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Results of investigations of the Hemiptera in Moravia made by the Moravian Museum (Aradidae, Pyrrhocoridae)

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STEHLÍK J. L. & HEISS E. 2000: Results of investigations of the Hemiptera in Moravia made by the Moravian Museum (Aradidae, Pyrrhocoridae). *Acta Musei Moraviae, Scientiae biologicae* (Brno) **85:** 333–350. – Distribution and bionomical remarks on the species of the Aradidae and Pyrrhocoridae are given. *Aradus pallescens* HERRICH-SCHAEFFER is new for Moravia. The subfamily Aradinae is represented by 14 species and Aneurinae by 2 species, and the family Pyrrhocoridae by 2 species.

Key words: Hemiptera, Heteroptera, Aradidae, Pyrrhocoridae, distribution, remarks, Moravia

Introduction

This paper follows on from previous publications on the distribution (with notes an bionomics) of species of various families of Heteroptera in Moravia, based on materials of this insect order held in the collections of the Moravian Museum, Brno (STEHLÍK 1981, 1983, 1984, 1985, 1986, 1987, 1988, 1995, STEHLÍK & VAVŘÍNOVÁ 1987, 1989, 1990, 1997a, 1997b, 1998a, 1998b). The introductory part, see STEHLÍK (1981: 185–219), contains all basic data and ways in which they have been approached.

For each of the species, the first paragraph of the text summarises faunological data on the Heteroptera from Moravia available between 1854 and 1980 [a detailed list of references may be found on pp. 111–116 of the introductory part (STEHLÍK 1981) (addendum to list of references: STEHLÍK & VAVŘÍNOVÁ 1997a: 231–232)]. In the "Literature" part, in the data on some localities the number of the biographic district (in parentheses) is supplied with a question mark. In these cases it is not clear to which biographic district the locality belongs (broader information on a locality usually situated at the border of two or even three biographic districts or subdistricts).

Material from the first authors' own and collaborators' collections, or acquired for the collections of the Moravian Museum, appears in the second paragraph. The localities are arranged according to biographic districts denoted by Arabic numerals (Map 1). In cases in which the Arabic numeral is followed by a letter, this denotes a sub-district. The districts and sub-districts have been defined according to our modification of the paper by DOSTÁL (1960), refined on the basis of additional sources. The classification by DOSTÁL (1960) is advantageous in that this author has also established a hierarchy of the biogeographical units (district, territory, subregion, region). The higher units also make it possible to compare more extensive territories and, moreover, they even have Latin denominations. The characteristics of the higher biogeographical units established by

Dostál (1960) has been supplemented by vegetation tiers after Raušer & Zlatník (1966): for particulars, see pp. 105–108 of the introductory part (Stehlík 1981).

All the specimens examined were collected in the 20th century, so only the final two numbers of a year have been used in the given data.The climatic regions mentioned in the commentaries have been established after Quitt (1971), see pp. 100–103 of the introductory part (Stehlík 1981).

The commentary to each species begins with an abbreviation indicating the pertinence of the species to a particular zoogeographical element. In the vast majority of cases, we have adhered to Josifov (1986) in this respect; we ourselves have established the pertinence to the various elements for those species which do not occur in the Balkans.

In the former Czechoslovakia, the Aradidae were studied by Hoberlandt and Štys and the first author's studies concentrated on other families of Heteroptera. Consequently the samplings are not as rich as they are in other Heteroptera groups. This is also due to different sampling methods and a general lesser richness of species.

Abbreviations

List of the abbreviations used to denote the pertinence of species to zoogeographical elements (after Josifov 1986)

Aalp	Arcto-Alpine species
AM(l)	Atlanto-Mediterranean species s. l.
BMo	Boreo-montane species
E	Western European – Siberian species known to occur in Europe only
End	Endemic species
ES	Euro-Siberian species
HS	Holarctic species
HM	Holomediterranean species
HM(l)	Holomediterranean species reaching central Europe in the north
HP	Holopalearctic species
C	Cosmopolitan species
CSZ	Cosmopolitan species of tropical and subtropical zones
CA	Central Asian species
Mch	Manchurian species
NA	Nearctic species
NM	Northern Mediterranean species
NM(l)	Northern Mediterranean species reaching central Europe in the north
Or	Oriental species
PM	Ponto-Mediterranean species
PM(l)	Ponto-Mediterranean species of wider distribution towards the west and north-west
SES	Southern Eurosiberian species
WES	Western Eurosiberian species
WP	Western Palaearctic species

