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Orthoptera species of European importance in Slovakia

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Abstract

Among ten Orthoptera species of European Community interest (Council Habitats Directive of 1992), three Ensifera and three Caelifera species are present in Slovakia: *Isophya stysi, Saga pedo, Pholidoptera transsylvanica, Paracaloptenus caloptenoides, Odontopodisma rubripes* and *Stenobothrus eurasius.* The paper summarizes all original published data on the geographical distribution of these species in Slovakia and presents some notes to their ecological requirements. In addition, the paper deals with the distribution of the six species in relation to orographical and zoogeographical units of Slovakia.

Zusammenfassung

Von zehn im Rahmen der Fauna-Flora-Habitat-Richtlinie der Europäischen Gemeinschaft (92/43/EWG) als Tierarten von gemeinschaftlichem Interesse eingestuften Orthopteren kommen drei Langfühler- und drei Kurzfühlerschreckenarten in der Slowakischen Republik vor: *Isophya stysi, Saga pedo, Pholidoptera transsylvanica, Paracaloptenus caloptenoides, Odontopodisma rubripes* und *Stenobothrus eurasius.* Nachfolgend sind alle bekannten Verbreitungsdaten dieser Arten in der Slowakischen Republik zusammengestellt, teilweise mit Anmerkungen zu ihren ökologischen Ansprüchen. Ferner wird der Zusammenhang der Verbreitungsmuster der sechs Arten mit der zoogeographischen und orographischen Gliederung der Slowakischen Republik diskutiert.

Introduction

In connection with the establishment of the network NATURA 2000, the European Community accepted the basic document Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora ("Habitats Directive"). As listed in the Habitats Directive, Member States are obliged to design measures to maintain or restore favourable conservation status of habitats and species of Community interest. In Slovakia, it has been shown during working out the criteria to define the species favourable conservation status, that there is a lack of authentic data on invertebrates, including orthopterans, so an objective assessment of particular species in relation to their protection was difficult.

In general, it can be stated that the knowledge of the distribution, abundance and ecological requirements of orthopteran species of Community interest in Slovakia is sketchy and certainly not sufficient and satisfactory. In many cases there are available only older published data that need to be verified and updated. The

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insufficiency of the information can also be documented by the fact that new localities of these species, even new species of Community interest that have not been reported from Slovakia before, still appear (e.g. *Paracaloptenus caloptenoides*). General distribution data on these species were given by KOČÁREK et al. (2005).

Main goal of the paper is to sum up the data on the occurrence of the Orthoptera species of Community interest in Slovakia, to give short notices to ecological requirements of some species in Slovakia, and to describe the occurrence of these taxa within orographical and zoogeographical units of Slovakia.

Methods

The data about the distribution of particular species come from literature. Only original published data were considered. The occurrences of particular species are according to quadrates and orographical units of the Databank of Slovak Fauna (DFS). DFS is integrated information system on distribution and diversity of fauna in Slovakia; with the grid map consisting of 10,5 x 11 km quadrates (e.g. STLOUKAL 2002). There are four-digit codes of the DFS quadrates listed behind the names of localities in round brackets.

Distribution of Orthoptera species of Community interest

At present, six Orthoptera species (from 10 species in total) of Community interest, that are listed in Annexes of Habitats Directive, are present in Slovakia: *Isophya stysi, Pholidoptera transsylvanica, Saga pedo, Paracaloptenus caloptenoides, Odontopodisma rubripes* and *Stenobothrus urasius*. In Annex II (the species whose conservation requires the designation of special areas of conservation) there are listed five species occurring in Slovakia, whereas in Annex IV (the species of Community interest in need of strict protection) there are registered all six Slovak orthopterans.

Isophya stysi Čejchan, 1957

I. stysi (Fig. 1) is a Carpathian species which occurs in Hungary, Poland, Romania, Slovakia and Ukraine (ČEJCHAN 1958, 1989, HELLER 2004, HELLER et al. 2004). It is considered to be only the subspecies *I. modestior stysi* Čejchan, 1957 in Poland (BAZYLUK & LIANA 2000). The species was described from the Slovakian locality Ulič (Rožok National Nature Reserve) in Bukovské vrchy Mts. (ČEJCHAN 1957). It is a planticolous species living mostly at copious meadows (HARZ 1969), where it can be found mostly on higher forb vegetation and on bushes (ČEJCHAN 1958, GAVLAS 2004a).

