidae*, *Muridae*, rarely *Soricidae*.

On Babia Góra occurs in all zones; but is most numerous in lower subalpine forest zone. Most specimens obtained from *C. glareolus* and *Pitymys tatricus*. The highest mean intensity of infestation was found in *P. tatricus* and *C. glareolus* — 0.2. *C. agyrtes* in lower subalpine forest zone is three times as numerous than upper subalpine forest zone (0.2 and 0.06 on *C. glareolus*).

On Babia Góra there occur specimens with supremary features of *C. a. agyrtes* but with additional features of *C. a. peusianus* ROSICKÝ, 1955.

Ctenophthalmus bisoctodentatus KOLENATI, 1863. Localities in mountains: Pogórze Przemysko-Dynowskie (SKURATOWICZ 1964), Góry Kaczawskie (NAWROCKA 1967), Beskid Żywiecki, Pieniny, Gorce, Beskid Wyspowy (HAITLINGER 1971, 1974 b, 1978 a), Tatra, Łysogóry (BARTKOWSKA 1973, 1981).

In Poland common species occurs throughout country in accordance with the distribution of *T. europaea*. In mountains occurs to dwarf mountain pine zone (BARTKOWSKA 1973, 1981).

Hosts: mainly *Talpa europaea*, occasionally small rodents and insectivorous.

It is rare on Babia Góra, only two specimens collected in upper subalpine forest zone from accidental host *S. araneus*.

Rhadinopsylla integella JORDAN, ROTHSCHILD, 1921. Localities in mountains: Western Sudety, Pogórze Przemysko-Dynowskie (SKURATOWICZ 1954, 1964), Karkonosze, Ślęża, Beskid Żywiecki, Góry Sowie, Pieniny, Gorce, Beskid Wyspowy, Pasmo Radziejowej, Kotlina Sądecka, Dolina Popradu, Wzgórza Niemczańskie (HAITLINGER 1970 b, 1971, 1973, 1974 b, 1978 a, 1981 a), Tatra (SKURATOWICZ, 1967, HAITLINGER 1970 a, BARTKOWSKA 1973). Known from many localities in the whole of the country (SKURATOWICZ 1967).

Hosts: *Arvicolidae*, *Muridae*, accidentally *Soricidae*.

On Babia Góra it belongs to rare species; not numerously collected in both subalpine forest zones, mainly from *P. tatricus* and *C. glareolus*. Most frequently found above 1000 m a.s.l.

Atyphloceras nuperus (JORDAN, 1931). Localities in Poland: Śnieżnik Kłodzki (MASCHKE 1935, PAX 1937), Międzygórze (SKURATEWICZ 1966), Karkonosze, Góry Izerskie, Beskid Żywiecki, Góry Sowie, Gorce, Beskid Wyspowy (HAITLINGER 1970 b, 1971, 1973, 1978 a), Tatra (BARTKOWSKA 1973). Known from mountains only.

Hosts: *Arvicolidae*.

On Babia Góra above 1200 m a.s.l. 6 specimens collected from *P. tatricus* and *C. glareolus*.

Palaeopsylla soricis rosickyi SMIT, 1960. Localities in mountains (*P. s. rosickyi*; *P. s. starki*): West Sudety (SKURATOWICZ 1954, SMIT 1960), Śnieżnik Kłodzki (PAX 1937, SMIT 1960), Góry Kaczawskie (NAWROCKA 1967), Stary Sącz, Pogórze Przemysko-Dynowskie, Tatra (SKURATOWICZ 1964), Karkonosze, Góry Izerskie, Ślęża, Góry Sowie, Beskid Żywiecki, Pieniny, Gorce, Beskid Wyspowy, Pasmo Radziejowej, Kotlina Sądecka, Dolina Popradu, Beskid Niski, Wzgórza Niemczańskie (HAITLINGER 1970 b, 1971, 1973, 1974 b, 1978 a, 1981 a, 1984 a, c), Tatra, Łysogóry (BARTKOWSKA 1973, 1981). The very common species in Poland.

Hosts: *Soricidae*; occasionally other insectivorous and small rodents .

In Poland there are known two subspecies: *P. s. rosickyi* and *P. s. starki* WEGNER, 1930. On Babia Góra there occurs *P. s rosicyi*; it is most numerous in *Siphonaptera* collection. *P. s. rosickyi* occurs in all zones. The highest mean in-

Table III

Siphonaptera collected on small mammals of Babia Góra

	zone	1	2	3	4	6	7	8	9	10	11	12	13	Number in zones	Total
Ctenophthalmus agyrtes	lsf	9		2		1		1						13	
	usf	5	7	2	1	2								17	32
	dmp		1							1				2	
C. bisoctodentatus	usf									2			[3]	2	2
Megabothris turbidus	lsf	7		1	1	3	1	1						14	23
	usf	4		1	2	2								9	
Peromyscopsylla bidentata	lsf				1									1	
	usf	17	1		1					2				21	24
	dmp	1	1											2	
P. fallax	lsf	4												4	9
	usf	3	1							1				5	9
Leptopsylla segnis	usf		1			1								2	2
Amalareus penicilliger	lsf	3			1									4	
	usf	25	5	1	1					1				33	46
	dmp		7		2									9	
A. arvicolae	lsf			7										7	
	usf			1										1	8
Rhadinopsylla integella	lsf			1		1								2	12
	usf	4	6											10	12
Atyphloceras nuperum	usf	4	2											6	6
Monopsyllus sciurorum	usf								1					1	1
Palaeopsylla soricis	lsf						1			20			1	22	
	usf	3	2							43				48	71
	dmp									1				1	
Doratopsylla dasycnema	lsf									6	1			7	
	usf	1								7	3	1		12	19
Number of fleas		90	34	16	10	10	2	2	1	84	4	1	1	255	255
Number of mammals		136	33	28	25	20	4	4	2	72	4	24	2		

tensity of infestation was found in *S. araneus* from upper subalpine forest zone — 1.0. Besides *S. araneus* it was collected occasionally from four species.

Doratopsylla dasycnema dasycnema (Rothschild, 1987). Localities in mountains (*D. d. dasycnema* and *D. d. cuspis* Rothschild, 1915): Stary Sącz, Pogórze Przemysko-Dynowskie, Bieszczady (Skuratowicz 1964), Góry Kaczawskie (Nawrocka 1967), Karkonosze, Góry Izerskie, Ślęża, Góry Sowie, Beskid Żywiecki, Pieniny, Gorce, Beskid Wyspowy, Pasmo Radziejowej, Kotlina Sądecka, Dolina Popradu, Beskid Niski, Wzgórza Niemczańskie, Pogórze Przemysko-Dynowskie (Haitlinger 1970 b, 1971, 1973, 1974 b, 1978 a, 1984 a, b), Tatra (Skuratowicz 1967, Haitlinger 1970 a, Bartkowska 1973) Łysogóry (Bartkowska 1981). Known from many other localities in Poland (Skuratowicz 1964).

Hosts: *Soricidae*; rarely small rodents and *Talpa europaea*.

In Poland there occur two subspecies: *D. d. dasycnema* and *D. d. cuspis*. On Babia Góra there occurs *D. d dasycnema*; this subspecies was collected from *S. araneus* in both subalpine forest zones; also collected from *Sorex alpinus* and *C. glareolus*. On Babia Góra it is not very numerous; the mean intensity of infestation of *S. araneus* in upper subalpine forest zone — 0.2.

Ceratophyllidae Dampf, 1908

Megabothris turbidus (Rothschild, 1909). Localities in mountains: West Sudety, East Sudety, West Beskid Beskid Niski, Pogórze Przemysko-Dynowskie, Bieszczady (Skuratowicz 1954, 1964). Śnieżnik Kłodzki (Maschke 1935, Pax 1937), Góry Kaczawskie (Nawrocka 1967), West Beskid, (Niewiadomska 1953), Karkonosze, Góry Izerskie, Ślęża, middle Sudetes, Beskid Żywiecki, Pieniny, Góry Sowie, Gorce, Beskid Wyspowy, Pasmo Radziejowej, Kotlina Sądecka, Dolina Popradu, Beskid Niski, Pogórze Przemysko-Dynowskie, Bieszczady, Wzgórza Niemczańskie (Haitlinger 1970 b, 1971, 1974 b, 1978 a, 1981 a), Tatra, Łysogóry (Bartkowska 1973, 1981). Known from many localities in lowland of Poland (Skuratowicz 1964).

Hosts: *Rodentia* and *Insectivora*.

On Babia Góra collected in both subalpine forest zones, it was very numerous on *C. glareolus*. The mean intensity of infestation to *Arvicolidae* and *Muridae* conjoint in lower subalpine forest zone, was distinctly higher than in upper subalpine forest zone (0.17 to 0.06).

Amalareus arvicolae (Ioff, 1948). Localities in mountains: Tatra, Bieszczady (Skuratowicz 1964, 1966, Bartkowska 1973), Karkonosze, Góry Sowie, Beskid Żywiecki, Pieniny, Gorce, Beskid Wyspowy, Pasmo Radziejowej (Haitlinger 1970 b, 1971, 1973, 1973 b, 1978 a). In Poland known from mountains only.

Hosts: *Pitymys subterraneus*, *P. tatricus*; rarely other *Arvicolidae*; occasionally *Sicista betulina*, *S. araneus*.

On Babia Góra rare species, in upper subalpine forest zone there was col-

lected one specimen only in lower subalpine forest zone 7 specimens: all from *P. subterraneus*. This fact points the close connection of *A. arvicolae* with this host. According to BARTKOWSKA (1973) in dwarf mountain pine and alpine zones the mainly host is *P. tatricus*, but the present material does not confirm that. *A. arvicolae* was not found at an from the plentiful catching of *P. tatricus*. The fundamental role of *P. subterraneus* as a host is pointed also by date from Beskid Żywiecki (HAITLINGER 1971).

Amalareus penicilliger (GRUBE, 1852). Localities in mountains: Śnieżnik Kłodzki (PAX 1937), East Sudety (SKURATOWICZ 1957), Karkonosze, Ślęża, Beskid Żywiecki, Góry Sowie, Pieniny, Gorce, Beskid Wyspowy, Pasmo Radziejowej, Dolina Popradu (HAITLINGER 1970 b, 1973, 1974 b, 1978 a), Tatra (SKURATOWICZ 1966, BARTKOWSKA 1973), Łysogóry (SKURATOWICZ 1966, BARTKOWSKA 1981). Also known from few localities in lowlands (SKURATOWICZ 1967).