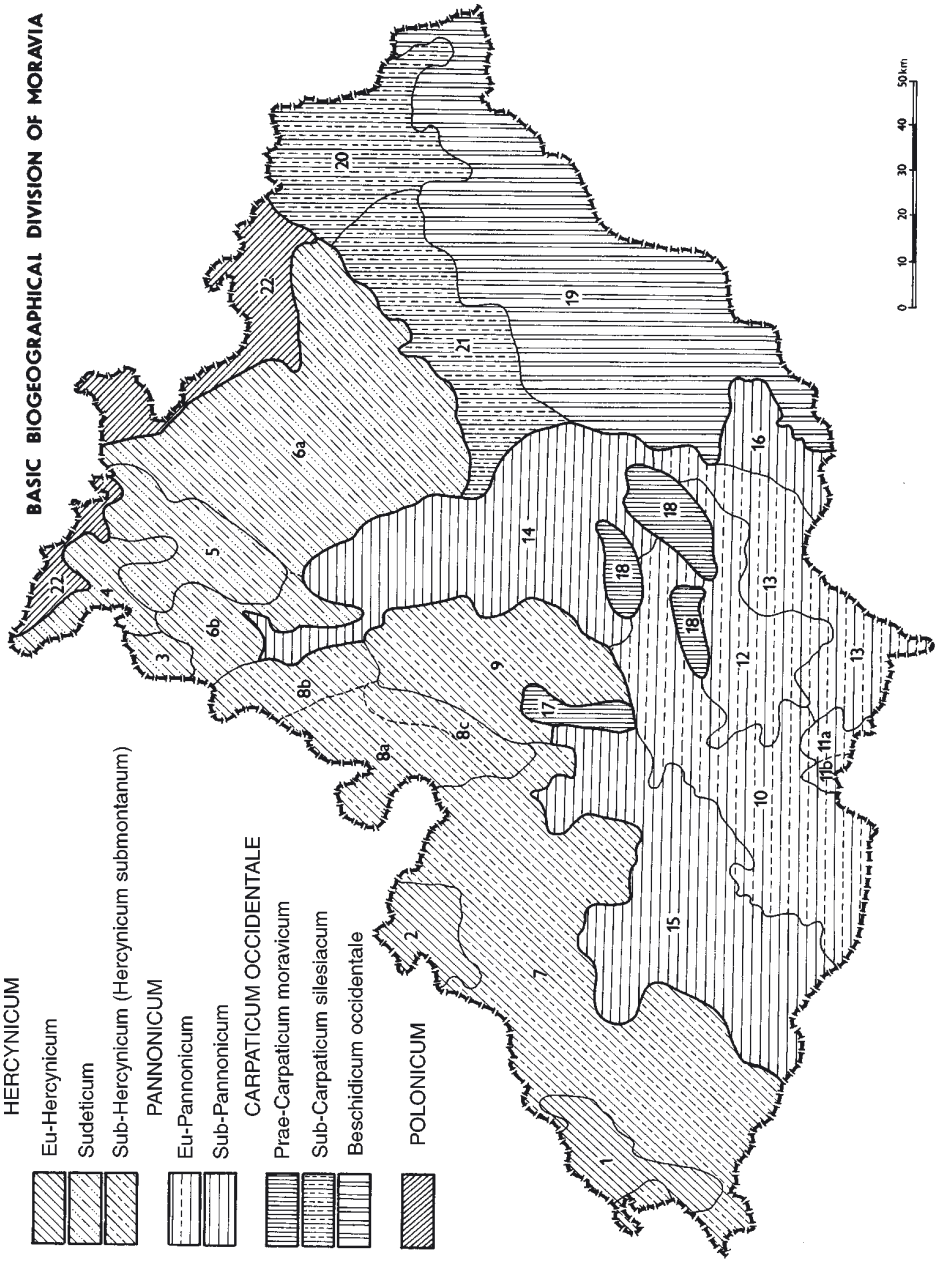

Fig. 1. Basic biogeographic division of Moravia.

Abbrevitation of collector's names

Chl	Chládek M.	Pal	Palásek M.
D	Dočekalová M.	Pč	Poláček K.
De	Dezort J.	Pe	Pecha Z.
Do	Dobšík B.	Pel	Pelikán J.
F	Fiala J.	Po	Pospíšilová L.
G	Gottwald J.	R	Raus P.
H	Huppertová M.	Ří	Říhová J.
H1	Hladil J.	S	Součková M.
Ju	Jurik M.	Sch	Schlaghammerský J.
K	Krejčí V.	St	Stehlík J.
Ke	Kempný L.	Šn	Šnoflák J.
Ko	Kocourek M.	Šu	Šustek Z.
Kun	Kunovský B.	T	Tešová I.
L	Lauterer P.	Va	Vavroušek J.
M	Matoušek J.	Vř	Vavřínová I. see Tešová I.
Ne	Netopil F.	Vě	Vězdová H.
Pa	Palásek J.		

b = brachypterous specimen
m = macropterous specimen

Synopsis of the species discovered

ARADIDAE

Aradinae

***Aradus betulae* (LINNAEUS, 1758)**

Literature. ROUBAL (1959): **Δ** "Praděd", 7.48 (5).

Material examined

5 Kouty nad Desnou, valley of the Divoká Desná River, 610–950 m, 10.4.52 (Pč) 1♂ 2♀.

SES. Both adults and nymphs hibernate. This species is predominantly associated with *Fagus silvatica*, but has also been recorded on *Populus nigra*, *Quercus* sp. and other deciduous trees, where it feeds and develops on fungi of the genera *Fomes* and *Leptoporus* (TAMANINI, 1981). When not feeding, imagines and nymphs are found under the loose, preferably dry, bark of dead trunks, still standing or fallen.

In Moravia it was found only in the highest mountains. This fact is interesting, as in neighbouring Slovakia it is rather common from lowlands to an altitude of about 1,000 m. In the Hrubý Jeseník mountains it was recorded between 610 m and 1,490 m in the colder climatic regions CH 7 and 6.

Aradus betulinus Fallén, 1807

Literature. Balthasar (1942a): Prostřední Bečva, 21.7. (19); Stehlík (1952): Rejvíz, peat bog, 750 m, 1.8.46 (Kratochvíl) 2♀ (5); Dobšík (1972a): Žimrovice, 15.5.38 (Pa) 1 ex. (6a).

Material examined

7 Čtyři Dvory, 530–540 m, 2.5.69 (L) 1♂ 1♀.
9 Krásensko-Podomí, valley of the Malá Haná Brook, 400–450 m, 24.5.79 (St) 1♂.
17 Ochoz u Brna, valley of the Říčka Brook, 265–270 m, 5.1.74 (L) 1♀ under bark of *Picea excelsa*.
19 Dolní Bečva, RadhošŹ, up to 1,129 m, 3, 31.5.36 (Pa) 1♂.

