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# The State of Knowledge of Thrips (Insecta: Thysanoptera) of the Carpathian Mountains

W. SIERKA<sup>1\*</sup>, P. J. FEDOR<sup>2</sup>, L. VASILIU-OROMULU<sup>3</sup>,  
G. JENSER<sup>4</sup> and D. BĂRBUCEANU<sup>3</sup>

<sup>1</sup>Department of Zoology, Faculty of Biology and Environmental Protection, University of Silesia,  
Bankowa 9, 40-007 Katowice, Poland

<sup>2</sup>Department of Ecosozology, Faculty of Natural Sciences, Comenius University,  
Mlynská dolina, 842 15 Bratislava, Slovakia

<sup>3</sup>Institute of Biology, 296 Splaiul Independentei, P.O. Box 56-53, 060031 Bucharest, Romania

<sup>4</sup>Plant Protection Institute, Hungarian Academy of Sciences, P.O. Box 102, H-1525 Budapest, Hungary

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An overview is given on the thrips fauna from the Polish, Slovak and Romanian part of the Carpathians, a mountain chain in Central Europe. Records on the Thysanoptera of the Carpathians date back to 1902. A total of 205 thrips species have hitherto been recorded from this large part (79,1%) of the Carpathians. Endemics are *Aeolothrips verbasci*, *Hoplothrips absimilis* and *Oxythrips tatricus*. *Apterothrips secticornis* is the only glacial relict with boreoalpine distribution.

Keywords: thrips, Thysanoptera, Carpathians, Mountains, faunistic distribution.

The biodiversity of Thysanoptera in the Carpathians is relatively well studied. The thrips fauna of this Central European region has been investigated by many authors. So far fourteen naturalists have collected information on thrips species within many mountainous areas of the Carpathians (Tables 1, 2, 3). The history of research into thrips fauna of the Polish, Slovak and Romanian Carpathian regions started over 105 years ago. Most thrips diversity must be derived from results of investigations in occasional communities of insects. Many years' studies focusing on qualitative and quantitative composition of thrips fauna were conducted more rarely. This is the first overview of the Carpathian Thysanoptera.

**Table 1**

Number of Thysanoptera species in areas of the Polish Carpathians

No.	Area	Number of species	Reference(s)
1	Beskid Śląski Hills	17	Zawirska, 1988
2	Beskid Mały Hills	45	Pokuta, 1991
3	Beskid Sądecki Hills	46	Schille, 1902, 1905, 1911a; Zawirska, 1988
4	Pieniny Hills	2	Zawirska, 1987, 1988
5	Tatra Mountains	5	Schille, 1911b; Zawirska, 1988
6	Bieszczady Hills	9	Zawirska, 1987, 1988
	Babia Góra Massif	63	Kucharczyk et al., in this issue
	Total number of species	103	

\* Corresponding author; e-mail: wojciech.sierka@gmail.com

**Table 2**

Number of Thysanoptera species in areas of the Slovak Carpathians

No.	Area(s)	Number of species	Reference(s)
7–12	Mountains (including: 7: Vysoké Tatry, 8: Veľká Fatra, 9: Malá Fatra, 10: Vihorlatské vrchy, 11: Slovenský Kras, 12: Štiavnické pohorie)	56	Kratochvíl, 1939a, b; Pelikán, 1951a, b, 1952, 1954, 1955, 1957, 1958, 1961, 1965, 1990
13	Little Carpathians	44	Dobrovodská, 1973
14	Jurský Šúr (at the foot of the Little Carpathians)	98	Hešková, 1967; Pelikán, 1992; Fedor, 2003, 2004; Fedor et al., 2001; Sierka, 2003, 2004, 2005, 2006; Sierka and Halgoš, 2003
15	Devínska Kobyla	55	Pelikán, 1951a, 1952; Fedor, in press
Total number of species:		135	