Hosts: mainly *Arvicolidae*, rarely *Muridae*, *Soricidae*.

On Babia Góra common species in all zones; in lower subalpine forest zone distinctly more rare than in other zones. *A. penicilliger* was collected from 5 mammals species most often on *P. tatricus* and *C. glareolus* (mean intensity of infestation 0.4 and 0.2 respectively).

Leptopsyllidae BAKER, 1905

Peromyscopsylla bidentata (KOLENATI, 1863). Localities in mountains: Śnieżnik Kłodzki (PAX 1937), Pogórze Przemysko-Dynowskie, Tatra (SKURATOWICZ 1964), Karkonosze, Góry Izerskie, Góry Sowie, Beskid Żywiecki, Pieniny, Gorce, Beskid Wyspowy, Pasmo Radziejowej, Dolina Popradu (HAITLINGER 1970 b, 1971, 1973, 1974 b, 1978 a), Tatra, Łysogóry (BARTKOWSKA 1973, 1981). Also known from few localities in northern Poland (SKURATOWICZ 1964).

Hosts: *Arvicolidae*; rarely other rodents and *Soricidae*; occasionally *Mustelidae*.

On Babia Góra it occurs in all zones. Number of *P. bidentata* in upper subalpine forest zone (above 1000 m a.s.l.) was 4 and 8 times greater than in other zones (data from *Arvicolidae*). It resembles the relations observed in other Polish mountains. For example mean intensity of infestation on *Arvicolidae* from Beskid Wyspowy was six times greater on level about 1000 m a.s.l. than below 600 m a.s.l. (HAITLINGER 1978 a).

Peromyscopsylla fallax (ROTHSCHILD, 1909). Localities in mountains: Beskid Żywiecki (HAITLINGER 1970 a, b, 1971), Beskid Śląski (BARTKOWSKA 1977).

Hosts: *Arvicolidae* (mainly *C. glareolus*); rarely *Muridae* and *Soricidae*.

An uncommon species in Poland. On Babia Góra it occurs in both subalpine forest zones, mainly on *C. glareolus*.

Leptopsylla segnis (SCHÖNHERR, 1811). Localities in mountains: Śnieżnik Kłodzki (MASCHKE 1935, PAX 1937), Pogórze Przemysko-Dynowskie (SKURATOWICZ 1964), Karkonosze, Góry Sowie, Beskid Żywiecki, Pieniny, Gorce,

Beskid Wyspowy, Kotina Sądecka, Beskid Niski (HAITLINGER 1970 b, 1971, 1973, 1974 b, 1978 a), Łysogóry (BARTKOWSKA 1981). A very common species known from many localities in lowlands (SKURATOWICZ 1964).

Hosts: *Mus musculus* and other *Muridae*; rarely *Arvicolidae*; occasionally *Aves*, *Artiodactyla*, *Soricidae*.

It is collected mainly in buildings or in the neighbourhood; common species in lower parts of Polish mountains. Under favourable conditions it occurs in great numbers, above 1000 m a.s.l., on Mt Pilsko (HAITLINGER 1971).

On Babia Góra very rare; two specimens collected above 1100 m a.s.l. near shelter house in Markowe Szczawiny. It was collected for the first time on *P. tatricus*. At this altitude the only refuge for *L. segnis* are buildings of shelter houses.

Coleoptera

Leptinidae LECONTE, 1836

Leptinus testaceus MÜLLER, 1817. Localities in mountains: Góry Orlickie, East Sudety, Babia Góra, Pogórze Przemysko-Dynowskie (BURAKOWSKI, MROCZKOWSKI, STEFAŃSKA 1978).

Hosts: small rodents and insectivorous. Free living species, collected on small mammals.

This common beetle hitherto not reported from mammals in Poland; in Rumania collected from *A. tauricus* (HAITLINGER 1980 a).

On Babia Góra collected in both subalpine forest zones from 5 species of small mammals; most numerously gathered from *A. sylvaticus* and *A. tauricus*.

Acari
Mesostigmata

Laelapidae BERLESE, 1892

Laelaps clethrionomydis LANGE, 1955. Localities in mountains: Góry Sowie, Tatra, Pieniny (HAITLINGER 1976 b, 1980 b, 1983 d). Also known from Karkonosze (Samotnia) — own information.

In lowlands very rare, known from Braniewo (voi. Elbląg) (BITKOWSKA, ŻUKOWSKI 1975) also Lipy (voi. Gorzów) and Wólka Kolczyńska (voi. Lublin) — own information.

Hosts: *C. glareolus*; occasionally other small mammals.

On Babia Góra common species, collected only on main host *C. glareolus*. Exceptionally one specimen gathered from *P. tatricus*. *L. clethrionomydis* most

numerous on bank voles from upper subalpine forest zone. The mean intensity of infestation of bank voles from this zone 0.9, from dwarf mountain pine zone — 0.6 and from lower subalpine forest zone — 0.5. In the Carpathian Mts lower subalpine forest zone the number of this species is smaller than in the Sudetes; in Pieniny Mts — 0.8, in Sowie Mts — 1.1 (HAITLINGER 1976 b, 1983 d).

Laelaps agilis KOCH, 1836. Localities in mountains: Śnieżnik Kłodzki (WILLMANN 1944, 1952), Góry Sowie, Pieniny, Beskid Wyspowy, Dolina Popradu, Gorce (HAITLINGER 1976 b, 1983 d, 1984 b, c). The author collected this species also in Karkonosze (Łabski Szczyt), Beskid Żywiecki (Wielka Racza, Osusz, Soblówka), Pasmo Radziejowej (Obidza), Beskid Sądecki (Muszyna) and Bieszczady (Rabe).

L. agilis is known from many localities in lowlands in Poland (HAITLINGER 1983 d), occurs throughout the country in accordance with the distribution of *A. tauricus* and *A. sylvaticus*.

Hosts: *A. tauricus*, *A. sylvaticus*; occasionally other small mammals.

L. agilis occurs commonly throught the entire range of Babia Góra in accordance with the distribution of *A. tauricus*. The mean intensity of infestation for *A. tauricus* 8.7 is slightly greater than settled in Góry Sowie (7.4) and lower than Pieniny Mts (12.3) (HAITLINGER 1976 b, 1983 d).

Laelaps hilaris KOCH, 1836. Localities in mountains: Śnieżnik Kłodzki (WILLMANN 1944), Góry Sowie, Góry Złote, Wzgórza Niemczańskie, Tatra, Pieniny, Beskid Wyspowy (HAITLINGER 1976 b, 1980 b, 1981 a, 1983 a, 1984 a, b, c). Collected also from Karkonosze (Łabski Szczyt), Góry Orlickie (Taszów), Beskid Żywiecki (Pilsko, Soblówka), Bieszczady (Przełęcz Wetlińska) — own information. Known from many localities in lowlands in Poland (HAITLINGER 1983 d).

Hosts: *Microtus arvalis*, *M. agrestis*, *M. oeconomus*, rarely *Pitymys tatricus*, occasionally other small mammals.

On Babia Góra collected on mammals from all investigated zones mainly on *M. agrestis*, rarely on *P. tatricus*. Accidentally were collected from *C. glareolus* and *P. subterraneus*.

Laelaps muris (LJUNGH, 1799). Localities in mountains: Śnieżnik Kłodzki (PAX, MASCHKE 1939, WILLMANN 1944), Pieniny (HAITLINGER 1983 d). Known also from northern Poland (HAITLINGER 1983 d).

Hosts: *Arvicola terrestris*.

Monoxenic species, surely occurs in throught of Poland in accordance with the distribution of *A. terrestris*; on highlands rare.

On Babia Góra from one *A. terrestris* gathered 20 specimens *L. muris*.

Hyperlaelaps microti (EWING, 1933), Localities in mountains: Śnieżnik Kłodzki (WILLMANN 1944), Góry Sowie, Tatra, Wzgórza Niemczańskie, Pieniny, Pasmo Radziejowej, Gorce, Beskid Wyspowy (HAITLINGER 1976 b, 1980 b, 1981 a, 1983 d, 1984 a, b, c). The author collected this species also from Karkonosze (Karpacz), Beskid Żywiecki (Wielka Racza), Beskid Niski (Bodaki) and Bieszczady (Przełęcz Wetlińska). Also known from many localities in the lowlands (HAITLINGER 1983 d).

Table IV

Mesostigmata collected on small mammals of Babia Góra

	zone	1	2	3	4	5	6	7	10	11	12	13	14	15	Number in zones	Total
Laelaps clethrionomydis	lsf	18													18	
	usf	82	1												83	108
	dmp	7													7	
L. hilaris	lsf				11										11	
	usf	4	11	3	66						1				85	121
	dmp		9		16										25	
L. agilis	lsf						65	29							94	210
	usf						116								116	
L. muris	lsf					20									20	20
Hyperlaelaps microti	lsf	1			10										11	
	usf		141	7	1				1						150	206
	dmp	2	24		19										45	
H. amphibia	lsf					6									6	6
Myonyssus ingricus	lsf	2													2	
	usf								2						2	4
Androlaelaps fahrenholzi	usf			1			1								2	2
Hypoaspis aculeifer	dmp								1						1	1
Haemogamasus nidi	lsf	10		1	1		3	1				1	1		18	
	usf	12	16	8	13				3						52	73
	dmp	2	1												3	
H. horridus	lsf			1	1		2	6					1		17	
	usf	4	6	1					1			5			17	36
	dmp	1	1												2	