ES. Adults and nymphs hibernate under the loose bark of the stumps of coniferous trees such as *Pinus silvestris*, *Picea excelsea* and *Larix decidua* (Heiss, 1972). They have been collected on *Trametes serialis* and *Poria crassa* (Tamanini, 1956), but also occur on other polyporous fungi.

In Moravia it is recorded at an altitude of between 265 m and 1,120 m, but not in the lowlands. It is most abundant in areas of medium to higher elevation (reaches the timber line at 1,700 m in N Tyrol, Austria) of moderately warm climatic regions MT 11, 7, 5 and the colder ones of CH 7, 6.

Aradus cinnamomeus Panzer, 1806

Literature. Spitzner (1892): Brno, surroundings (?), on the branches and trunks of young *Pinus*; Balthasar (1942a): Mutěnice, 3.8. (13); Roubal (1955): Štramberk, on different *Pinus*-species frequent (21); Hoberlandt (1955): Mohelno (15); Ostopovice (15); Štys (1959): Žulová, 400–500 m, 23.7.54 and 31.7.54 mass occurrence of nymphs under the bark of *Pinus silvestris* (4); Dobšík (1982): Bohuslavice, 13.9.76 (Luža) 1 ex. (22).

Material examined

6a Háj ve Slezsku, 234–317 m, 8.9.72 (Do) 1♀ m.
9 Slatinky, 275–400 m, 22.4.46 (Pa) 1♀ b; Střemeníčko, Holý vrch Hill, 470–510 m, 12.8.57 (L) 1♀ m.
10 Nemotice, SE slopes of the Vysoká Hill, 280–335 m, 22.5.79 (St) 1♀ b.
13 Hlohovec, 180 m, 20.4.61 (St) 7♀ b, 1♀ m; Hodonín, 208 m, 17.5.48 (St) 1♂ m, 2♀ b; ditto, 6.4.59 (Ko) 3♂ m, 8♀ b; Rohatec (→ Lidéřovice), 185 m, 17.5.48 (Do) 1♀ b; Vacenovice, pine wood on sand, 210–215 m, 16.9.76 (Po) 1♀ m; Valtice, Boří les Wood, 188 m, 2.8.93 (St) 1♀ m.
14 Slatinice, 250–320 m, 25.4.43 (Pa) 8♀ b, 5 nymphs; ditto, 10.10.43 (Pa) 1♀ b.
15 Blansko, 2 km W of the town, clearing, 550 m, 1.9.55 (L) 1♀ m; Brno-Obřany, 250–280 m, 29.8.45 (F) 1♀ m; Mohelno, Mohelská hadcová step Steppe, serpentine steep slope, 1.6.64 (L) 1♀ on *Pinus*; Nebovidy, Δ 370.2, 4.8.47 (Do) 1♀ b; Únanov, Δ 330, 14.8.75 (L) 1♀; Vevčice, slopes above the Jevišovka River, 290–330 m, 17.7.63 (St) 1♀ b; Zakřany, 425 m, 7.6.66 (Po) 1♀ b.

ES. Adults and nymphs hibernate under bark scales at the base of the host tree or in the nearby substrate. *Aradus cinnamomeus* is the only primary pest in the family Aradidae, causing severe damage to *Pinus sylvestris* in Eastern and Northern Europe (Bramannis 1975, Heliövaara 1984). Unlike other *Aradus* species which are typically fungivorous, *A. cinnamomeus* is specialised to feed on the living tissues of Scots pine (*Pinus sylvestris*), but also occurs on other species of *Pinus* and occasionally on *Larix* sp. Nymphs and adults live under the bark scales of living pine saplings where they insert their stylets into the young tissues of phloem and xylem surrounding the cambium (Heliövaara & Laurema 1988). The development of *A. cinnamomeus* shows a two-year pattern of periodicity in most parts of Europe, but they reproduce in a three-year cycle in northern Europe.

Widely distributed in Moravia but not yet recorded from higher altitudes. It was found between 180 m and 550 m in the warm climatic regions T 4, 2, in the moderately warm MT 11, 10, 9 and the cold CH 7, 4.

Aradus conspicuus Herrich-Schaeffer, 1835

Literature. Spitzner (1892): Soběsuky by Plumlov (14); Napajedla (13 or 14); Roubal (1955): Štramberk, many specimens on old stumps (21); Hoberlandt (1955): Mrsklesy (6a); Vizovice (19); Dobšík (1972a): Komorní Lhotka, 13.6.65 (Kempný) (19).

Material examined

6a Hlubočky, 289–360 m, 15.7.51 (Pa) 4♂ 3♀; Mrsklesy, 282–339 m, 6.6.48 (Pa) 17♂ 2♀.
10 Dolní Věstonice, 170–177 m, 11.8.75 (Hl) 1 nymph (5. instar).
14 Grygov, 203 m, 2.10. 57 (Pa) 1 nymph (5. instar).
15 Adamov, 380–400 m, 2.10.55 (L, G) 4♂ 7♀ 17 nymphs of different instars; ditto, 1968 (Hl) 1♂; Babice u Brna, brooklet valley , 250–280 m, 8.9.75 (L) 1♀; Moravské Knínice, 320 m, 6.7.74 (Šu) 1♀.
17 Adamov, Josefské údolí Valley, 300–450 m, 19.5.73 (L) 1♀.
19 Strání, Dúbrava, Δ 548, 540–550 m, 7.7.80 (Po) 2 nymphs (4. and 5. instar).
22 Ondřejovice, 460–560 m, 16.8.55 (Va) 1 nymph (4. instar).
? Brno, 200–300 m, 1944 (Pel) 1 nymph (5. instar).