**Table 3**

Number of Thysanoptera species in areas of the Romanian Carpathians

No.	Area	Number of species	References
16	Piatra Craiului Massif	14	Knechtel, 1937,
17	Retezat Massif	46	1952, 1956, 1963;
18	Făgăraș Massif	29	Vasiliiu 1969, 1971, 1975;
19	Bucegi Massif	87	Vasiliiu-Oromulu 1989, 1993,
20	Gârbova Massif	77	1995, 1998a, b, 1999a, b, 2000,
21	Gurghiuului Mts	38	2001, 2002a, b, 2004a, b;
22	Cozia Mts	1	Jenser et al., 2003
23	Cerna Mts	26	
24	Giupalău Mts	6	
25	Țarcuului Mts	24	
26	Apuseni Mts	18	
27	Călimani Mts	23	
28	Moldavian Plateau	34	
29	Transylvanian Plateau	113	
Total number of species		158	

*Study area*

The data on thrips presented here come from the Polish, Slovak and Romanian sections of the Carpathians (and adjacent areas) comprising 29 regions (*Fig. 1*). The Carpathian

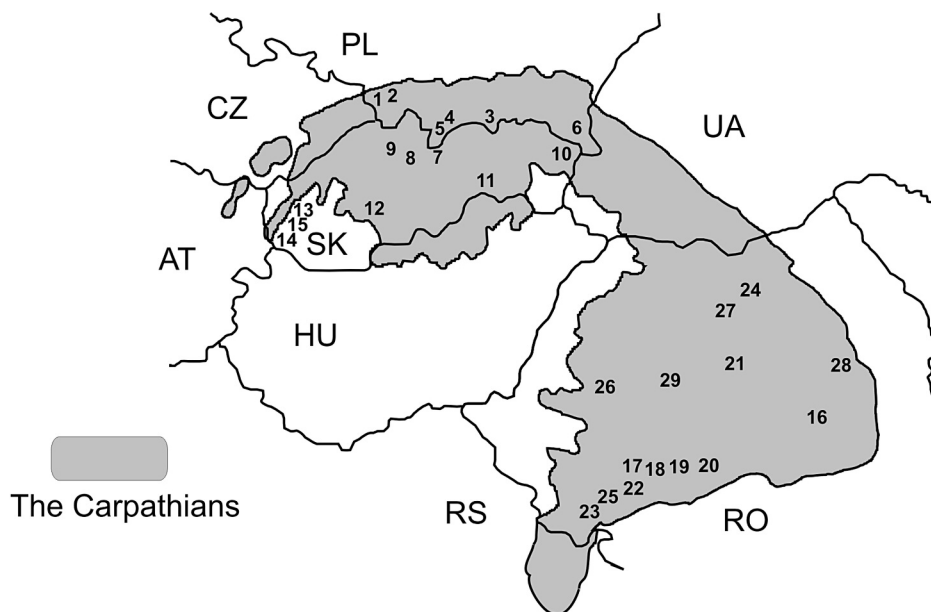


Fig. 1. Carpathian areas investigated on Thysanoptera in Poland (PL), Slovakia (SK) and Romania (RO). The numbers refer to areas given in *Table 1–3* (drawn by W. Sierka)

Mountains constitute a vast mountain range located in the territory of seven (or eight) European countries. The total area of the Carpathians is estimated as follows in individual countries: Romania (55.5%), Slovakia (14.3%), Ukraine (10.3%), Poland (9.3%), the Czech Republic (6.0%), Hungary (4.3%), and Austria (0.2%); some sources add a part of Serbia to the list. In the West the Carpathians border the Alps and begin directly north of the Danube river near Bratislava. They surround Transcarpathia and Transylvania in a large semicircle, sweeping towards the south-west, and at its southern part it borders the Balkan Mountains and ends also directly north of the Danube near Orşova, in Romania. The total length of the Carpathians is over 1500 km and the mountain chain's width varies between 12 and 500 km. The greatest width of the Carpathians corresponds with its highest altitudes. The system attains its greatest breadth in the Transylvanian plateau and in the meridian of the Tatra group.