H. hirsutus	lsf	3					1	1	6			2	1		14	
	usf	7	19	3	1				8						38	90
	dmp	12	26												38	
H. bregetovae	lsf	1													1	1
Eulaelaps	lsf	5		1	3		1								10	
stabularis	usf	2	9	2	4		2		1		1				21	33
	dmp	2													2	
Echinonyssus	lsf	4		1	1										6	
isabellinus	usf	11	6		2										19	32
	dmp	2	3		2										7	
E. tatricus	usf	1	3	1											5	
	dmp		2												2	7
E. sunci	lsf							2							2	
	usf		1				1								2	4
	lsf								5	1		1			7	
E. soricis	usf								2						2	11
	dmp								1		1				2	
E. carnifex	lsf													1	1	1
Cyrtolaelaps	lsf	2							3			1			6	
mucronatus	usf	6	2	1					1						10	19
	dmp	1	2												3	
C. minor	usf	1	1												2	2
Euryparasitus	lsf	3		1			1		3			1			9	13
emarginatus	usf	1	2								1				4	
Macrocheles glaber	lsf	1											1		2	2
M. montanus	lsf	1													1	1
Macrocheles sp.	dmp	1							1						2	2
Proctolaelaps	lsf	2			1										3	
pygmaeus	usf	1	2				2		2						7	13
	dmp	1	2												3	
Vulgarogamasus	lsf				3			4	3			2	1		13	44
remberti	usf	12	4	2					8		2				28	
	dmp	1	1		1										3	

table IV continued

	zone	1	2	3	4	5	6	7	10	11	12	13	14	15	Number in zones	Total
	lsf	5							1						6	
	usf	5	1						1						7	14
V. kraepelini	dmp	1													1	
Porrhostaspis lunulata	lsf	2							1						3	3
Poecilochirus carabi	dmp										1				1	1
Pergamasus brevicornis	lsf				1		1								2	2
P. mediocris	usf	1	2												3	3
Pergamasus sp.	usf	1	1	1			1								4	4
Amblygamasus septentrionalis	lsf								1						1	1
Holoparasitus sp.	lsf	1													1	2
	usf	1													1	
	lsf	3													3	
Parasitidae	usf	12	4	1	4										21	29
	dmp	2	2						1						5	
Veigaia kochi	usf		1						1						2	2
Sessiluncus cavensis	usf			1											1	1
Number of mites		268	307	37	161	26	197	43	58	1	7	9	4	1	1124	
Number of mammals		136	33	28	25	1	20	4	72	4	2	2	1	1		

Hosts: *Microtus arvalis*, *M. agrestis*, *P. tatricus*; accidental other small mammals.

On Babia Góra it is common species, mainly occurs on *P. tatricus*. It was collected from all zones, most numerous on upper subalpine forest zone. The mean intensity of infestation was high — 5.0.

Hyperlaelaps amphibia ZACHVATKIN, 1948. Locality in mountains: Zawoja-Składy (Babia Góra).

H. amphibia was not reported from Poland. The author collected this species also in northern part of country: Dźwirzyno (voi. Koszalin), Miłuki n. Pasym (voi. Olsztyn), Murowany Most (voi. Suwałki), all specimens from *A. terrestris*.

Host: *Arvicola terrestris*.

Monoxenic species; on Babia Góra (Zawoja-Składy) from one *A. terrestris* were collected 6 specimens *H. amphibia*.

Myonyssus ingricus BREGETOVA, 1956. Localities in mountains: Góry Sowie, Karkonosze, Pieniny (HAITLINGER 1976 b, 1982, 1984 c). In Poland this species known also from Kotlina Nowotarska (HAITLINGER 1982) and Białowieża (KOZŁOWSKI, ŻUKOWSKI 1958).

Hosts: *Arvicolidae*, *Muridae*, *Soricidae*.

Rare species, on Babia Góra collected only 4 specimens from *C. glareolus* and *S. araneus* from both subalpine forest zones.

Androlaelaps fahrenholzi (BERLESE, 1911). Localities in mountains: Góry Sowie, Wzgórza Niemczańskie, Pieniny, Gorce (HAITLINGER 1976 b, 1981 a, 1983 d, 1984 a, c). The author collected *A. fahrenholzi* also from Bieszczady (Przełęcz Wetlińska). This species is known from numerous localities in lowlands (HAITLINGER 1983 d).

Hosts: *Rodentia*, *Insectivora*. *A. fahrenholzi* occurs on mammals and in their nests.

On Babia Góra it is a rare species; only two specimens collected in upper subalpine forest zone.

Hypoaspis (Gaeolaelaps) aculeifer (CANESTRINI, 1883). Localities in mountains: Babia Góra. Known from numerous localities in lowlands.

Hosts: accidentally small mammals; in Poland *A. agrarius* (HAITLINGER 1986 b). Free-living species occurs rarely in nests of small mammals. On Babia Góra, from dward mountain pine zone, was one collected specimen from *S. araneus* (new host).

Haemogamasidae OUDEMANS, 1926

Haemogamasus nidi MICHAEL, 1892. Localities in mountains: Śnieżnik Kłodzki (WILLMANN 1944), Góry Sowie, Tatra, Pieniny, Wzgórza Niemczańskie, Babia Góra, Gorce, Beskid Wyspowy, Dolina Popradu (HAITLINGER 1976 b-1980 b, 1981 a, 1983 d, 1984 a, b, c). The author collected *H. nidi* also in Łysogóry (Huta Szklana), Karkonosze (Łabski Szczyt, Samotnia), Góry Orlickie

(Taszów), Beskid Żywiecki (Oszus n. Soblówka). Known from numerous localities in lowlands (HAITLINGER 1983 d).

Hosts: *Arvicolidae*, *Muridae*, *Soricidae*.

On Babia Góra occurs in all zones, most numerous in upper subalpine forest zone. Collected from 9 species of mammals; mainly from *M. agrestis* (mean intensity of infestation — 0.6) and *P. tatricus* (0.5).

Haemogamasus horridus MICHAEL, 1892. Localities in mountains: Śnieżnik Kłodzki (WILLMANN 1944), Góry Sowie, Wzgórza Niemczańskie, Pieniny, Babia Góra, Gorce (HAITLINGER 1976 b, 1981 a, 1983 d, 1984 a, c). The author collected this species also from Karkonosze (Łabski Szczyt). Known from localities in lowlands (HAITLINGER 1983 d).

Hosts: *Arvicolidae*, *Muridae*, *Soricidae*.

On Babia Góra it occurs in all zones; most numerous in lower subalpine forest zone; mainly on *C. glareolus*, *P. tatricus* and *A. sylvaticus*.

Haemogamasus hirsutus BERLESE, 1889. Localities in mountains: Góry Sowie, Wzgórza Niemczańskie, Babia Góra, Pieniny, Beskid Wyspowy, Gorce, Dolina Popradu, Beskid Niski (HAITLINGER 1976 b, 1981 a, 1983 d, 1984 a, b, c, 1986 a). The author collected *H. hirsutus* also from Łysogóry (Huta Szklana), Beskid Żywiecki (Rysianka, Oszus) and Beskid Niski (Grab, Foluszt Bodaki). Known from numerous localities in lowlands (HAITLINGER 1983 d).

Hosts: *Arvicolidae*, *Muridae*, *Soricidae*.

On Babia Góra most numerous species of *Haemogamasidae*; occurs in all zones of this massif.

Haemogamasus bregetovae MRCIAK, 1958. Locality in Poland: Babia Góra (HAITLINGER 1987).

Hosts: *Arvicolidae*: occurs on mammals and in their nests.

Rare species; in Poland probably occurs also in Tatra, Pilsko and Karkonosze. In Czechoslovakia it was found in mentioned mountains (AMBROS 1982).

On Babia Góra there was collected one specimen on *C. glareolus* in lower subalpine forest zone. This locality (600 m) is lowest of all known localities *H. bregetovae*.

Eulaelaps stabularis (KOCH, 1836). Localities in mountains: Góry Sowie, Tatra, Wzgórza Niemczańskie, Pieniny, Beskid Wyspowy, Pasmo Radziejowej, Dolina Popradu, Gorce, Bieszczady (HAITLINGER 1976 b, 1980 b, 1981 a, 1983 d, 1984 a, c). The author collected this species also in Łysogóry (Huta Szklana), Karkonosze (Samotnia), Beskid Żywiecki (Soblówka, Wielka Racza), Beskid Niski (Bodaki). Known from numerous localities in lowlands (HAITLINGER 1983 d).

It occurs in all the zones of Babia Góra, most numerously collected from *P. tatricus*.

Hirstionyssidae EVANS et TILL, 1966

Echinonyssus soricis (TURK, 1945). Localities in mountains: Góry Sowie, Tatra, Pieniny, Wzgórza Niemczańskie, Pasmo Radziejowej, Dolina Popradu, Gorce, Bieszczady, Babia Góra, Beskid Niski (HAITLINGER 1976 b, 1980 b, 1983 d, 1984 a, b, c, 1986 a). The author collected *E. soricis* also in Karkonosze (Samotnia, Łabski Szczyt). Known from numerous localities in lowlands.

Hosts: species of the genera *Sorex*, *Neomys* and *Crocidura*; occasionally from small rodents.

On Babia Góra it occurs in all the zones; most numerously was collected in lower subalpine forest zone. On hosts occurs not numerously the mean intensity of infestation of *S. araneus* 0.1; is higher than of other *Soricidae* in Polish mountains.

Echinonyssus tatricus (MRCIAK, 1958). Locality in Poland: Babia Góra (HAITLINGER 1983 b). Known also from Slovak Tatra (AMBROS 1982).

Hosts: mainly species from the genus *Clethrionomys*, *Microtus* and *Pitymys*.

On Babia Góra rare species; collected on upper subalpine forest and dwarf mountain pine zones mainly on *P. tatricus*. Also gathered from *P. subterraneus* and *C. glareolus*.

Echinonyssus carnifex (KOCH, 1839). Localities in mountains: Śnieżnik Kłodzki (WILLMANN 1944); Góry Sowie (HAITLINGER 1976 b). The author collected *E. carnifex* also in Wzgórza Niemczańskie (Stolec).

Host: *Talpa europaea*; occasionally on other small mammals.

On Babia Góra only one female, collected in lower subalpine forest zone. This specific species of *T. europaea* is probably common in lower parts of the massif in relation to the high number of present *T. europaea*.

Echinonyssus isabellinus (OUDEMANS, 1913). Localities in mountains: Góry Sowie, Tatra, Wzgórza Niemczańskie, Pieniny, Gorce (HAITLINGER, 1976 b, 1980 b, 1981 a, 1984 a, b, c). The author collected this species also in Karkonosze (Samotnia — Łabski Szczyt). Known from many localities in lowlands (HAITLINGER 1983 d).

Hosts: mainly *Arvicolidae*; rarely *Muridae* and *Soricidae*; in Poland *E. isabellinus* is the most common mite of genus *Echinonyssus*.

On Babia Góra occurs in all zones; most numerously in upper subalpine forest zone.