ES. Adults and and nymphs hibernate. This species is predominately associated with deciduous trees such as *Fagus*, *Populus*, and *Quercus*, but is also found occasionally on coniferous trees. It feeds on polyporous fungi of the genera *Leptoporus*, *Fomes* and *Trametes* (syn. *Coriolus*) (Heiss 1972, Tamanini 1981). Hides under loose dry bark of stumps or fallen trees, where it can be collected by removing the bark.

A. conspicuus is widely distributed in Moravia and was found between 250 m to 450 m in warm climatic regions T 4, 2 and moderately warm ones MT 11, 10, 9, 7, 5, 2.

Aradus corticalis (Linnaeus, 1758)

Literature. Assmann (1854): Jeseník Mts. (5 or 6a,b); Kraszny (1875): Vidnava (22); Spitzner (1892): Brno (?): Napajedla (13 or 14) (as *A. annulicornis* Fabricius); Hoberlandt (1955):Bílý Kříž (19); Prostřední Bečva (19); Praděd Mt. (5); Dobšík (1972a): Ostrava-Moravská Ostrava (Wawerka) 1 ex. (20).

Material examined

10 Jestřabice, Kamenný stůl, 400–500 m, 22.5.79 (Po) 1♀.
12 Čejč, 190–230 m, 6.58 (Ko) 1♂.
14 Střeň, 224 m, 25.5.40 (Pa) 1♀.
15 Střelice u Brna, wood-steppe on slopes above the BobravaBrook, 250–260 m, 6.5.56 (L) 1♂.
(?) Brno, 220–300 m, 10.5.58 (St) 1♀.

ES. Adults and nymphs hibernate. Develops on polyporous fungi such as *Fomitopsis pinicola* (Heliövaara, 1983), *Fomes marginatus* (Tamanini, 1956) primarily associated with pine trees (*Pinus*, *Picea*, *Abies*, *Larix*), but is also known to occur on *Quercus* and *Salix*. Is mostly found on or under the bark of stubs in sunny clearings and prefers rather dry habitats.

A. corticalis is not common in Moravia and shows an azonal distribution. It was found between 190 m and 1,490 m in the warm regions T 4, 2, the moderately warm MT 11, 10, 9 and the cold CH 7, 4.

Aradus depressus (Fabricius, 1794)

Literature. Assmann (1854): Praděd Mt. (Letzner) (5); Spitzner (1892): Brno (?); Napajedla (13 or 14); Pavlov (11a); under the bark and on trunks of *Betula* and *Quercus*; Roubal (1955): Štramberk (21); Hoberlandt (1955): Mutěnice (13); Lednice (13); Zlín (19); Šumárník (16); Křístek & Dobšík (1985): Lednice, Horní les Wood (13); Křístek (1991): Lednice, Horní les Wood (13).

Material examined

5 Kouty, valley of the Divoká Desná River, 660–800 m, 8.8.63 (Pč) 1♂.
6a Mrsklesy, 282–339 m, 29.5.49 (Pa) 1♀; ditto, 14.5.50 (Pa) 1♂ 1♀; Velký Újezd, 340–440 m, 5.7.48 (Pa) 1♀.
10 Heršpice (near Slavkov u Brna), 350 m, 10.4.71 (L) 1♀; Iváň, floodplain wood, 171 m, 29.5.91 (L) 1♀; Nevojice (→ Nesovice), Malolhotská stráň Slope, 240–300 m, 7.5.51 (Ne) 2♀.
11a Pavlovské kopce Hills: Klentnice, S slope of Tabulová hora Hill, 370–455 m, 24.5.89 (L) 1♂; Perná, Kotelná Hill, 380–480 m, 26.5.82 (L) 1♀. Klentnice, 300–350 m, 23.4.62 (K) 1♂.
12 Čejč, 190–220 m, 6.58 (Ko) 1♀.
13 Břeclav, under bark of cherry-tree, 158 m, 7.5.76, 1♂; Lednice, 165–180 m, 5.55 (K) 1♀; ditto, 9.6.55 (Do) 1♀; ditto, 12. 5.71 (Pe) 1♀; ditto, Horní les Wood, 31.5.97 (Sch) 1♂ 1♀.
14 Olomouc-Černovír, 218 m, 29.4.55 (Pa) 1♀; ditto, 5.5.58 (Pa) 1♀; ditto, 15.4.59 (Pa) 1♂.

15 Adamov, 380–400 m, 1968 (Hl) 1♀; ditto, 18.4.68 (Hl) 2♂; ditto, 5.68 (Hl) 1♀; ditto, 6.69 (Hl) 1♀; Biskoupky, Biskoupský kopec Hill, 321–390 m, 12.5.71 (St) 1♀; Brno-Žlutý kopec Hill, 270 m, 1.6.63 (L) 1♀; ditto, 19.5.75 (St) 1♀; Ketkovice, valley of the Chvojnice Brook, 270–350 m, 10.6.79 (L) 44♂ 35♀; Sudice (→ Ketkovice), surroundings of Ketkovský Hrad Castle, 280–380 m, 17.5.75 (L) 3♂1♀; Útěchov, U jezírka Pond, surroundings, 300–350 m, 1.5.73 (L) 1♂; ditto, (→ Soběšice), woods, 19.5.74 (L) 1♂; Veverská Bítýška, surroundings of Veveří hrad Castle, 250–270 m, 16.5.52 (Ju) 1♀.
16 Horní Mlýn, Šumárník Hill, Δ 398, 16.5.53 (S) 1♂.
17 Brno-Líšeň, Hády, Klajdovka, 350 m, 10.6.72 (L) 1♀; Ochoz, Obce, clearing, 390–400 m, 22.9.80 (St) 1♂.
19 Rajnochovice, 450 m, 20.6.59 (Pa) 1♀.