Although commonly referred to as a mountain chain, the Carpathians do not actually form an uninterrupted chain of mountains. Rather, they consist of several orographically and geologically distinctive groups, presenting as great a structural variety as the Alps. The Carpathians, which in only a few places attain an altitude of over 2500 m, lack the bold peaks, extensive snow-fields, large glaciers, high waterfalls, and numerous large lakes that are common in the Alps. No area of the Carpathian range is covered in snow year-round. The Carpathians at their highest altitude are only as high as the Middle Region of the Alps, with which they share a common appearance, climate, and flora.

## Nomenclature

Names of the thrips species and their systematic position presented in this work were established according to Schliephake and Klimt (1979) and zur Strassen (2003). The number of thrips presented here is a result of review of the literature, which has led to updating of species and generic names of thrips as a consequence of developments in this branch of knowledge (Table 4).

**Table 4**

Current synonyms of Carpathian thrips species

Valid name	Synonym
<i>Bolothrips icarus</i> (Uzel, 1895)	<i>Nesothrips icarus</i> (Uzel, 1895)
<i>Dictyothrips betae</i> Uzel, 1895	<i>Anaphothrips omissus</i> Priesner, 1924
<i>Hoplandrothrips famelicus</i> (Priesner, 1926)	<i>Cryptaplothrips famelicus</i> Priesner, 1926
<i>Hoplothrips lichenis</i> Knechtel, 1954	<i>Haplothrips lichenis</i> *
<i>Liothrips setinodis</i> (Reuter, 1880)	<i>Liothrips hradecensis</i> Uzel, 1895
<i>Melanthrips fuscus</i> (Sulzer, 1776)	<i>Melanthrips gracilicornis</i> Maltb�ck, 1930
<i>Mycterothrips albidicornis</i> (Knechtel, 1923)	<i>Physothrips albidicornis</i> (Knechtel, 1923)
<i>Mycterothrips latus</i> (Bagnall, 1912)	<i>Taeniothrips latus</i> (Bagnall, 1912)
<i>Mycterothrips salicis</i> (Reuter, 1878)	<i>Physothrips salicis</i> (Reuter, 1878)
<i>Pezothrips dianthi</i> (Priesner, 1921)	<i>Ceratothripoides dianthi</i> (Priesner, 1921)
	<i>Taeniothrips dianthi</i> Priesner, 1921
	<i>Thrips dianthi</i> (Priesner, 1921)
<i>Rubiothrips silvarum</i> (Priesner, 1920)	<i>Anaphothrips silvarum</i> Priesner, 1920
<i>Rubiothrips validus</i> (Karny, 1909)	<i>Anaphothrips validus</i> Karny, 1909
<i>Sphaeropothrips vittipennis</i> (Bagnall, 1927)	<i>Baliothrips vittipennis</i> Bagnall, 1927
<i>Tenothrips frici</i> (Uzel, 1895)	<i>Thrips fri�i</i> *
<i>Tenothrips reichardti</i> (Priesner, 1926)	<i>Ceratothrips reichardti</i> (John, 1923)*
<i>Thrips atratus</i> Haliday, 1836	<i>Taeniothrips atratus</i> (Haliday, 1836)
	<i>Similothrips atratus</i> (Haliday, 1836)
	<i>Taeniothrips montanus</i> Priesner, 1920
	<i>Thrips montanus</i> (Priesner, 1920)
<i>Thrips juniperinus</i> Linnaeus, 1758	<i>Thrips carpathicus</i> Knechtel, 1948
<i>Thrips palustris</i> Reuter, 1899	<i>Thrips paluster</i> *
<i>Thrips trehernei</i> Priesner, 1927	<i>Thrips hukkineni</i> Priesner, 1937
<i>Thrips trybomi</i> (Karny, 1908)	<i>Taeniothrips trybomi</i> (Karny, 1908)
<i>Thrips vulgatissimus</i> Haliday, 1836	<i>Taeniothrips vulgatissimus</i> (Haliday, 1836)
<i>Thrips pini</i> (Uzel, 1895)	<i>Taeniothrips laricivorus</i> Kratochvil and Farsky, 1942
	<i>Taeniothrips pini</i> (Uzel, 1895)
	<i>Thrips laricivorus</i> (Kratochvil and Farsky, 1942)