Echinonyssus sunci (WANG, 1962). Localities in mountains: Góry Sowie, Pieniny (HAITLINGER 1976 b, 1938 d). The author collected *E. sunci* also in Łysogóry (Huta Szklana) and Beskid Żywiecki (Wielka Racza). Known from many localities in lowlands (HAITLINGER 1983 d).

Hosts: species from the genus *Apodemus*; occasionally other small mammals.

On Babia Góra rare species due to the not very numerous *A. tauricus*; collected in both subalpine forest zones.

Ascidae VOIGTS et OUDEMANS, 1905

Proctolaelaps pygmaeus (MÜLLER, 1859). Localities in mountains: Góry Sowie, Tatra, Wzgórza Niemczańskie, Pieniny, Beskid Wyspowy, Babia Góra (HAITLINGER 1976 b, 1980 b, 1981 a, 1983 d, 1984 a, c). Known from many localities in lowland (HAITLINGER 1983 d).

Hosts: frequently on various small rodents and insectivorous. Free living species also collected from nests of small mammals, litter and plants.

It is on the Babia Góra common species; collected from 5 species of small mammals on all zones.

Veigaiidae OUDEMANS, 1939

Veigaia kochi (TRÄGÄRDH, 1901). Localities in mountains: Śnieżnik Kłodzki (WILLMANN, 1956), Góry Sowie, Pieniny, Karkonosze (HAITLINGER 1976 b, 1983 d, 1986 a). The author collected *V. kochi* also in Karkonosze (Łabski Szczyt). Known from many localities in lowlands (from soil) in voi. Włocławek, Bydgoszcz, Toruń (DZIUBA 1962, 1972) and voi. Katowice (MADEJ, WRÓBLEWSKA 1983).

Hosts: occasionally various small mammals; in Poland *A. agrarius*, *C. glareolus* and *S. alpinus*. Free living species.

On Babia Góra in upper subalpine forest zone were 2 specimens collected from *P. tatricus* and *S. araneus*.

Macrochelidae VITZTHUM, 1930

Macrocheles montanus WILLMANN, 1951. Localities in Poland: Góry Sowie, Pieniny, Wzgórza Niemczańskie (HAITLINGER 1976 b, 1983 d, 1984 a).

Hosts: in Poland collected from various small mammals (HAITLINGER 1983 d). Free living species occurs also in nests of small mammals.

On Babia Góra not numerous; only one specimen collected in lower subalpine forest zone from *C. glareolus*.

Macrocheles glaber (MÜFFER, 1860). Localities in mountains: Wzgórza Niemczańskie, Dolina Popradu, Babia Góra (HAITLINGER 1981 a, 1984 b, c).

Hosts: occasionally various small mammals and frequently *Coleoptera*. Free living species.

The very common species in Poland, mainly occurring on beetles *Geotrupes* (own information). On Babia Góra one specimen collected from *C. glareolus* in lower subalpine forest zone.

Parasitidae OUDEMANS, 1901

Pergamasus brevicornis (BERLESE, 1903). Localities in mountains (from litter): Śnieżnik Kłodzki (WILLMANN 1939), Tatra, Beskid Wyspowy, Dolina Popradu (Rytro) (MICHERDZIŃSKI 1969) (from litter and small mammals),

Babia Góra, Bieszczady, Beskid Niski, Pieniny (WITALIŃSKI 1971, 1976; HAITLINGER 1983 d).

Hosts: in Poland sporadically gathered from small mammals: *M. agrestis*, *C. glareolus*, *P. subterraneus*, *A. tauricus*, *S. araneus*. Free living predacious species, phoresy on small mammals.

On Babia Góra two specimens collected from *M. agrestis* and *A. tauricus*.

Pergamasus mediocris BERLESE, 1904. Localities in Poland (from litter): Sudety (OUDEMANS 1926), Tatra, Dolina Popradu (Rytro) (MICHERDZIŃSKI 1969), Babia Góra, Pieniny (WITALIŃSKI 1971, 1976).

Free living species not collected from mammals hitherto. In Poland known only from mountains, and submontane district.

On Babia Góra 3 specimens collected in upper subalpine forest zone from *P. tatricus* and *C. glareolus*.

Amblygamasus septentrionalis (OUDEMANS, 1902). Localities in Poland (from soil): Zielonka n. Poznań (WIŚNIEWSKI 1966), the Kołobrzeg region (voi. Koszalin), Wolin (voi. Szczecin) (DZIUBA 1972), the Poznań region and Pieniny (Czorsztyn area) (WITALIŃSKI 1976); from mammals: (Pieniny — voi. Nowy Sącz) (HAITLINGER, 1983 d).

Hosts: occasionally small mammals; is Poland *C. glareolus*, *S. araneus*. Free living predacious species.

On Babia Góra one specimen collected in lower subalpine forest zone from *S. araneus*.

Porrhostaspis lunulata MÜLLER, 1859. Localities in mountains (from soil): Śnieżnik Kłodzki (PAX, MASCHKE 1939), Beskid Wyspowy (Jordanów) (MICHERDZIŃSKI 1969), Pieniny (WITALIŃSKI 1976); from mammals: Pieniny (HAITLINGER, 1983 d), Dolina Popradu (Muszyna), Beskid Wyspowy, Góry Sowie, Wzgórza Niemczańskie (HAITLINGER 1976 b, 1984 c). Known from many localities in the whole country (HAITLINGER 1983 d).

Hosts: free living species relatively numerous on small mammals: *Arvicolidae*, *Muridae*, *Soricidae*.

On Babia Góra collected only in lower subalpine forest zone from *C. glareolus* and *S. araneus*.

Vulgarogamasus kraepelini (BERLESE, 1905). Localities in mountains: Śnieżnik Kłodzki (PAX, MASCHKE 1939, WILLMANN 1956), Beskid Mały (Kalwaria), Dolina Popradu (Rytro), Bieszczady (MICHERDZIŃSKI 1969), Pieniny (WITALIŃSKI 1976, HAITLINGER 1983 d), Góry Sowie, Wzgórza Niemczańskie (HAITLINGER 1976 b, 1981 a, 1984 a). The author collected this species also in Karkonosze (Łabski Szczyt) and Łysogóry (Huta Szklana). Known from localites in lowlands (HAITLINGER 1983 d).

Hosts: *Arvicolidae*, *Muridae*, *Soricidae*. Free living species; it was numerously collected from small mammals; occurs in their nests.

On Babia Góra common species, collected in all zones; the most frequent on *C. glareolus*.

Vulgarogamasus remberti (OUDEMANS, 1912). Localities in mountains: Kotlina Kłodzka (WILLMANN 1952), Góry Sowie (HAITLINGER 1976 b). The author collected this species also in Tatra Mts. (Zakopane) and Łysogóry (Huta Szklana).

Deutonymphs of this species frequently occur on small mammals. In Poland collected hitherto only in mountains, but *V. remberti* is common in the whole country. The author obtained deutonymphs from mammals in Strzeszów (voi. Szczecin), Wicie (voi. Koszalin), Wenecja (voi. Olsztyn), Ryczywół (voi. Radom), Lubniewice (voi. Gorzów), Zabierzyce (voi. Opole), Strabin (voi. Sieradz), Dubienka (voi. Chełm).

Hosts (for deutonymphs): *Arvicolidae*, *Muridae*, *Soricidae*. Free-living species.

On Babia Góra common species; most frequent from *Parasitidae*; occur on small mammals. Collected in all zones.

Poecilochirus carabi G. et R. CANESTRINI, 1882. Localities in mountains: Śnieżnik Kłodzki (WILLMANN 1939), Pieniny, Dolina Popradu (RYTRO), Tuszyn (MICHERDZIŃSKI 1969), Góry Sowie, Wzgórza Niemczańskie, Pieniny (HAITLINGER 1976 b, 1981 a, 1983 d, 1984 a). The author collected this species also in Góry Orlickie (Taszów). Known from many localities in lowlands (HAITLINGER 1983 d).

Hosts (deutonymphs): various *Coleoptera*; occasionally on mammals: *Arvicolidae*, *Muridae*, *Soricidae*. Free-living species.

On Babia Góra only one deutonymph collected from *S. minutus*.

Rhodacaridae OUDEMANS, 1902

Cyrtolaelaps mucronatus G. et R. CANESTRINI, 1881. Localities in mountains: Śnieżnik Kłodzki (WILLMANN 1944), Góry Sowie, Tatra, Pieniny, Wzgórza Niemczańskie, Dolina Popradu, Pasmo Radziejowej, Babia Góra, Beskid Wyspowy (HAITLINGER 1976 b, 1980 b, 1981 a, 1983 d, 1984 b, c, 1986 a). The author collected this species also in Karkonosze (Łabski Szczyt, Samotnia, Karpacz) and Beskid Żywiecki (Wielka Racza, Soblówka). Known from many localities in lowland (HAITLINGER 1983 d).

Hosts: deutonymphs occur on *Arvicolidae*, *Muridae* and *Soricidae* and also in their nests.

On Babia Góra common species, collected from five marmal species in all the zones.

Cyrtolaelaps minor WILLMANN, 1952. Localities in mountains: Góry Sowie, Pieniny, Wzgórza Niemczańskie, Karkonosze (HAITLINGER 1976 b, 1983 d, 1984 a, 1986 a). Known also from lowlands (HAITLINGER 1983 d).

Hosts: deutonymphs occur on *Arvicolidae*, *Muridae* and *Soricidae*; also known from their nests.

It is the more rare species than *C. mucronatus*; on Babia Góra collected only in upper subalpine forest zone from *C. glareolus* and *P. tatricus*.

Euryparasitus emarginatus (KOCH, 1839). Localities in mountains: Góry

Sowie, Wzgórza Niemczańskie, Pieniny, Beskid Wyspowy, Gorce, Babia Góra, Karkonosze (HAITLINGER 1979 b, 1981 a, 1983 d, 1984 a, c, 1986 a). The author collected this species also in Karkonosze (Łabski Szczyt), Beskid Żywiecki (Wielka Racza), Beskid Niski (Polany) and Łysogóry (Huta Szklana). *E. emarginatus* is widely distributed in Poland (HAITLINGER 1983 d).

Hosts: deutonymphs occur on *Arvicolidae*, *Muridae* and *Soricidae*. Free-living species.

On Babia Góra common species, collected from 7 mammals species in both subalpine forest zones.

Ologamasidae RYKE, 1962

Sessiluncus cavensis WILLMANN, 1940. Locality in Poland: Babia Góra.