ES. As in presumably all *Aradus*-species, adults and nymphs hibernate. The most common of the European species feeds on several polyporous fungi, such as *Trametes versicolor, T. zonatus* and *Oxyporus populinus* on *Betula*, *Populus*, *Acer*, *Alnus*, *Quercus*, *Fagus* and other deciduous trees.

Widespread and common in Moravia, but azonal between 158 m and 1,490m in warm climatic regions T 4, 2, moderately warm MT 11, 10, 9, 7, 2 and in cold regions CH 6, 4.

Aradus distinctus Fieber, 1861

Literature. Dobšík (1947): Nebovidy, Nebovid, 2.45, 9.45 (15); Hoberlandt (1955): Pouzdřany, 29.3.53 (L) 1♀ (as *A. palllens* /sic!/ Herrich-Schaeffer).

Material examined

12 Pouzdřany, Kolby Wood, 230–290 m, 7.5.65 (De) 1♀ b.
15 Brno, Palackého vrch Hill, 330–380 m, 24.5.64 (Do) 1♀ b; ditto, 16.4.67 (Do) 2♂ m; ditto, 11.7.71 (Do) 1♀ b; Trstěnice, slope above the village, 290–330 m, 6.6.63 (L) 1♀ b.

E. Adults hibernate, most probably also nymphs. Seems to be associated with *Populus nigra*, where it is found under the loose bark of stubs or under leaves, stones and detritus in sandy habitats at the base of living trees.

Xerophilous species which is rarely found, only in the southern parts of Moravia. The records are from altitudes between 200 m and 380 m exclusively in warm climatic regions T 4, 2.

Aradus erosus Fallén, 1807

Literature. Stehlík (1952): Vidly, Videlské rozcestí, 825–840 m, 26.7.48 (St) 1♀ (5).

WES. Adults and nymphs hibernate. This generally rare species was found in N Tirol, Austria by the second author and in Bavaria by Seidensteucker (pers. comm.) only

on stubs of *Picea excelsea* infested by *Gloeophyllum odoratum*, but is also recorded from *Abies*.

The single record is from Hrubý Jeseník, the highest mountain in Moravia, in the cold climatic region CH 6.

Aradus krueperi Reuter, 1884

Literature. Hoberlandt (1977): Moravia, without data.

Material examined

11a Pavlovské kopce Hills: Pavlov, Děvín Mt., path along the top to Dívčí hrady Castle, ca 400 m, 1952 (St) 1♀; ditto, 16.5. 63 (L) 5♂ 1♀ on *Fraxinus excelsior*; ditto, Děvín Mt., SE limestone slope, ca 370 m, 10.6.62 (K) 3♂ 1♀ 36 nymphs; ditto, S limestone slope, 16.5.63 (L) 1♂ 2♀ on *Fraxinus excelsior*; Klentnice, Soutěska Defile, 350 m, 14.6.62 (L) 30♂ 29♀ 111 nymphs on *Acer campestre*; ditto, 19.6.62 (L) 6♂ 5♀ 4 nymphs; ditto, 29.6.62 (L) 7♂ 6♀; ditto, 15.8.62 (L) 60♂ 45♀ 1 nymph; ditto, 4.10.62 (L) 169♂ 264♀ 16 nymphs; ditto, 13.5.63 (St) 33♂ 16♀ 2 nymphs; ditto, 13.5.63 (L) 18♂ 12♀ 2 nymphs; ditto, 8.9.65 (Do) 5♂1♀; ditto, 17.7.71 (Kun) 1♂ 7 nymphs (5. instar).

HM(l). Adults and nymphs hibernate. This species has been found on *Schizophyllum commune* and *Trametes gallica* (Tamanini, 1981). Seems to be bound to deciduous trees such as *Populus*, *Quercus* and others.

Recorded from the Pavlovské kopce mountains, where it was collected on fallen dry trunks and branches, but also under the loose bark of standing decaying trees of *Acer campestre* and *Fraxinus excelsior*. In all cases *Trametes gallica* was present. The habitats are dry, sunny, limestone slopes with scattered vegetation. They occurred in large numbers at the Soutěska Defile locality . This is the northernmost record in Middle-Europe. The altitude ranged between 350 m and 550 m in the warm climatic region T 4.

Aradus mirus Bergroth 1894

Literature. Stehlík (1946): Mohelno, Mohelská hadcová step Steppe, 16.7.41 (Gr) 1♂(15).

Material examined

10 Nemotice, SE slopes of the Vysoká Hill, 280–335 m, 22.5.79 (L) 1♀.

15 Mohelno, Mohelská hadcová step Steppe, serpentine steep slope with *Pinus*, 250–380 m, 20.6.75 (Po) 2♀.

End. Adults and nymphs most probably hibernate. Originally described from Austria, this species is recorded only from the Czech Republic, Hungary and Slovakia. It was collected in Austria by beating branches of drying *Pinus nigra* and *Pinus sylvestris*. The ecology is still unknown.

This rare xerophilous species was found only in southern Moravia, at an altitude of between 280 m and 380 m in the moderate warm region T 11.

Aradus obtectus Vásárhelyi, 1988

Literature. Vásárhelyi (1988): Paskov (Reitter) (20); Lomná, Mionší Mt., 17.10.71 (Nohel) 2♀ (19)

ES. Most probably adults and nymphs hibernate, but no data are available. Closely related to *Aradus pictus* Baerensprung, 1859, from which is was not separated before its description in 1988. Feeds on polypores, preferably on coniferous trees but seems to occur on deciduous trees as well.

The records are from northern Moravia, where it occurred at the lower altitude of 256 m in the warm climatic region MT 10, but also in the mountains at 890 m in the cold climatic region CH 6.