\* clerical error

### *The Thysanoptera of the Carpathians*

Detailed analysis of thysanopterological reports resulted in establishment of 205 thrips species (143 Terebrantia and 62 Tubulifera) in the analysed region of the Carpathians (Table 5). The Order Thysanoptera in the whole area is represented by 143 species belonging to the suborder Terebrantia and 62 species from suborder Tubulifera. The Alpine Thysanoptera has not been studied for the total region, but a good study on its vertical distribution is given by Pelikán (1996).

The Carpathian insects of this order represent 40.45% of the total Thysanoptera fauna of Poland, 89.40% of Slovakia, and 69.64% of Romania. Among the 205 species of thrips so far recorded from three analysed countries (Table 5), *Aeolothrips intermedius*, *Frankliniella intonsa*, *Chirothrips manicatus* were present the most often. More than 60 species have been recorded only once, out of which several were observed before World War II. Carpathian endemics are *Aeolothrips verbasci* Knechtel, *Hoplothrips absimilis* Knechtel (both from Romania), *Oxythrips tatricus* Pelikan (from Poland and Slovakia), while in the Romanian part collected *Apterothrips secticornis* (Trybom) is the only glacial relict with boreoalpine distribution.

The thrips fauna of the Carpathian Mountains naturally reflects the diversity of ecological conditions, specific for this region. It includes xerothermophilous species as well as mesophilous, hygrophilous and skiophilous ones. Except for cosmopolitan species and thrips common in Central Europe, the spectrum includes some other interesting and often rare insects. The Carpathians provide suitable conditions for Pannonian and Submediterranean species (e.g. *Aptinothrips elegans* Priesner), xerothermophilous and infiltrating from the south, especially from warmer regions of Europe. On the other hand, mountainous regions usually with low stands of *Pinus mugo* and *Pinus cembra*, are rich in psychrophilous thrips, such as *Oxythrips tatricus*. Other typical mountain species include: *Haplothrips alpester* Priesner, *H. alpicola* Priesner, *Hoplothrips carpathicus* Pelikán, *O. tatricus*, *Thrips herricki* Bagnall and *Thrips trybomi* (Karny).

### *Thysanoptera of the Polish Carpathians*

The first Polish results of investigation of Carpathian thrips provide information concerning the insects collected by Schille in the valley of the Poprad River in the Beskid Sądecki Hills and the Tatra Mountains (Schille, 1902, 1905, 1911a, b). It is worth noting that in the material collected by Schille, two thrips species were new to the world fauna: *Ankothrips niezabitoskii* (Schille) and *Scolothrips uzeli* (Schille).

Strictly speaking, a vast majority of Polish data on thrips of the Carpathians come from the Beskid Sądecki Hills, where they were collected and studied not only by Schille, but also by Pokuta (1991) and Zawirska (1988). There are also fragmentary data on thrips of the Polish Eastern Beskids – the Bieszczady Hills (Zawirska, 1988), which border in the south the Bukovské Vrchy of Slovakia and Ukraine. In the higher portions of the Polish Carpathians, especially in the Tatra Mountains, thrips were collected by Schille (1911b) and Zawirska (1988).