This free-living species is known from Yugoslavia (WILLMANN 1940). Probably the specimens collected in rodent nests in Ukraine and in litter in Osetia belong to this species (BREGETOVA 1977).

On Babia Góra one specimen collected from *P. subterraneus* in upper subalpine forest zone. Provicusly not reported from small mammals. New to the fauna of Poland.

Prostigmata

Trombiculidae EWING, 1929

Neotrombicula autumnalis (SHAW, 1790). Localities in mountains: Góry Sowie, Pieniny, Wzgórza Niemczańskie, Gorce, Beskid Wyspowy, Beskid Niski, Dolina Popradu, Kotlina Nowosądecka (HAITLINGER 1977 a, 1981 a, 1983 d, 1984 b, 1986 a). The author collected this species also in Karkonosze (Karpacz), Wzgórza Niemczańskie (Stolec), Pogórze Przemysko-Dynowskie (Nowosiółki Dynowskie, Tarnawka) and Bieszczady (Przełęcz Wetlińska). Known from many localities in lowland (HAITLINGER 1983 d).

Hosts: *Arvicolidae*, *Muridae*, *Soricidae*; rarely *Talpidae*.

On Babia Góra *N. autumnali* is a rare species; probably occurs only in the lower subalpine forest zone, collected from *P. subterraneus* and *T. europaea*.

Neotrombicula nagayoi (SASA et allies, 1950). Localities in Poland: Tatra Mts., Babia Góra (1980 b, 1982). Known from Slovak Tatra (KOVAČIK 1984).

Hosts: *Arvicolidae*.

On Babia Góra collected in higher parts of upper subalpine forest and dwarf mountain pine zones from *M. agrestis*, *C. glareolus* and *P. tatricus*.

Neotrombicula inopinata (OUDEMANS, 1909). Localities in mountains: Góry Sowie, Tatra, Wzgórza Niemczańskie, Pieniny, Dolina Popradu, Gorce, Beskid Wyspowy, Babia Góra (HAITLINGER 1977 a, 1980 b, 1983 d, 1984 a, b, c).

Table V

Prostigmata collected on small mammals of Babia Góra

	zone	1	2	3	4	5	6	7	8	10	11	12	14	15	Number in zones	Total
Hirsutiella zachvatkini	lsf	183		2	69		3	12		1					270	
	usf	186	14	3	25		1								229	509
	dmp	6	4												10	
Neotrombicula inopinata	lsf	284		19	6				1	3					313	
	usf	49	1	2											52	366
	dmp				1										1	
N. autumnalis	lsf			2										3	5	5
	usf	6													6	8
N. nagayoi	dmp		1		1										2	8
Cheladonta costulata	lsf				4	11				1					16	
	usf						1								1	17
Miyatrombicula muris	dmp		1												1	1
Schoutedenichia krampitzi	usf			1											1	1

Radfordia	lsf			3	1			1							5	31
lemnina	usf	9	7	2	1										19	
	dmp	1	6												7	
R. arvicolae	lsf					3									3	3
Myobia	lsf						2								2	
musculi	usf						2								2	4
Amorphacarus	lsf									5					5	
elongatus	usf									2	1				3	9
	dmp									1					1	
Protomyobia	lsf									23					23	24
onoi	usf									1					1	
Psorergates															1	
apodemi	usf						90								90	90
Pygmephorus	lsf			1											1	
soricis	usf									1					1	2
	lsf	1								2					3	
P. spinosus	usf	2	4	1						2		1			10	13
P. erlangensis	usf	1													1	1
P. forcipatus	usf				1					2					3	3
Bakerdania sp.	lsf			1						1			1		3	
	usf		2												2	5
Cheyletidae	lsf										1				1	1
Number of mites		728	40	37	109	14	99	13	1	45	2	1	1	3	1093	
Number of mammals		136	33	28	25	1	20	4	4	72	4	24	1	1		

The author collected this species also in Karkonosze (Karpacz), Beskid Żywiecki (Soblówka, Osusz, Wielka Racza), Pogórze Przemysko-Dynowskie (Nowosiółki Dydyńskie) and Bieszczady (Rajskie).

Hosts: *Arvicolidae, Muridae, Soricidae, Talpidae.*

On Babia Góra very common chigger-mite; occurs in all zones; the most numerous was in lower subalpine forest zone, mainly on *C. glareolus.*

Hirsutiella zachvatkini (SCHLUGER, 1948). Localities in mountains: Góry Sowie, Tatra, Pieniny, Wzgórza Niemczańskie, Dolina Popradu, Gorce, Pasmo Radziejowej, Beskid Wyspowy, Karkonosze (HAITLINGER 1977 a, 1980 b, 1983 d, 1984 a, b, c, 1986 a). The author collected this species also in Góry Orlickie (Taszów), Beskid Żywiecki (Pilsko, Wielka Racza, Soblówka), Kotlina Nowosądecka (Słowikowa), Beskid Niski (Bodaki, Wisłok). Known from many localities in lowland (HAITLINGER 1983 d).

Hosts: *Arvicolidae, Muridae, Soricidae, Talpidae.*

On Babia Góra the most numerous mite species occurring on small mammals, found in all the zones, mainly in upper subalpine forest zone. It was gathered from 7 host species, the most numerous on *M. agrestis* and *C. glareolus.*

Miyatrombicula muris (OUDEMANS, 1910). Localities in Poland: Wzgórza Niemczańskie (HAITLINGER 1981 a, 1984 a). Known also from Wenecja (voi. Olsztyn) (HAITLINGER 1981 b). The author collected this species also in Kujan (voi. Piła) and Wrocław.

Hosts: small mammals, *Aves* (in Poland *Parus major* — HAITLINGER 1987 b).

On Babia Góra very rare species; only one larva collected from *P. tatricus* in dwarf mountain pine zone.

Cheladonta costulata (WILLMANN, 1952). Localities in Poland: Śnieżnik Kłodzki (WILLMANN 1952), Góry Sowie, Wzgórza Niemczańskie, Pieniny (HAITLINGER 1977 a, 1981 a, 1983 d, 1984 a). The author collected this species also in Beskid Wyspowy (Żegocina, Jurków, Kasinka Mała), Dolina Popradu (Zubrzyk) and Beskid Niski (Bodaki). This species in Poland is not numerous; known only from mountains and submontane areas.

On Babia Góra common species but only in lower subalpine forest zone; in upper subalpine forest zone obtained hardly one larva.

Schoutedenichia krampitzi (WILLMANN, 1955). Locality in Poland: Babia Góra (HAITLINGER 1982).

Hosts: small rodents and insectivorous.

The locality in Poland is at the farthest to north and to be found far beyond close range of this species. On Babia Góra collected only one larva on about 1200 m als (september) from *P. subterraneus.*

Myobiidae MEGNIN, 1817

Protomyobia onoi JAMESON, DUSBABEK, 1971. Localities in mountains: Góry Sowie, Wzgórza Niemczańskie, Dolina Popradu, Kotlina Nowosądecka, Pasmo Radziejowej, Beskid Niski, Karkonosze (HAITLINGER 1977 a, 1981 a, 1982,

1986 a). The author collected this species also in Tatra (Zakopane). Known from few localities in lowland (HAITLINGER 1983 d).

Hosts: *S. araneus*; occasionally *N. fodiens*, *M. arvalis*.

On Babia Górd common species in lower subalpine forest zone; in upper subalpine forest zone collected only one specimen; obtained only from *S. araneus*.

Amorphacarus elongatus (POPPE, 1896). Localities in mountains: Góry Sowie, Wzgórza Niemczańskie, Pieniny, Gorce, Babia Góra (HAITLINGER 1977 a, 1981 a, 1983 d, 1984 c, 1986 a). The author collected this species also in Karkonosze (Łabski Szczyt), Tatra (Zakopane), Pasmo Radziejowej (Czarna Woda), Pogórze Przemysko-Dynowskie (Tarnawka). Known from lowland (WILLMANN 1952, BITKOWSKA, ŻUKOWSKI 1975).

Hosts: *Soricidae*; sporadically *A. tauricus*, *C. glareolus*, *M. arvalis*.

On Babia Górd obtained from *S. araneus* and exceptionally from *S. alpinus* in all investigated zones.

Radfordia lemnina (KOCH, 1841). Localities in mountains: Góry Sowie, Tatra, Wzgórza Niemczańskie, Pieniny (HAITLINGER 1977 a, 1980 b, 1981 a, 1984 a). The author this species also collected from Beskid Średni (Pcim), Gorce (Łopuszna), Beskid Wyspowy (Wierzbanowa, Muchówka, Kasinka Mała), Pasmo Radziejowej (Dolina Jaworzynki), Kotlina Nowosądecka (Nawojowa), Dolina Popradu (Zubrzyk), Beskid Niski (Wisłok) and Bieszczady (Rajskie). Known from many localities in lowlands (HAITLINGER 1983 d).

Hosts: *Arvicolidae*, rarely *Muridae*, *Soricidae*.

On Babia Góra common species, occurs in all zones. The most numerous was on *P. tatricus*; the mean intensity of infestation 0.4.

Radfordia arvicolae FAIN, LUKOSCHUS, 1977. Localities in Poland: Zawoja (HAITLINGER 1982).

Hosts: *A. terrestris*.

The monoxenic, rare species; area of this species in Poland are not known.

On Babia Góra 3 species collected (in september) on 700 m a.s.l. near Zawoja-Składy.

Myobia musculi (SCHRANK, 1781). Localities in mountains: Góry Sowie, Wzgórza Niemczańskie (HAITLINGER 1977 a, 1981 a, 1984 a). The author collected *M. musculi* also in Łysogóry (Huta Szklana) and Beskid Wyspowy (Jurków). The very common species in lowland (HAITLINGER 1983 d).

Hosts: mainly *M. musculus*, rarely *A. tauricus*, *A. agrarius*; sporadically *C. glareolus*, *M. arvalis*.

On the Babia Góra not numerous species mainly occur on *A. tauricus* in both subalpine forest zones.

Psorergatidae DUBININ, 1955

Psorergates apodemi FAIN, LUKOSCHUS, HALLMANN, 1966. Localities in Poland: Wzgórza Niemczańskie, Zabierzyce (voi. Opole), Wenecja (vol. Olsztyn) (HAITLINGER 1978 b).

Hosts: *A. tauricus*.