Aradus pallescens Herrich-Schaeffer, 1839

Material examined
20 Ostrava, surroundings of the Petr Bezruč coal mine, 260 m, 3.7.75 (Ke) 1♀.

WES. Most probably adults and nymphs hibernate, but no data are available. Literature reports records from *Populus* and *Salix*, which might be only secondary. In Austria this species has been found under flat stones on the limestone gravel terraces of rivers, where bushes of *Salix* and *Populus* were growing. The presence of *Helianthemum* sp. in that habitat leads to the assumption that *A. pallescens* is also associated with this plant, as is the closely related vicariant of higher mountains, *A. frigidus* Kiritshenko, 1913 (Tamanini 1955, Heiss 1983).

New record for the Czech Republic. This species is known so far from Austria, Croatia, Germany, Hungary, Northern Italy, Slovenia, Slovakia, Switzerland and Ukraine. In Moravia it was found in the moderately warm climatic region MT 10.

Aradus truncatus Fieber, 1861

Literature. Stehlík (1944): Senorady, valley of the Oslava River, 23.5. (15); Hoberlandt (1955): valley of the Chvojnice Brook (Ketkovice) (15).

Material examined
10 Velké Němčice, 177 m, 26.5.64 (Do) 1♀; Židlochovice, 180 m, 6.70 (De) 1♀.
15 Ketkovice, valley of the Chvojnice Brook, 268–350 m, 23. 5.43 (St) 1♀.

E. Most probably adults and nymphs hibernate, but no data are available. Has been collected under the bark of *Populus tremulae* infested by *Phellinus igniarius* in Sweden (Coulianos 1989) and in Finland, but is recorded from *Quercus* and *Acer* elsewhere. The ecology is unknown.

The few Moravian records are from lower and medium altitudes between 177 m and 350 m in the warm climatic region T 4 and the moderately warm MT 11.

Aradus versicolor Herrich-Schaeffer, 1839

Literature. Spitzner (1892): Brno (?), Napajedla (13 or 14); Hoberlandt (1955): Ketkovice (15).

Material examined

10 Vranovice, 175 m, 2.5.51 (Do) 1♂.
12 Pouzdřany, 230–290 m, 28.5.78 (Hl) 1♂.
13 Lednice, 165–180 m, 5.56 (Do) 1♂ ; ditto, 1.5.63 (K) 2 nymphs (5. instar).
19 Strání, Doubrava, Δ 550, 7.7.80 (Po) 1♂ 1♀.

NM. Adults and nymphs hibernate. Feeds on fungi such as *Trametes versicolor*, *T. gibbosa*, *Stereum hirsutum* and *Polyporus* species on deciduous trees, predominantly associated with *Fagus*, *Quercus* and *Populus*.

Not recorded to date from northern Moravia. This species was found at lower and medium-high altitudes, between 165 m and 550 m in warm climatic regions T 4, 2 and the moderately warm MT 5.

Aneurinae

Aneurus (*Aneurodes*) *avenius avenius* (Dufour, 1833)

Literature. Stehlík (1946b): Senorady, 1.6.41 (M); Štys (1974): Moravičany (14); Pavlovské kopce Hills (11a).

Material examined

6a Mrsklesy, 282–339 m, 7.4.46 (Pa) 3♂ 5♀; ditto, 15.6.47 (Pa) 2♂ 1♀.
10 Dolní Věstonice, floodplain wood, 168–177 m, 24.3.73 (L) 1♂ 1♀.
11a Pavlovské kopce Hills: Horní Věstonice, border of the deer-park, Kotelná Hill, 370–400 m, 17.5.94 (L) 1♀; Perná, Kotelná Hill, 280–480 m, 26.5.82 (L) 1♀.
12 Uherčice, 220–300 m, 6.5.73 (Šu) 3♀; ditto, 5.5.75 (Šu) 1♀; ditto, (→ Pouzdřany), 19.5.74 (Šu) 3♀.
13 Charvátská Nová Ves, Boří les Wood. 175–180 m, 1.6.80 (L) 6♂ 5♀; Hodonín, 208 m (Hl) 1♂ 2♀; ditto, 2.5.69 (Hl) 1♂ 1♀ on *Populus tremulae*; ditto, 5.5.68 (Hl) 1♂ 1♀; ditto, 15.6.69 (Hl) 4♀; ditto, 6.70 (Hl) 1♂ 1♀.
15 Adamov, 380–400 m, 2.10.55 (L) 4♂ 1♀; ditto, (→ Babice), Δ 522 and surroundings, 15.5.76 (L) 2♀; Brno-Brněnská přehrada Reservoir, surroundings, 230–270 m, 5.3.55 (L) 1♀; Havraníky, Skalky Rocks, 290–300 m, 5.6.84 (L) 1♀; Kramolín, Dřínová hora Hill, 290–430 m, 20.6.75 (L) 1♀; Sudice (→ Ketkovice), surroundings of the Ketkovský Hrad Castle, 280–380 m, 17.5.75 (L) 1♂.

ES. Most probably adults and nymphs hibernate, but no data are available. This widespread species is found under the thin loose bark of logs and branches lying on the

ground, predominantly of deciduous trees such as *Fagus*, *Quercus*, *Carpinus*, *Tilia*, *Betula* and *Alnus*, but is also recorded from *Larix*.

It is not rare in Moravia, although no record from northern Moravia is known to date. *A. avenius* occurs at an altitude of between 168 m and 520 m of the warm climatic regions T 4, 2 and the moderately warm MT 11.