Table 5

Thysanoptera of the Polish (PL), Slovak (SK) and Romanian (RO) Carpathians

Species	PL	SK	RO	Species	PL	SK	RO
TEREBRANTIA				<i>Ceratothrips ericae</i>	X	X	
AEOLOTHIRIPIDAE				<i>Chirothrips aculeatus</i>	X	X	X
<i>Aeolothrips albicinctus</i>	X	X	X	<i>C. ambulans</i>	X	X	
<i>A. astutus</i>			X	<i>C. hamatus</i>	X	X	X
<i>A. ericae</i>	X	X	X	<i>C. manicatus</i>	X	X	X
<i>A. fasciatus</i>	X*	X	X	<i>C. molestus</i>		X	
<i>A. intermedius</i>	X	X	X	<i>C. pallidicornis</i>	X	X	
<i>A. melaleucus</i>	X*	X	X	<i>C. ruptipennis</i>			X
<i>A. propinquus</i>		X		<i>Dendrothrips degeeri</i>		X	X
<i>A. verbasci</i>			X	<i>D. ornatus</i>	X	X	X
<i>A. versicolor</i>	X	X		<i>D. saltatrix</i>	X	X	X
<i>A. vittatus</i>	X		X	<i>Dictyothrips betae</i>		X	X
<i>Ankothrips niezabitoskii</i>	X	X		<i>Drepanothrips reuteri</i>		X	
<i>Melanthrips acetosellae</i>		X		<i>Firmothrips firmus</i>	X		X
<i>M. fuscus</i>	X	X	X	<i>Frankliniella intonsa</i>	X	X	X
<i>M. knechteli</i>			X	<i>F. pallida</i>	X	X	X
<i>M. pallidior</i>	X	X	X	<i>F. schultzei</i>			X
<i>Rhipidothrips elegans</i>		X		<i>F. tenuicornis</i>	X	X	X
<i>R. graciosus</i>		X	X	<i>Hemianaphothrips articulosus</i>			X
THRIPIDAE				<i>Idolimotheus paradoxus</i>			X
<i>Anaphothrips atroapterus</i>			X	<i>Iridothrips iridis</i>	X	X	
<i>A. badius</i>		X	X	<i>I. mariae</i>			X
<i>A. euphorbiae</i>	X	X	X	<i>Kakothrips dentatus</i>			X
<i>A. obscurus</i>	X	X	X	<i>K. robustus</i>	X	X	X
<i>Apterothrips secticornis</i>			X	<i>Limothrips cerealium</i>		X	X
<i>Aptinothrips elegans</i>	X	X	X	<i>L. angulicornis</i>		X	
<i>A. karnyi</i>		X	X	<i>L. consimilis</i>	X	X	X
<i>A. rufus</i>	X*	X	X	<i>L. denticornis</i>	X	X	X
<i>A. stylifer</i>	X	X	X	<i>L. schmutzi</i>			X
<i>Baliothrips dispar</i>	X	X	X	<i>Mycterothrips albidicornis</i>		X	X
<i>Belothrips acuminatus</i>		X		<i>M. annulicornis</i>			X
<i>B. morio</i>		X		<i>M. consociatus</i>	X		
<i>Bolacothrips jordani</i>		X		<i>M. latus</i>		X	

Table 5 (Cont.)