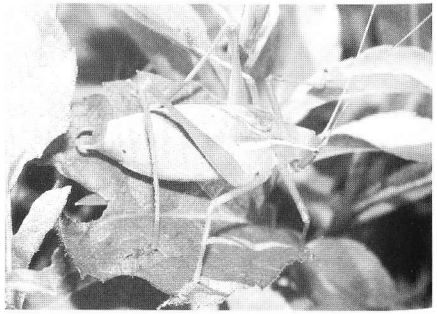

Fig. 1: Male of *Isophya stysi*.

In Slovakia, it occurs in eastern part of the country (Fig. 5). Older original data come from the orographical unit Bukovské vrchy Mts. (ČEJCHAN 1958) and from Vihorlatské vrchy Mts. (ČEJCHAN 1981). Currently, also data from other localities of E Slovakia are known. The western-most locality is located in Slanské vrchy Mts. (NAGY et al. 1998). In addition to these findings, *I. stysi* was currently found in Laborecká vrchovina Mts. (CHLÁDEK & GAVLAS 2004). *I. stysi* inhabits semi-natural, extensively used or abandoned grasslands with higher forb vegetation in Slovakia (but see KOČÁREK et al. 2005). It seems to prefer mesic habitats, though it can be found in sub-xeric and humid sites, as well. It lives also on higher vegetation around bushes, in forest margins, along forest roads etc. It is regarded as a data defficient taxon (DD) in the national red-list (KRIŠTÍN 2001).

Newer data (after 1975):

Bukovské vrchy Mts.
Ruský Potok (6900): GAVLAS (2004a).
Nová Sedlica (6901): CHLÁDEK & GAVLAS (2004).

Vihorlatské vrchy Mts.
Remetské Hámre (7199): ČEJCHAN (1981) - as *Isophya modestior stysi*.

Slanské vrchy Mts.
Zlatá Baňa - Pusté Pole (7094): NAGY et al. (1998).

Laborecká vrchovina Mts.
Hankovce (6997): CHLÁDEK & GAVLAS (2004).
Dedačov (6997): CHLÁDEK & GAVLAS (2004).

Older data (before 1975) - unconfirmed:

Bukovské vrchy Mts.
Ulič - Rožok (7000): ČEJCHAN (1957, 1958).

Saga pedo (Pallas, 1771)

S. pedo is a Ponto-Mediterranean species (e.g. VIDLIČKA et al. 2002). According to INGRISCH & KÖHLER (1998), it has Westernsiberian-European range and Paleo-Aegean origin. It is known from Albania, Austria, Bosnia and Herzegovina, Bulgaria, Corsica, Croatia, Czech Republic, European Turkey, France, Hungary, Italy, Macedonia, Portugal, Romania, Russia, Sardinia, Sicily, Slovakia, Slovenia, Spain, Switzerland, Ukraine and Yugoslavia (HELLER 2004). Regarding ecological requirements, it is a thermophilous pratinicolous bush-cricket (INGRISCH & KÖHLER 1998).

The distribution of *S. pedo* throughout Slovakia is relatively well-known and it was presented by VIDLIČKA et al. (2002). From that reason only a DFS grid map with the occurrence of this species is given in this place (Fig. 5). However, newer data from the locality Višňové - Čachtice Castle hill (7272) published by CHLÁDEK & LUKÁŠ (2003) should be filled up to obtain general image of the occurrence of this species in Slovakia. I also argue that the orographical unit Beskydské predhorie listed in the mentioned paper (VIDLIČKA et al. 2002) should be replaced with Spišsko-šarišské medzihorie. Furthermore, the data from Zádielska dolina (KLINDA 1985, in VIDLIČKA et al. 2002) cannot be regarded as original, that is why

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it is not considered in this paper. *S. pedo* is an endangered (EN) species in Slovakia (KRIŠTÍN 2001).

***Pholidoptera transsylvanica* (Fischer, 1853)**

Ph. transsylvanica is a Southeast-European species occurring in Croatia, Hungary, Romania, Slovakia and Yugoslavia (HELLER 2004). Its occurrence in Bosnia and Herzegovina is doubtful (HARZ 1969, HELLER 2004). In accordance to MAŘAN (1953) and ČEJCHAN (1958, 1989), it is also present in Ukraine; in addition, ČEJCHAN (1958) mentioned it from Bulgaria. *Ph. transsylvanica* is a silvicolous and pratinicolous species (e.g. ČEJCHAN 1989), living mostly in semi-dry forest and grassy habitats (JORDÁN et al. 2003).