Aneurus (*Aneurus*) *laevis laevis* (Fabricius, 1794)

Literature. Stehlík (1945): Brno-Bystrc, 3.6.42 (Šn) (15); Balthasar (1945): Pavlovské kopce Hills (lla); Štys (1974): Lednice (13**).**

Material examined

15 Doubravník, near Prudká railway station, Sokolí hora Hill, 400 m, 26.4.87 (L) 1♂ on *Carpinus betulus*.

WES. Most probably adults and nymphs hibernate, but no data are available. This species is recorded from the same trees and habitats as *A. avenius* but seems to prefer a warmer climate. It was found associated with the polyporous fungi such *Trametes versicolor*, *Stereum hirsutum*, *Corticium* sp.and *Polyporus* sp.

Only few records, from southern Moravia between 220 m and 500 m altitude in the warm climatic region T 4 and the moderately warm MT 11, 9.

PYRRHOCORIDAE

Pyrrhocoris apterus (Linnaeus, 1758)

Literature. Kraszny (1875): Vidnava (22); Fritsch (1880): Brno (?), Mikulov (lla), Kroměříž (14), Nový Jičín (21), Rusava (19), Opava (22); Spitzner (1892): (Velké) Věstonice (lla), a great quantity on poplars; Teyrovský (1922): Brno-Královo Pole, macropterous specimen; Dobšík (1950): Brno-Hrad (f. *hilaris* Horváth, f. *laniger* Horváth, f. *carbonaria* Horváth) (15); Stehlík (1954): Brno-Žlutý kopec Hill (15); Roubal (1955): Štramberk (21); Štys (1959):Žulová (4); Dobšík (1965): Javorník-Červený Důl (4), Horní Benešov (6a), Bohušov (22), Hrozová (22), Javorník (22), Kravaře (22), Mikulovice (22), Ondřejovice (22), Opava (22), Skorošice (22); Dobšík (1972b): Bohdíkov (6b), Komorní Lhotka (20), Krnov (22); Dobšík (1982): Hradec u Opavy (6a), Lhotka (near Ostrava)(22); Otice (22).

Material examined

7 Červená Lhota, Dolní Lhota.

9 Jedovnice, Ječmaň, Křtiny, Mladeč.

10 Brno (Brněnské Ivanovice, Central Cemetery, Komárov, Zábrdovice), Bučovice, Dolní Věstonice, Křižanovice, Lechovice, Nesvačilka, Nevojice, Pohořelice, Rajhrad, Šlapanice u Brna, Slavkov u Brna, Smolín, Viničné Šumice, Vranovice, Židlochovice.

11a Pavlovské kopce Hills: Klentnice, Sirotek Castle; Mikulov, Šibeničník Hill; Pavlov, Děvín Mt.; Perná, Kotelná Hill.

12 Bořetice, Čejč, Koběřice, Kobylí, Pouzdřany, Uherčice, Židlochovice.

13 Bzenec-Přívoz, Hlohovec, Hodonín, Lednice, Milotice, Mutěnice, Nejdek, Poštorná, Sedlec, Valtice.

14 Bystrovany, Grygov, Kroměříž, Litovel, NáměšŹ na Hané, Vyškov na Moravě.
15 Adamov, Bohutice, Březník, Brno (Bosonohy, Černá Pole, Kamenný kopec Hill, Komín, Královo Pole, Lískovec, Maloměřice, Mokrá Hora), Budkovice, Hluboké Mašůvky, Ivančice-Letkovice, Kadov, Ketkovice, Kuřim, Lažánky (→ Heroltice), Modřice, Mohelno, Moravský Krumlov, NáměšŹ n. Oslavou, Nebovidy, Olbramovice, Omice, Ořešín, Popůvky, Přeckov, Rěznovice, Rokytná, Rosice, Silůvky, Třebíč, Tvořihráz, Veverská Bítýška, Vladislav, Vranov u Brna, Vranov nad Dyjí, Želešice, Znojmo.
16 Petrov.
17 Brno (Hády, Líšeň), Vilémovice.
18 Bohuslavice.
21 Hustopeče n. Bečvou, Příbor.

WP. The species hibernates as an adult, but from the middle of March it can be observed emerging, basking and mass mating in sunny but still frosty weather (it sometimes leaves its hiding places during mild warming in winter). Mating also takes place during the following months and thus the development is unusually prolonged. The adults from early clutches probably mate and create another incomplete generation (in warmer regions at least). Nymphs of the 4th and 5th instars were recorded among the adults as late as October 30. The species may prefer to feed on Tiliaceae and Malvaceae, but it must be considered to be polyphagous. For example, STEHLÍK (1998) observed its hibernation and development in detritus with a large number of *Thuja occidentalis* seeds. In one place many nymphs and adults were found feeding on the fallen seeds of various plants under dried, mown ruderal plants. Similar cases have also been recorded in other places. STEHLÍK (1959) mentioned one large population near overfilled litter bins that had been placed under a big linden tree where firebugs were feeding on food scraps. The author's laboratory experiments have shown that firebugs suck on bread, cheese, and salami, especially on apple pips, and above all on walnut kernels. This food adaptability may serve as an explanation for their intruding on ships to Northern and Central America and also to India (to a lesser extent).