Species	PL	SK	RO	Species	PL	SK	RO
<i>M. salicis</i>	X	X	X	<i>T. discolor</i>			X
<i>Neohydatothrips abnormis</i>	X*	X	X	<i>T. frici</i>	X	X	X
<i>N. gracilicornis</i>	X	X	X	<i>T. reichardti</i>	X		
<i>Odontothrips biuncus</i>	X		X	<i>Theilopodothrips pilosus</i>		X	
<i>O. confusus</i>		X	X	<i>Thrips alni</i>	X	X	X
<i>Odontothrips dorycnii</i>			X	<i>T. albopilosus</i>	X*	X	X
<i>O. intermedius</i>			X	<i>T. angusticeps</i>	X	X	
<i>O. loti</i>	X	X	X	<i>T. atratus</i>	X	X	X
<i>O. meliloti</i>		X	X	<i>T. brevicornis</i>	X	X	X
<i>O. meridionalis</i>		X		<i>T. calcaratus</i>	X		X
<i>O. phaleratus</i>	X	X	X	<i>T. conferticornis</i>	X		X
<i>Oxythrips ajugae</i>	X	X		<i>T. crassicornis</i>	X		X
<i>O. bicolor</i>	X	X	X	<i>T. difficilis</i>			X
<i>O. priesneri</i>		X		<i>T. dilatatus</i>	X	X	X
<i>O. taticus</i>	X*	X		<i>T. discolor</i>	X		X
<i>O. ulmifoliorum</i>		X	X	<i>T. euphorbiae</i>			X
<i>Pezothrips dianthi</i>		X	X	<i>T. flavus</i>	X	X	X
<i>P. frontalis</i>		X		<i>T. fulvipes</i>		X	
<i>Platythrips tunicatus</i>		X	X	<i>T. fuscipennis</i>	X	X	X
<i>Prosopothrips vej dovskyi</i>	X	X	X	<i>T. herricki</i>		X	
<i>Rhaphidothrips longistylosus</i>	X	X	X	<i>T. incognitos</i>			X
<i>Rubiothrips ferrugineus</i>	X	X	X	<i>T. juniperinus</i>	X*	X	X
<i>R. silvarum</i>		X	X	<i>T. klapaleki</i>			X
<i>R. sordidus</i>	X	X		<i>T. linarius</i>		X	X
<i>R. validus</i>		X	X	<i>T. major</i>	X	X	X
<i>Scolothrips uzeli</i>	X			<i>T. mancosetosus</i>	X		
<i>Sericothrips bicornis</i>	X*		X	<i>T. minutissimus</i>	X	X	X
<i>S. staphylinus</i>			X	<i>T. nigropilosus</i>	X	X	X
<i>Sminyothrips biuncatus</i>			X	<i>T. palustris</i>		X	
<i>Sphaerophothrips vittipennis</i>		X	X	<i>T. pelikani</i>			X
<i>Stenothrips graminum</i>	X*	X	X	<i>T. physapus</i>	X	X	X
<i>Taeniothrips inconsequens</i>	X*		X	<i>T. pillichi</i>	X	X	X
<i>T. picipes</i>	X	X	X	<i>T. pini</i>	X*	X	X
<i>Tenothrips croceicollis</i>			X	<i>T. praetermissus</i>		X	X



Table 5 (Cont.)