On Babia Góra collected 90 specimens from *A. tauricus* in upper subalpine forest zone.

Pygmephoridae CROSS, 1965

Pygmephorus soricis KRCZAL, 1959. Localities in Poland: Góry Sowie, Wzgórza Niemczańskie, Gorce, Pogórze Przemysko-Dynowskie (HAITLINGER 1977 a, 1984 a, c). The author collected this species also in Bieszczady (Połonina Wetlińska) and in northern Poland in Nowe Drawsko, Głęboczek (voi. Koszalin) and Jasień (voi. Słupsk).

Hosts: *S. araneus*, *S. minutus*, *T. europaea*, *C. glareolus*.

The rare species; distribution *P. soricis* in Poland suggest its connexion to frigid zones and coniferous forest.

On Babia Góra rare species, two specimen collected from both subalpine forest zones from *P. subterraneus* and *S. araneus*.

Pygmephorus erlangensis KRCZAL, 1959. Localities in Poland: Góry Sowie (HAITLINGER 1987 a); Wola Uhruska (voi. Chełm) (HAITLINGER 1987 d). The author this species collected also in Łysogóry (Huta Szklana) and Nowy Targ (voi. Nowy Sącz).

Hosts: free-living species, rare collected on *Soricidae*, *Arvicolidae* and *Muridae*.

On Babia Góra one specimens obtained from *C. glareolus* in upper subalpine forest zone. This species the most often occur in compost and detritus.

Pygmephorus forcipatus WILLMANN, 1952. Localities in mountains: Góry Sowie, Wzgórza Niemczańskie, Gorce (HAITLINGER, 1977 a, 1984 a, 1986 a). The author collected this species also in Łysogóry (Huta Szklana), Karkonosze (Łabski Szczyt), Beskid Średni and Wyspowy (Pcim, Muchówka, Kasinka Mała), Gorce (Szczawa), Pasmo Radziejowej (Czarna Woda). Known from lowland (HAITLINGER 1983 d).

Hosts: *Soricidae*, *Talpidae*, *Muridae*, *Arvicolidae*; free-living species relatively often collected on small mammals.

On Babia Góra collected only 3 specimens in upper subalpine forest zone from *S. araneus* and *M. agrestis*.

Pygmephorus spinosus KRAMER, 1877. Localities in mountains: Śnieżnik Kłodzki (PAX, MASCHKE 1939, WILLMANN 1952), Góry Sowie, Tatra, Wzgórza Niemczańskie, Pieniny, Beskid Wyspowy, Karkonosze (HAITLINGER 1977 a, 1980 b, 1981 a, 1983 d, 1984 a, 1986 a). The author collected this species also in Góry Orlickie (Taszów) and Beskid Niski (Bodaki).

Hosts: *Soricidae*, *Arvicolidae*, *Muridae*. Free-living species.

On Babia Góra commonest species of the genus, collected in both subalpine forest zones; in great number were gathered above 900 m a..sl.

Astigmata

Glycyphagidae BERLESE, 1887

Glycyphagus hypuadei (KOCH, 1841). Localities in mountains: Góry Sowie, Pogórze Wałbrzyskie (Książ), Tatra, Wzgórza Niemczańskie, Pieniny, Gorce, Dolina Popradu, Beskid Niski, Beskid Wyspowy, Pasmo Radziejowej, Karkonosze (HAITLINGER 1977 a, 1979, 1980 b, 1981 a, 1983 d, 1984 a, b, c, 1986 a). Known from many localities in lowland (HAITLINGER 1983 d).

Hosts (deutonymphs): small mammals. Free-living species.

On Babia Góra were the most numerous species on mammals from dwarf mountain pine zone. Collected from 9 mammals species most numerous from *C. glareolus*.

Orycteroxenus soricis (OUDEMANS, 1915). Localities in mountains: Góry Sowie, Góry Kaczawskie, Pogórze Kaczawskie (Płuczki Dolne), Kotlina Kłodzka (Kłodzko), Tatra, Wzgórza Niemczańskie, Pieniny, Beskid Wyspowy, Gorce, Pasmo Radziejowej, Dolina Popradu, Kotlina Nowosądecka (Słowikowa), Pogórze Przemysko-Dynowskie, Bieszczady, Karkonosze, Babia Góra (HAITLINGER 1977 a, 1979, 1980 b, 1981 a, 1984 a, c, 1986 a). Known in lowland (HAITLINGER 1983 d).

Hosts: mainly *Soricidae*, rarely other small rodents (only for deutonymphs).

It occurs on throughout of the Babia Góra, mainly on *S. araneus*, from lower subalpine forest zone. Collected from mammals species.

Xenoryctes krameri (MICHAEL, 1886). Localities in mountains: Góry Sowie, Tatra, Wzgórza Niemczańskie, Beskid Wyspowy, Gorce, Karkonosze (HAITLINGER 1977 a, 1980 b, 1981 a, 1983 d, 1984 a, c, 1986 a). Known from few localities in lowland (HAITLINGER 1984 c).

Hosts: small rodents and insectivorous (only for deutonymphs).

On Babia Góra not numerous species, collected mainly in upper subalpine forest zone on *C. glareolus* and six other species.

Myocoptidae GUNTHER, 1942

Myocoptes japonensis RADFORD, 1955. Localities in mountains: Góry Sowie, Wzgórza Niemczańskie, Pieniny (HAITLINGER 1977 a, 1980 b, 1981a, 1983d, 1984 a, c). Known from many localities from lowland (HAITLINGER 1986 c).

Hosts: mainly *Arvicolidae*, rarely *Muridae*, *Soridae*.

On Babia Góra this species occur in all zones; the most numerous it was in upper subalpine forest zone, mainly on *P. tatricus* and *C. glareolus*.

Trichoecius tenax (MICHAEL, 1880). Localities in mountains: Góry Sowie, Tatra, Wzgórza Niemczańskie, Góry Orlickie, Bieszczady (HAITLINGER 1986 c). Known from many localities in lowland (HAITLINGER 1986 c).

Hosts: *Arvicolidae*, *Muridae*, rarely *Soricidae*.

Table VI

Astigmata, Cryptostigmata, Ixodida and *Coleoptera* collected on small mammals of Babia Góra

Astigmata	zone	1	2	3	4	5	6	7	8	9	10	11	12	13	Number in zones	Total
Myocoptes japonensis	lsf	1		1											2	
	usf	6	6	4			1								17	20
	dmp				1										1	
Myocoptes sp.	lsf											1			1	1
Trichoecius tenax	lsf			1											1	
	usf	1		1											2	3
Glycyphagus hypuadci	lsf	83		1	2			1			5	1			93	
	usf	1286	123	11	59		8				272		13		1772	2296
	dmp	342	50		33						6				431	
Orycteroxenus soricis	lsfs				2						105				107	
	usf	2	4	2						1	78	11	17		115	264
	dmp		2								37		3		42	
Xenoryctes krameri	lsf								3						3	
	usf	16	2	1							1	1	1		22	25
Listrophorus brevipes	lsf	1		67	88										156	
	usf	9	503	20	82						11		2		627	1102
	dmp	2	265		52										319	

L. leuckarti	lsf					30									30	30
Glycyphagidae	lsf													1	1	
	usf	2													2	3
Prowichmannia	usf	7	7	1							6				14	
spinifera	lsf	12	5				1				4		1		25	44
	dmp														5	
Number of *Astigmata*		1770	967	110	319	30	10	1	3	1	525	14	37	1		
Cryptostigmata																
Oribatidae	lsf	1													1	
	usf	5			1										6	8
	dmp										1				1	
Ixodida																
Ixodes	lsf	1		4	3										8	
triangulíceps	usf						1								1	9
I. ricinus	usf	1		1											2	2
Insecta Coleoptera																
Leptinus	lsf						2	4			1			2	9	11
testaceus	usf	1					1								2	
Number of mammals		136	33	28	25	1	20	4	4	2	72	4	24	2		

On Babia Góra is a rare species, collected not numerous in both subalpine forest zones but perhaps occurs in more higher for example in Tatra Mts. above 1600 m a.s.l.

Listrophoridae MEGNIN, TROUESSART, 1884

Listrophorus brevipes DUBININA, 1968. Localities in mountains: Góry Sowie, Tatra, Pieniny (HAITLINGER 1977 a, 1980 b, 1983 d). Also known from Łysogóry (Huta Szklana), Karkonosze (Samotnia, Łabski Szczyt), Beskid Niski (Bodaki) — own information.

L. brevipes found also in lowland. The author collected this species in Dąbki (voi. Koszalin), Brzyno (voi. Gdańsk), Charzykowy (voi. Bydgoszcz), Natać Mała (voi. Olsztyn), Taras (voi. Piotrków), Powidz (voi. Konin), Jedlec (voi. Kalisz) and Rzędziszowice (voi. Częstochowa).

Hosts: mainly *Arvicolidae*.

On Babia Góra common species; it occurs in all zones mainly on *P. tatricus* and *M. agrestis*. Mean intensity of infestation of *P. tatricus* 23.3, *M. agrestis* 8.9 and *P. subterraneus* 3.1. are highest among noted in Poland.

Listrophorus leuckarti PAGENSTECHER, 1862. Localities in Poland: Pieniny (HAITLINGER 1983 d). Also known from Dźwirzyno, Wicie (voi. Koszalin), Miłuki n. Pasym (voi. Olsztyn), Murowany Most n. Suwałki (voi. Suwałki) — own information.

Hosts: *A. terrestris*.

In Poland common species on *A. terrestris*. Specimens collected by LACHMAJER, WEGNER (1959) and WEGNER (1960) from *A. tauricus* probably incorrectly were designated as *L. leuckarti*.

On Babia Góra this species collected only below 800 m a.s.l.

Anoetidae OUDEMANS, 1904

Prowichmannia spinifera (MICHAEL, 1901). Localities in mountains: Góry Sowie, Pogórze Kaczawskie (Płuczki), Kotlina Kłodzka (Kłodzko), Tatra, Wzgórza Niemczańskie, Pieniny, Pasmo Radziejowej, Dolina Popradu, Gorce (Koszarka), Bieszczady, Karkonosze (HAITLINGER 1977 a, 1979, 1980 b, 1981 a, 1983 d, 1984 a, b, c, 1986 a). The author collected this species also in Łysogóry (Huta Szklana) and Karkonosze (Samotnia, Łabski Szczyt). Known from few localities in lowland (HAITLINGER 1983 d). In all previously papers incorrectly mentioned as *Acotyledon pedispinifer*.