In Slovakia, this species, like *I. stysi*, occurs in eastern part of the country (Fig. 5). The finding in Považský Inovec Mts. near Moravany nad Váhom (GÖRTLER 1946) is rather doubtful, probably it was mistaken for other related species. The first mention of *Ph. transsylvanica* comes from Bukovské vrchy Mts. (CHYZER 1897), where it also was recorded at several sites later by MAŘAN (1953) and by KRIŠTÍN & MIHÁL (2000). Next original data are from Vihorlatské vrchy Mts. (MAŘAN 1953, GULIČKA 1967, HOLUŠA 1996), Slanské vrchy Mts. (ČEJCHAN 1958), Volovské vrchy Mts. (CHLÁDEK 1968, 2003) and Laborecká vrchovina Mts. (CHLÁDEK & GAVLAS 2004). The species can be found mostly on bushy slopes, forest margins and clearings and partially in more preserved grass-forb stands in Slovakia. In the national red-list (KRIŠTÍN 2001), it is among vulnerable (VU) taxa.

Newer data (after 1975):

Bukovské vrchy Mts.
Slatina pod Stinskou (Stinská slatina National Nature Reserve) (6901): KRIŠTÍN & MIHÁL (2000).

Vihorlatské vrchy Mts.
Vihorlat - saddle between Mt. Malé Tŕstie and Mt. Motrogon (7198): HOLUŠA (1996).

Laborecká vrchovina Mts.
Hankovce (6997): CHLÁDEK & GAVLAS (2004).

Older data (before 1975) - unconfirmed:

Bukovské vrchy Mts.
Runina (as Runyina) (6900): CHYZER (1897).
Bukovce - Stužica (6901): MAŘAN (1953).

Vihorlatské vrchy Mts.
Vihorlat (7198): MAŘAN (1953).
Remetské Hámre (7199): GULIČKA (1967).

Slanské vrchy Mts.
Šimonka (7094): Čejchan (1958).

Volovské vrchy Mts.
Zlatý stôl - Soľná lúka (7289): CHLÁDEK (1968, 2003).
Zlatý stôl - Volovec a Skalisko (7289): CHLÁDEK (2003).

?Považský Inovec Mts.?
?Moravany nad Váhom (7373): GÖRTLER (1946) - improbable data.

***Paracaloptenus caloptenoides* (Brunner von Wattenwyl, 1861)**

P. caloptenoides (Fig. 2, 3) is a grasshopper species with southeast-European continental distribution and Ponto-Mediterranean origin (INGRISCH & KÖHLER 1998). Its reported from Albania, Austria, Bosnia and Herzegovina, Bulgaria, Croatia, European Turkey, Greece, Hungary, Macedonia, Moldavia, Romania, Slovenia, Ukraine, Yugoslavia and from Near East (HELLER 2004). The species is considered to be extinct in Lower Austria (BERG & ZUNA-KRATKY 1997). *P. caloptenoides* is a thermophilous animal which prefers mainly dry and warm rocky hillsides and places with bare soil, sparsely covered with vegetation. It can be found in forests, too (HARZ 1975, INGRISCH & KÖHLER 1998).

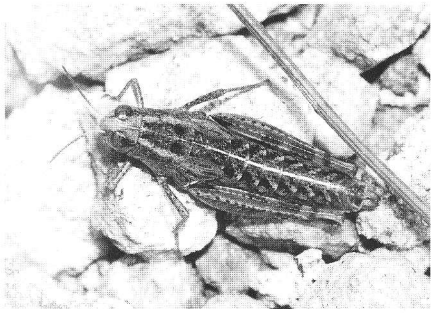

Fig. 2: Female of *P. caloptenoides*.

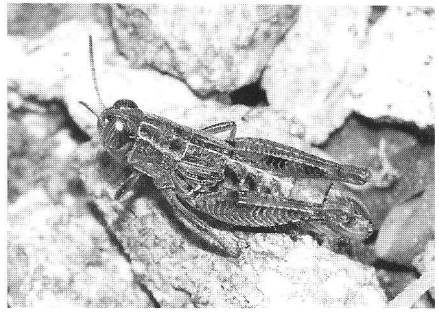

Fig. 3: Male of *P. caloptenoides*.

The first record of this species from Slovakia comes only from 2004 (GAVLAS 2004b). It was found only in one locality (Fig. 5) in the central part of Štiavnické vrchy Mts., which is situated on the northern edge of its geographical range. At this site, *P. caloptenoides* occurs in warm and dryer habitat with thinner grass-forb cover on gravelly or clayey substratum. Because of the late finding of this species, it has not been involved in the Slovak red-list yet (cf. KRIŠTÍN 2001).