Species	PL	SK	RO	Species	PL	SK	RO
<i>T. robustus</i>			X	<i>H. leucanthemi</i>	X	X	X
<i>T. sambuci</i>		X	X	<i>H. minutus</i>	X		X
<i>T. tabaci</i>	X	X	X	<i>H. niger</i>		X	X
<i>T. timidus</i>			X	<i>H. nigricans</i>			X
<i>T. trehernei</i>	X	X	X	<i>H. pannonicus</i>		X	X
<i>T. trybomi</i>	X	X	X	<i>H. phyllophilus</i>	X	X	X
<i>T. urticae</i>	X	X		<i>H. propinquus</i>	X*		
<i>T. validus</i>	X	X	X	<i>H. reuteri</i>			X
<i>T. verbasci</i>			X	<i>H. setiger</i>	X*	X	X
<i>T. viminalis</i>		X	X	<i>H. statices</i>			X
<i>T. vulgatissimus</i>	X	X	X	<i>H. subtilissimus</i>	X	X	X
<i>Tmetothrips subapterus</i>	X		X	<i>H. tritici</i>		X	X
TUBULIFERA				<i>H. vUILLETi</i>		X	
PHLAEOTHIRIPIDAE				<i>Hoplandrothrips bidens</i>	X	X	X
<i>Acanthothrips nodicornis</i>	X		X	<i>H. famelicus</i>		X	
<i>Bolothrips bicolor</i>		X	X	<i>H. hungaricus</i>			X
<i>B. dentipes</i>		X		<i>H. williamsianus</i>		X	
<i>B. icarus</i>		X	X	<i>Hoplothrips absimilis</i>			X
<i>Cephalothrips monilicornis</i>	X	X	X	<i>H. carpathicus</i>		X	
<i>Compsothrips uzeli</i>			X	<i>H. corticis</i>	X		X
<i>Cryptothrips nigripes</i>	X		X	<i>H. lichenis</i>			X
<i>H. acanthoscelis</i>		X	X	<i>H. pedicularius</i>	X		
<i>H. aculeatus</i>	X	X	X	<i>H. quercinus</i>			X
<i>H. alpester</i>	X	X	X	<i>H. semicaecus</i>	X		
<i>H. alpicola</i>	X			<i>H. ulmi</i>			X
<i>H. angusticornis</i>	X*	X	X	<i>Liothrips austriacus</i>		X	X
<i>H. crassicornis</i>		X		<i>L. pragensis</i>		X	X
<i>H. dianthinus</i>		X		<i>L. setinodis</i>	X	X	X
<i>H. distinguendus</i>	X	X	X	<i>Maderothrips longisetis</i>			X
<i>H. dudichi</i>		X		<i>Megalothrips bonannii</i>			X
<i>H. flavicinctus</i>		X	X	<i>Megathrips lativentris</i>		X	X
<i>H. juncorum</i>			X	<i>Neoheegeria verbasci</i>			X
<i>H. knechteli</i>			X	<i>Pezidothrips robiniae</i>			X
<i>H. kurdjumovi</i>		X	X	<i>Phlaeothrips albivittatus</i>	X		

Table 5 (Cont.)

Species	PL	SK	RO	Species	PL	SK	RO
<i>P. annulipes</i>		X		<i>Priesneriella clavicornis</i>			X
<i>P. bispinosus</i>			X	<i>Thorybothrips unicolor</i>	X		
<i>P. coriaceus</i>	X	X	X	<i>Xylaplothrips fuliginosus</i>	X	X	X
<i>P. pillichianus</i>			X	Total number of species	89 + *14	135	158
<i>Poecilothrips albopictus</i>			X				

\* = Additional data from Kucharczyk et al., in this issue

Recently Kucharczyk et al. (2008) investigated the Babia Góra Massif and added 14 species to the list. Altogether, from the Polish part of the Carpathian region, 103 species have so far been reported (Table 5).

#### *Thysanoptera of the Slovak Carpathians*

Although research on thrips in Slovakia has not been very intensive and detailed yet, there are numerous faunistic data resulting in a list of 136 species (Table 5). Many faunistic records are from mountainous areas including Vysoké Tatry and neighbouring Veľká Fatra and Malá Fatra, as well as Vihorlatské vrchy, Slovenský Kras and Štiavnické foothills (Table 2). Moreover, also a certain amount of data were derived from sampling in the Little Carpathians and related areas: Šúr and Devínska Kobyla.

#### *Thysanoptera of the Romanian Carpathians*

Investigation of the thrips fauna of the Romanian Carpathians has been conducted within many parts of the Carpathian chain with numerous massifs, mountain chains, subcarpathian hills and the Transylvanian and the Moldavian Plateau.

The bibliography on the Romanian Carpathian Thysanoptera fauna consists mainly of works by W. K. Knechtel and L. Vasiliu-Oromulu (Table 3). It leads to a list of 158 thrips species (Table 5).

#### *Future prospects*

Further research on the distribution of Thysanoptera in the Carpathians should be carried out. Many habitats in which thrips frequently occur (e.g. decaying logs, branches and twigs of trees and bushes, and litter) have not been examined seriously. Moreover, the use of other collecting methods (e.g. glycol traps) will certainly bring new data concerning thrips of the entire Carpathian region.

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