Hosts: small rodents and insectivorous. Free-living species deutonymphs frequently occur on small mammals.

On Babia Góra occurs on all zones; most numerous collected on *P. tatricus* and *C. glareolus*.

Ixodides

Ixodidae MURRAY, 1877

*Ixodes triangulicep*s BIRULA, 1895. Localities in mountains: Góry Sowie, Pogórze Kaczawskie (Pluczki), Tatra, Pieniny, Wzgórza Niemczańskie, Gorce, Beskid Wyspowy, Kotlina Nowosądecka, Dolina Popradu, Karkonosze (HAITLINGER 1977 a, 1979, 1980 b, 1983 a, 1984 a, b, c, 1986 a). The author collected this species also in Łysogóry (Huta Szklana), Karkonosze (Karpacz), Góry Orlickie (Taszów), Dolina Popradu (Milik), Pasmo Radziejowej (Seweryнówka), Beskid Niski (Grab, Polany). Known from many localities in lowland.

Hosts: small mammals.

On Babia Góra rare species in upper subalpine forest zone collected only 1 larva, in lower subalpine forest zone 8 larvas. The most mean intensity of infestation discovered on *P. subterraneus* — 0.1.

Ixodes ricinus (LINNE, 1758). Localities in mountains: Góry Sowie, Pieniny, Wzgórza Niemczańskie, (HAITLINGRER 1977 a, 1981 a, 1983 d). Known from Czech Karkonosze (ČERNY 1959).

Hosts: in Poland all mammals (exclusive marine species), majority *Aves*, *Lacerta agilis* and *L. vivipara (Reptilia)* (HAITLINGER 1987 c).

On Babia Góra collected only 2 specimens in upper subalpine forest zone. This species in Poland is very common except higher parts of mountains; also in lower parts of mountains is rare; for example in Góry Sowie the most mean intensity of infestation finding on *A. tauricus* 0.25; in Pieniny Mts only 0.08 (HAITLINGER 1983 d).

IV. THE VERTICAL DISTRIBUTION OF ARTHROPODS IN THE BABIA GÓRA MASSIF

The present remarks refer to the three studied layers of Babia Góra: lower and upper subalpine forest and dwarf mountain pine zone. The alpine layer on Babia Góra is limited only to the small area within 1650 to 1725 m a.s.l. and was not investigated, what is not important as mammals are not numerous here (KOWALSKI, SYCH 1963). It can be presumed then that the arthropod fauna of mammals living in this area is not different than the arthropod fauna of mammals of the dwarf mountain pine layer. The nest-host arthropod fauna in the studied layers depends on the species composition of the hosts and secondarily on the environmental conditions while the nest arthropod fauna is determined by the environmental conditions. The small mammals distinctly respond to the changing conditions connected with the situation above the sea level. In the lower subalpine forest (600—900 m a.s.l.) and its edges (agricultu-

ral lands, meadows) 13 species of mammals have been caught, in the upper subalpine forest (1050—1300) — 9 species and in the dwarf mountain pine zone — only 5. The intensity of catching (the number of traps) in both kinds of subalpine forest was similar, only in the dwarf mountain pine zone the number of traps was lower in late autumn and early summer according to the technical problems in catching. The above data indicate the indigence of mammals fauna above the forest limite. It is also reflected in the quantitative relations. In the dwarf mountain forest only 32 mammals were caught whereas in the upper subalpine forest — 214 (Table I). In all the layers, the most numerous was *C. glareolus*; in the dwarf mountain pine forest (herbs) also *P. tatricus* and *M. agrestis*; in the upper subalpine forest *S. araneus* and *P. tatricus*, in lower subalpine forest *S. araneus* and *P. subterraneus*. Such quantitative relations among mammals result in domination of arthropods connected with *Arvicolidae* and *Soricidae* while these connected with *Muridae* and *Muscaridinidae* in particular, play a less significant role.

The lower subalpine forest. From 111 mammals of 13 species 1510 arthropods of 67 species have been obtained. The domination of the most common species does not exceed 21%. Within the group there dominate mites, especially the larvae of *Trombiculidae*, mainly the common in Polish mountains *N. inopinata*. Among the dominants there are parasites and commensals periodically connected with mammals as larvae or hypopi and two species constantly connected with hosts: *L. agilis* and *L. brevipes*. Remarkable is the low frequency in the catchings of the two constant parasites of the most abundant mammals in this layer *C. glareolus*, i. e. *Hoplopleura edentula* and *Laelaps clethrionomadis*.

The upper subalpine forest. From 214 mammals of 9 species 4148 specimens of 70 species have been collected. The following differences to the lower subalpine forest have been estimated: the higher intensity of infestation of mammals — the average intensity of infestation for the whole catching in upper subalpine forest — 18.9 and in lower subalpine forest — 13.6; the more varied arthropod fauna on the less varied mammals fauna; the distinct change in dominants, mainly the drop in frequency of *N. inopinata*.

The dwarf mountain pine zone. From 32 mammals of 5 species 1111 arthropods of 38 species were found. The layer of the dwarf mountain pine forest is poor in mammal species and they occur not numerously. This fact, apart from the climatic conditions, influences on the qualitative and quantitative indigence of the arthropod fauna of mammals from this layer. In relation to the upper subalpine forest the number of arthropod species is smaller by 32; the *Trombiculidae* are almost absent while in the upper and lower subalpine forests play a significant role. The dominant group except *H. zachvatkini* is identical as in the upper subalpine forest. Excluding *G. hypuadei* they are the constant mammals parasites.

The dwarf mountain pine zone of Babia Góra proves the recessive characters in comparison with both subalpine forests: the decline of the number of the

arthropod species and the lack of species connected only with layer; these features are going together with the high average intensity of infestation — 34.9, much higher than in both subalpine forest.

V. THE ARTHROPOD FAUNA OF BABIA GÓRA AGAINST THE BACKGROUND OF OTHER MOUNTAIN MASSIFS

There is no possibility of complex of the arthropod fauna of Babia Góra connected with small mammals with the parallel fauna of other Polish mountains, particularly of the similar climatic conditions. We can comparise it with Tatra Mts. but the mite fauna of their northern slopes is still not well studied; in the lower parts of Carpathian and Sudety Mts. we can compare only *Siphonaptera* and to the certain degree *Anoplura*. The full comparison, and only

Table VII

Dominance structure of arthropod communities in three zones of Babia Góra

	Lower subalpine forest	Upper subalpine forest	Dwarf mountain pine zone
Eudominants 15%	*Neotrombicula inopinata* *Hirsutiella zachvatkni*	*Glycyphagus hypuadei*	*Glycyphagus hypuadei* *Listrophorus brevipes*
Dominants 5.1—15%	*Listrophorus brevipes* *Orycteroxenus soricis* *Laelaps agilis* *Glycyphagus hypuadei*	*Listrophorus brevipes* *Hirsutiella zachvatkini* *Hoplopleura edentula*	*Hoplopleura edentula*
Subdominants 2.1—5%	*Hoplopleura edentula*	*Laelaps hilaris* *Laelaps agilis* *Hyperlaelaps microti* *Orycteroxenus soricis* *Psorergates apodemi*	*Orycteroxenus soricis* *Laelaps hilaris* *Hyperlaelaps microti* *Haemogamasus hirsutus*
Recedents 1.1—2%	9 species	4 species	1 species
Subrecedents over 1.1%	51 species	57 species	30 species

with the lower subalpine forest, can be made with Góry Sowie (Central Sudety) and Pieniny Mts.

Siphonaptera. In Polish Carpathians and Sudety the *Siphonaptera* fauna of small mammals is rather uniform and the number of collected species in the best examined massifs (Beskid Żywiecki, Tatra Mts., Pieniny Mts., Góry Sowie, Beskid Wyspowy, Gorce and Łysogóry) oscillates from 17 to 21 (HAITLINGER 1971, 1973, 1974 b, 1975, 1978 a; BARTKOWSKA 1973 1981). Considering the studies in Slovakia (Wielka Racza, Pilsko) the number arises to 22 (DUDICH, HAITLINGER, ŠTOLLMANN 1982; DUDICH 1983). According to these data then, the founding of only 13 species of fleas on Babia Góra stresses the indigence of this group of insects on small mammals of the studied massif. The indigence becomes more apparent as the elevation of the studied area arises. In the dwarf mountain pine zone only 5 flea species were found, in the upper subalpine forest — 13 and in the lower subalpine forest — 9. It is a general rule that above the forest range in the dwarf mountain pine the flea fauna is considerably reduced, e. g. in Tatra Mts. from 19 in subalpine forests to 15 in dwarf mountain pine zone and 10 in alps (BARTKOWSKA 1973). In mountain ranges of Poland and Czechoslovakia *Ctenophtalmus agyrtes* distinctly predominates while on Babia Góra *C. agyrtes* makes only 12.6% of the whole of *Siphonaptera* that means that is less numerous than *Paleopsylla soricis* 27.8% and *A. penicilliger* 18.1%. On Babia Góra the average intensity of infestation of mammals (in relation to the whole) is lowest from all Polish mountains — 0.7 (e. g. in Tatra Mts. — over 1). Also remarkable is the absence of *Megabothris rectangulatus* and *Amphipsylla sibirica* which occur in Central Europe only in the high mountains, in Poland only in Tatra Mts. (BARTKOWSKA 1973), *Ctenophthalmus congener*, *Rhadinopsylla pentacantha* present in Beskid Żywiecki (HAITLINGER 1971; DUDICH, HAITLINGER, ŠTOLLMANN 1982), *Ctenophthalmus assimilis*, *C. solutus*. *C. uncinatus* and *C. obtusus* found in the not far Gorce and Beskid Wyspowy (HAITLINGER 1978 a) and *Peromyscopsylla silvatica* known from Tatra Mts. (BARTKOWSKA 1973). The indigence of *Siphonaptera* on Babia Góra is closely connected with the severe climatic conditions and the lack of synantropic mammals e. g. the absence of *Nosopsyllus fasciatus* is due to it. The fauna of *Siphonaptera* is richest in the most primeval upper subalpine forest and, may be, the species connected with moles will be found here *(Paleopsylla steini* and *P. similis)* and also *Rhadinopsylla isacantha* and *Paleopsylla cisalpina* noticed on Pilsko (DUDICH et al. 1982).