Newer data (after 1975):

Štiavnické vrchy Mts.
Ilija (7679): GAVLAS (2004b).

***Odontopodisma rubripes* Ramme, 1931**

O. rubripes is an East-Carpathian species occurring in Bulgaria, Hungary, Romania, Slovakia and Ukraine (HELLER 2004). It is an arbusticolous grasshopper living especially on shrubs (e.g. HARZ 1975, ČEJCHAN 1989).

Only two original records of this rare species from two localities in eastern Slovakia are known (Fig. 5). The first record comes from Bukovské vrchy Mts. (MAŘAN 1954), the second one is from Vihorlatské vrchy Mts. (HOLUŠA 1996). In the second locality it was found in the bramble-bush growth (*Rubus* sp.). In the national red-list, it is regarded as a data defficient (DD) taxon (KRIŠTÍN 2001).

Newer data (after 1975):

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Vihorlatské vrchy Mts.
Vihorlat - saddle between Mt. Tŕstie and Mt. Motrogon (7198): HOLUŠA (1996).

Older data (before 1975) - unconfirmed:

Bukovské vrchy Mts.
Uličˇ (7000): MAŘAN (1954).

***Stenobothrus eurasius* Zubovskii, 1898**

S. eurasius (Fig. 4) has Southeast-europe-Siberian distribution and Angarian or Pontic origin (INGRISCH & KÖHLER 1998). It is present in Austria, Czech Republic, Greece, Hungary, Moldavia, Romania, Russia, Slovakia, Ukraine and East Palearctis (HARZ 1975, HELLER 2004). In terms of ecological requirements, it is considered to be a xerothermophilous pratinicolous and graminicolous species (HARZ 1975, INGRISCH & KÖHLER 1998).

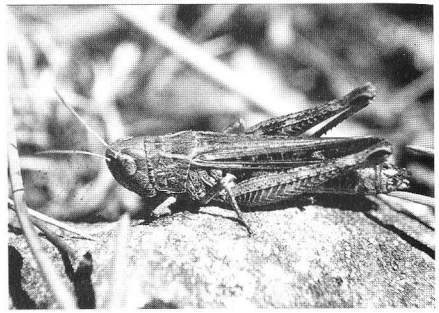

Fig. 4: Female of *S. eurasius*.

In Slovakia, it comes as *S. eurasius slovacus* Mařan, 1958, which was described on the base of individuals from Slovak Karst (MAŘAN 1958). Several other original data on the occurrence of this taxon were published from this territory (ČEJCHAN 1959, CHLÁDEK 1988, 1994, HOLUŠA 1996, GAVLAS 2003, GAVLAS 2005). In addition to the Slovak Karst area, *S. eurasius* was recorded in Strážovské vrchy Mts., Tríbeč Mts. (CHLÁDEK 1988) and Vihorlatské vrchy Mts. (HOLUŠA 1996) (Fig. 5). In Slovakia, this species inhabits dry and warm well-preserved habitats with thinner grassy vegetation. It often can be found in places with bare rocky substratum. *S. eurasius slovacus* is considered to be an endangered (EN) species, as listed in the national red list (KRIŠTÍN 2001).

Newer data (after 1975):

Slovenský kras Mts.
Plešivecká planina plateau (7488): CHLÁDEK (1988).
Zádielska planina plateau (7391): CHLÁDEK (1994).
Silická planina plateau (7588): CHLÁDEK (1994).
Silická planina plateau - Hrušov (7489): HOLUŠA (1996).
Horný vrch plateau - Hrhov (7390): HOLUŠA (1996).
Horný vrch plateau - Hrhov - Okrúhle hill (7390): GAVLAS (2003).
Silická planina plateau - Kečovo - Kečovské škrapy National Nature Reserve (7588): GAVLAS (2005).

Tríbeč Mts.
Nitra - Zobor hill (7674): CHLÁDEK (1988).

Strážovské vrchy Mts.
Oslany (7376): CHLÁDEK (1988).

Vihorlatské vrchy Mts.
Vinné - Vinné Castle hill (7197): HOLUŠA (1996).

Older data (before 1975) - confirmed:

Slovenský kras Mts.
Zádielska planina plateau - Turňa (7391): MARAN (1958).
Plešivecká planina plateau - Plešivec (7488): MARAN (1958).
Silická planina plateau - Domica (7588): MARAN (1958).
Zádielska planina plateau - between Zádiel and Turňa castle (7391): ČEJCHAN (1959).

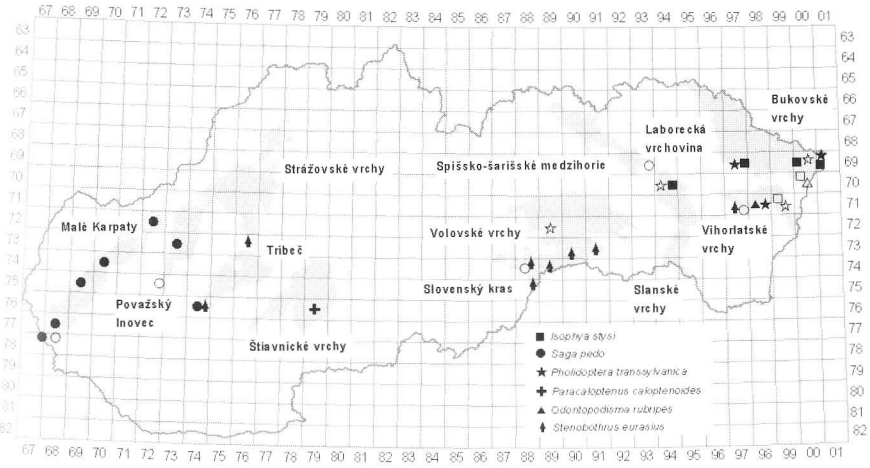

Fig. 5: Occurrence of Orthoptera species of Community interest within DFS quadrates and orographical units of Slovakia (empty symbols: data before 1975, full symbols: data after 1975)

Distribution within DFS quadrates, orographical and zoogeographical units

The orthopteran species of Community interest occur in 12 orographical units in Slovakia (Fig. 5). The highest numbers of these species were found in Vihorlatské vrchy Mts. (five species) and in Bukovské vrchy Mts. (three species), that are located in the eastern part of Slovakia. In each of the orographical units Tríbeč Mts., Slovenský kras Mts., Slanské vrchy Mts. and Laborecká vrchovina Mts. there were present two species, and one species of Community interest was recorded in Malé Karpaty Mts., Považský Inovec Mts., Strážovské vrchy Mts., Štiavnické vrchy Mts., Volovské vrchy Mts. and Spišsko-šarišské medzihorie. Generally it can be stated that, from the viewpoint of the presence of these spe-

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cies of Community interest, eastern Slovakia is the most significant area, with five from six species present here. According to the zoogeographical division of Slovakia (JEDLIČKA & KALIVODOVÁ 2002), the orthopteran species of Community interest occur in all three provinces of Euro-Siberian subarea extending to Slovakia, namely the Steppe province, Broad-leaved forests province and Central European mountain province (Fig. 6). However, in the Central European mountain province, these species occur only in the East Carpathians district, whereas they absent in the West Carpathians district. In total, the Broad-leaved forests province (Subcarpathian district), which covers the largest area of Slovakia, have the highest number of the species. There were found all six orthopteran species of Community interest. Three species occur in the East Carpathians district of Carpathian mountains subprovince (Central European mountain province); only two species are present in the Pannonian district of the Steppe province.

The orthopteran species of Community interest occurring in Slovakia reach their distribution limit in Central Europe here. For instance, almost all the species reach northern limits of their range in Slovakia, what can be supported by the fact that none of them, with the exception of *I. stysi,* have been reported from Poland so far (BAZYLUK & LIANA 2000). Furthermore, the majority of the taxa hit western border of their distribution; only *S. pedo* occurs in the eastern part of the Czech Republic. Also the species *S. eurasius* is present in the Czech republic, however, it comes as the different subspecies *S. eurasius bohemicus* Mařan, 1958 here (KOČÁREK et al. 2005). Likewise, only these two species (*S. pedo* and *S. eurasius*) live in Austria at present. The species *P. caloptenoides* is considered to be extinct here (BERG & ZUNA-KRATKY 1997, INGRISCH & KÖHLER 1998). A different situation is in Hungary, all the six species of Community interest occurring in Slovakia are also present in Hungary (e.g. HELLER 2004), as these species have come to Slovakia from south or south-east. In Ukraine, there are also present all six mentioned species, though two of them (*I. stysi* and *Ph. transsylvanica*) were not reported by HELLER (2004). However, the localities in question are situated not far from known Slovakian localities in eastern Slovakia (ČEJCHAN 1958 or MAŘAN 1953, respectively).