Anoplura. The fauna poor, typical of the hosts studied. In relation to the Tatra Mts. (CAIS 1977) *Polyplax borealis* is lacking. Among *Anoplura H. edentula* predominates which is due to the distinct domination of *C. glareolus* in catchings of *Arvicolidae*. It can be stated that in Polish mountains, except Tatra Mts., the *Anoplura* fauna on small mammals is identical. The observed differences come from the quantitative relations among hosts and the proportions in their catchings in successive seasons of the year. Typical of the upper subalpine forest and dwarf mountain pine zone of high mountain massifs (Ta-

tra, Babia Góra) is the high frequency of *Polyplax hannswrangeli*. In the lower mountains, as Pieniny, Góry Sowie this species is very rare among the arthropod groups (HAITLINGER 1974 b, 1975, 1977 b).

Acari

Mesostigmata. Not less than 38 species of *Mesostigmata* have been obtained. This number is not too high in relation to Pieniny (45) or particularly Góry Sowie (53) (HAITLINGER 1976 b, 1983 d). In lower mountains the fauna of *Mesostigmata* of small mammals is far more rich than in high massifs and in the valleys of high massifs or plateau of Eastern Carpathians e. g. in Lubochnanska Valley (450—1200 m a.s.l.). In Wielka Fatra (Slovakia) only 34 species of *Mesostigmata* were collected from the plentiful mammal material (546 specimens) and in the Vyhorlat Plateau (Eastern Slovakian Carpathians) on 2937 mammals there have been collected only 32 *Mesostigmata* species (AMBROS 1983 a, b). In Western Tatra Mts. (Slovakia) within 800—2200 m a.s.l. scarcely 23 *Mesostigmata* species have been found on 660 mammals (KOČIANOVA 1980). In the relation to the results of studies in Slovakia particularly in Tatra Mts., the fauna of *Mesostigmata* of Babia Góra seems to be rather rich of course, Tatra Mts. are not sufficiently explored yet. There is no doubt however, that the fauna of the area of the Tatra Mts. is more rich than that of Babia Góra. The basic differences are in presence in Tatra of *Haemogamasus nidiformis*, *H. zachvatkini* and *Laelaps pitymydis*, the two borecalpine and one montane species and we can not exclude the possibility of presence on Babia Góra of at least one of them — *H. nidiformis*. The negative features connected with the situation of the massif above the sea level and the northern exposure of the slopes reflect in the comparison with Pieniny and Sowie Mts. i. e., in lower number of species of the genus *Macrocheles* and the family *Parasitidae* and probably the lack of *Haemogamasus hirsutosimilis* and *Myonyssus rossicus*. In the fauna of Babia Góra there are the species not present in other Polish mountains or in Poland at all, except Tatra Mts. They are: *Haemogamasus bregetovae*, *Hirstionyssus tatricus* and *Sessiluncus cavensis*, however, these are very rare species.

Prostigmata. 19 species have been estimated to occur. It is a relatively high number because in Pieniny there have been only 15 species reported and in Sowie Mts. only a few more (21) (HAITLINGER 1977 a, 1983 d). In the realtion to Sowie Mts., the *Prostigmata* of Babia Góra are not numerous in the genus *Pygmephorus* and more rich in *Trombiculidae (Schoutedenichia krampitzi*, *Miyatrombicula muris* and *Neotrombicula magayoi)*. The *Prostigmata* of Babia Góra and Pieniny differ in *Trombiculidae* fauna (present on Babia Góra: *N. nagayoi*, *M. muris*, *S. krampitzi*; absent: *Neotrombicula talmensis*, *N. earis*, *N. japonica*, *Leptotrombidium europaeum*). The fauna of *Prostigmata* of Babia Góra is closer

to the fauna of Góry Sowie than to Pieniny (considerable differences in *Trombiculidae*).

Astigmata. The presence of not less than 10 species was recorded. No significant differences between the fauna of *Astigmata* of Pieniny, Góry Sowie and Babia Góra were estimated, except the absence of *Afrolistrophorus apodemi* on Babia Góra and in Pieniny. Apart from that *Astigmata* of Babia Góra are characterized by the high number of *G. hypuadei* (an eudominant in the whole arthropod group).

Ixodida. 2 species were recorded; the low number of *I. trianguliceps* and *I. ricinus* is remarkable.

VI. HOSTS AND THEIR ARTHROPODS

The 15 species found on Babia Góra do not represent the whole theriological list of the small mammals of this massif particularly considering the surrounding agricultural lands. It should be supplemented with synantropical species as *Mus musculus* L., *Rattus norvegicus* (BERK.), *Microtus arvalis* (PALL) and probably *Sicista betulina* (PALL.). The occurrence of *Eliomys quercinus* (L.), needs confirmation and *Neomys anomalus* probably does not occur here at all. Considering the single accidental catchings of *Talpa europaea* and *Arvicola terrestris* it is necessary to say that the arthropod fauna connected with samall mammals of Babia Góra is far more rich than the presented list suggests. Some mammals, very common otherwise, e. g., *A. agrarius* and in a lower degree *A. sylvaticus* and *N. fodiens* are very rare in Babia Góra massif what makes the comparison of their arthropod fauna impossible.

Among more numerous mammals (over 20 caught specimens) the most varied fauna is observed on *C. glareolus* (54 species), *P. tatricus* (44), *S. araneus* (43) and *P. subterraneus* (39). The fauna of the remaining three species: *M. agrestis* (28), *A. tauricus* (25) and *S. minutus* (13) is far more poor. The differences result from the unequal number of the hosts and particularly from the scale of seizure of the environment. *C. glareolus*, an eurytopic species, occurs in the whole of Babia Góra, in the wood and bushes, in dwarf mountain pine zone. The remaining species are not only rare but also have more distinct environmental requirements. The presented data in comparisen e. g. with Góry Sowie (HAITLINGER 1977 b) are very low and in only few cases may be connected with the number of the hosts, because in majority, the numbers were comparable. So the fauna of *C. glareolus* from Babia Góra is indigent by 26 species, what, apart from *Astigmata* and *Ixodida*, refers to all orda. *M. agrestis*, *S. araneus* and *A. tauricus* are poor by 12, 23 and 38 species respectively. In case of *A. tauricus* probably it is due to the differences in number of yellow-necked field mouse in both massifs. The minimum differences refer to *P. subterraneus* and *S. minutus*.

The arthropod fauna of small mammals of Babia Góra is more indigent

than the fauna in lower mountain massifs but the arthropods are far more numerous there. The highest average intensity of infestation was found on *Pitymys tatricus* — 41.1; it considerably exceeds the respective values not only in remaining mammals of Babia Góra but also in the mammals from other mountains. The comparable indicators were obtained only in Wzgórza Niemczańskie for *Microtus arvalis* (40.6) (HAITLINGER 1981 a). This indicator differs also among *P. tatricus* caught in different layers: in the upper subalpine forest it was 36.8 and in the dwarf mountain pine zone — 52.4. Also the average intensity of infestation in *C. glareolus* and *S. araneus* in dwarf mountain pine zone was higher in both subalpine forests.

Remarkable is the rich arthropod fauna on *P. tatricus*. It occurs only in Tatra Mts. on Babia Góra and Pilsko in Poland, so it is possible to recapitulate the state of knowledge of the arthropod fauna of this mammals. Apart from the arthropods found on Babia Góra, *P. tatricus* is infested also by fleas *Magabothris reciangulatus* (WAHLG.) (SKURATOWICZ 1967), *Rhadinopsylla mesoides* SMIT, *Amphipsylla sibirica* (WAGN.) (BARTKOWSKA 1973), *Megabothris turbidus* (ROTHS.) (HAITLINGER 1971) a louse *Polyplax borealis* FERRIS (CAIS 1977) and a mite *Trichoecius tenax* (MICH.) (HAITLINGER 1980 b). Generally, in Poland 12 species of flea, 3 of louse, 6 *Prostigmata*, 18 *Mesostigmata* and 7 *Astigmata* were found on *P. tatricus*. This number, together with the very small range of this species places *P. tatricus* among mammals of highest faunistic variation of their arthropods and among the most infested (intensity of infestation).

Department of Zoology
Wrocław Academy of Agriculture
ul. Cybulskiego 20
50-205 Wrocław, Poland

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STRESZCZENIE

Z 15 gatunków gryzoni i owadożernych zebrano 6769 stawonogów należących do 83 gatunków. Stawonogi zbierano ze ssaków złowionych w reglu dolnym, górnym i piętrze kosodrzewiny. W reglu dolnym z 13 gatunków ssaków uzyskano 1510 stawonogów, należących do 67 gatunków. Stwierdzono 2 gatunki eudominantów, 4 dominantów i 1 subdominanta. W reglu górnym z 9 gatunków ssaków uzyskano 4148 stawonogów, należących do 70 gatunków. Stwierdzono 1 eudominanta, 3 dominanty i 5 subdominantów. W piętrze kosodrzewiny z 5 gatunków ssaków uzyskano 1111 stawonogów, należących do 38 gatunków. Stwierdzono 2 eudominanty, 1 dominanta i 4 subdominanty. Piętro kosodrzewiny cechuje daleko posunięte zubożenie fauny stawonogów oraz wysoka średnia intensywność zarażenia ssaków (34,9), dużo wyższa niż w obu reglach.

Najbogatsze w gatunki są *Mesostigmata* (38) i *Prostigmata* (19), najuboższe *Anoplura* (4). Także uboga jest fauna *Siphonaptera* (13), z tym iż najbardziej urozmaicona jest ona w reglu górnym.

Najbardziej urozmaiconą faunę stawonogów posiadają *Clethrionomys glareolus* (54 gatunki), *Pitymys tatricus* (44), *Sorex araneus* (43) i *Pitymys subterraneus* (39).

Podsumowano stan badań fauny stawonogów *P. tatricus*, ssaka żyjącego w Polsce tylko w Tatrach, Pilsku i na Babiej Górze. Ogółem stwierdzono na darniówce tatrzańskiej 46 gatunków stawonogów. Przy bardzo wąskim areale tego gatunku liczba ta stawia *P. tatricus* wśród ssaków z najbogatszą fauną stawonogów, a także wśród najsilniej zarażonych ssaków w Polsce.

Redaktor pracy: prof. dr A. Szeptycki