Among the orthopteran species of Community interest, *S. pedo* can be regarded as the most widespread species in Slovakia (Fig. 5, 6). Altogether, it was found in 12 DFS quadrates, six orographical units and two zoogeographical provinces (Fig. 7) throughout the western, central and eastern part of the country Fig. 5, 6). But it also could be caused by the fact that it is one of the most conspicuous and well-known insect species at all, due to its size and specific appearance. However, there are only older data from the eastern Slovakia, so the newer data come only from seven DFS quadrates, three orographical units and two zoogeographical provinces in the western part of Slovakia. At present (in the last 30 years), the most widespread species is *S. eurasius,* occurring in eight DFS quadrates, four orographical units and two zoogeographical provinces (Fig. 7). On the other hand, the grasshopper *P. caloptenoides* seems to be the rarest species, because it has been found only in one locality so far. Also the species *O. rubripes* is very rare, because only one locality of this species is known at present, the other data from Bukovské vrchy Mts. remains unconfirmed.

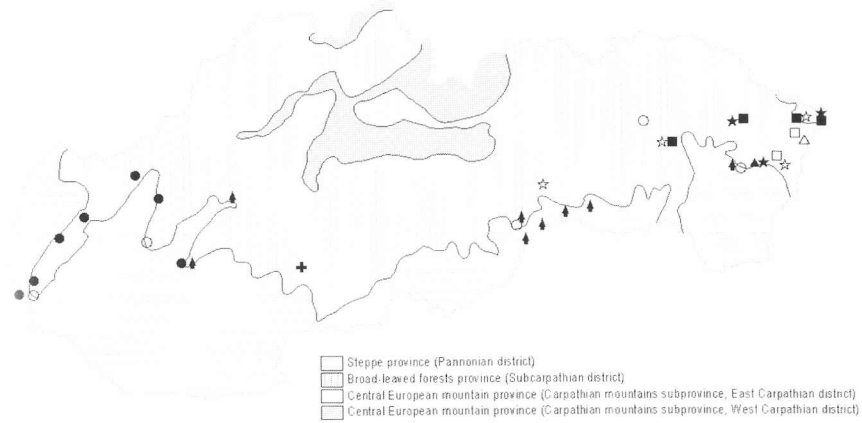

Fig. 6: Occurrence of Orthoptera species of Community interest within zoogeographical units of Slovakia (empty symbols: data before 1975, full symbols: data after 1975)

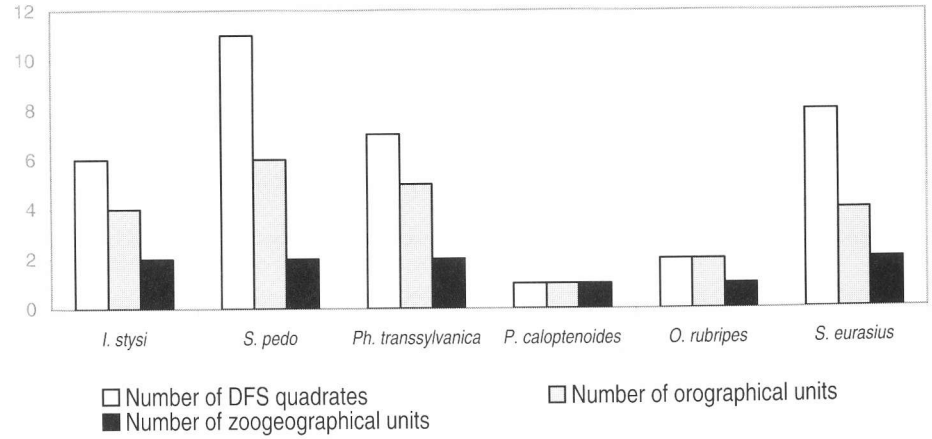

Fig. 7: Presence of Orthoptera species of Community interest within DFS quadrates, orographical units and zoogeographical units

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Conclusions

As already mentioned above, present knowledge on the distribution of orthopteran species of Community interest in Slovakia is not satisfying. Verification of older published data, as well as searching for new localities, is important and urgent challenge for the close future. Considerable part of the territory of Slovakia is still unresearched from the point of view of Orthoptera fauna, or, only sporadic data exist from many sites. It is needed to conduct research for the purposes of actualisation of their occurrence in Slovakia and providing for their favourable conservation status. Otherwise, especially because of the habitat fragmentation and habitat loss as a result mostly of successive overgrowing, afforestation and intensive agriculture, it is pretty possible that the species or some of their localities will disappear before we recognise them.

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