This firebug has also been recorded as necrophagous. It can often be observed at roadsides sucking from crushed specimens of both the its own and other species. In this species cannibalism has also been observed (author's observations). Many authors have studied this species from various aspects. Hitherto results have been summarised by SOCHA (1993) – hence our reference to his paper. Masses of this species can be seen near the roots of linden trees; however lesser aggregations were observed near birch and maple roots on October 30. The specimens often form large conglomerations on walls, especially enclosures (e.g. cemeteries) or on bare ground. It mainly occurs as a brachypterous morph. The first author recorded 12 males and 9 females as macropterous and 5 females as submacropterous in the territory of Moravia. An interesting population was found in Brno in the Žlutý kopec Hill area in August 1952 in which 2 specimens of 43 males and 1 specimen of 35 females of were brachypterous, while the other specimens were macropterous, submacropterous and subbrachypterous. A large part of the

population showed strong tendency towards asymmetry of the hemielytra (e.g. one forewing is subbrachypterous, the second one macropterous). Stenoptery in this population often occurred: wings macropterous, but the membrane narrowed. In two specimens, milky coloured hind wings reached over brachypterous hemielytra (Stehlík 1954). The species is distributed in the lowlands and midlands of Moravia; it was not found at higher altitudes (with a few exceptions). That is contradictory to the fact that it is also tolerant of lower temperatures. It was recorded at the altitudes of 162 to 570 m . The species was found in both warm climatic regions of Moravia (T 4, 2), in moderately warm climatic regions (MT 11, 10, 9, 7, 5, 2) and exceptionally in the cold region of CH 7.

Pyrrhocoris marginatus (Kolenati, 1845)

Literature. Balthasar (1942a): Čejč (12), Bzenec (13); Dlabola (1943): Mutěnice, 25.8.42 (Ko); Hoberlandt (1944): Bořetice, 25.7.41, 9. 42 (12); Hodonín, 27.7.42 (13); Dobšík (1945): Sokolnice, Stará hora Hill, 20.7.41 (10); Uherčice, 22.7.41 (Do) (12); Dobšík (1949): Brno-Kamenný kopec Hill, 7.8.47 (Do) 1♀ m (15); Nebovidy, Nebovid Hill, 7.9.45 (Do) 1♂ m; Roubal (1955): Štramberk (21); Dobšík (1957): Čejč (12), Ostopovice (15); Roubal (1964): Mohelno, 10.6.63 (15).

Material examined

10 Bratčice, sand quarry, 210 m, 29.8.83 (St, Ří) 3♂ b 3♀ b; Brno-Staré Černovice, sand quarry, 210–230 m, 23.9.63 (Po) 2♂ b 3♀ b; ditto, 27.3.89 (St) 1♂ b 4♀ b; ditto, 16.4.89 (St) 1♂ b 1♀ b; Brno-Horní Heršpice, ruderal, 203 m, 22.9.94 (St) 1♂ b 1♀ b; Dolní Věstonice, Písky, sands, 175 m, 4.5.62 (St) 2♀ b; ditto, 8.8.62 (St) 4♀ b; ditto, 11.9.62 (St, T, L) 18♂ b 26♀ b 2♀ m; ditto, 16.5.63 (St) 1♀ b; ditto, 28.5.63 (St, L, T, Po) 25♂ b 38♀ b; ditto, 18.9.63 (Po, T) 11♂ b 9♀ b; ditto, 28.8. 64 (Po) 1♂ m 9♂ b 10♀ b; ditto, 28.9.66 (St) 2♂ b; ditto, 16.4.69 (Do) 1♀ b; ditto, 15.8.73 (St, Po) 6♂ b 5♀ b; ditto, 12.9.73 (St) 3♂ 5♀ b; ditto, Komárka, sands, 170 m, 15.8.73 (St, Po) 19♂ b 16♀ b; ditto, 7.10.76 (Po, Vě) 2♂ b 1♀ b; Marefy, Ševy, xerothermophilous vegetation, 230–280 m, 18.8.64 (Po) 1♂ m; Milešovice, W slopes, Δ 300.4, 25.8.80 (St) 1♂ b; Mušov, steppe W of the village, 175 m, 17.7.73 (St) 1♀ b; ditto, 29.8.73 (Po) 8♀ b; ditto, 3.4.74 (St, Po) 2♂ b 3♀ b; ditto, 23.7.74 (St) 5♂ b 3♀ b; ditto, NW of the village, under road (sand), 170–175 m, 27.8.73 (St) 5♂ b 2♀ b; ditto, N border of the second dam, 170 m, 18.7.87 (St) 1♂ b; ditto, 30.7.87 (St) 1♀ b; Nesvačilka, 200–220 m, 1.10.46 (Do) 2♂ b; Rebešovice, Velké Družďavy Hill, Δ 225.5, Miocene sands, 29.8.65 (Ch) 1♂ b; Šakvice, steppe SE of the village above a pond, 175 m, 2.8.73 (Po) 1♂ b 1♀ b; ditto, 27.8.73 (St) 4♂ b; ditto, 29.8.73 (St, Po) 19♂ b 12♀ b; ditto, 4.4.74 (St) 1♂ b; ditto, 22.7.74 (St) 6♂ b 7♀ b; Slavkov u Brna, 210–250 m, 5.47 (M) 1♂ b 1♀ b; Smolín, sands in a pine wood on slope, 200 m, 25..8.74 (St) 4♀ b; ditto, 27.9.76 (St, Po) 9♂ b 9♀ b; Sokolnice, Stará hora Hill, Δ 321, 23.5.29 (F) 1♂ b 1♀ b; Strachotín, N edge of the pond, 170 m, 6.9.73 (St, Po) 26♂ b 22♀ b 1♀ m; Velatice, steppe on conglomerate slope, 285–300 m, 15.5.76 (St) 1♀ b; Viničné Šumice, conglomerate slope, 390–400 m, 12.5.76 (St) 1♀ b; ditto, 6.9.77 (St, Po) 9♂ b 9♀ b; Židlochovice, 180 m, 9.61 (De) 1♂ b 1♀ b; ditto, 4.63 (De) 1♀ b; ditto,

11.4.64 (De) 1♂ b 2♀ b; ditto, 8.64 (De) 3♂ 3♀ b; ditto, 18.8.64 (De) 1♂ b; ditto, 1965 (De) 1♀ b; ditto, the sedimentation field of a sugarhouse, 9.73 (De) 1♀ b.

11a Pavlovské kopce Hills: Klentnice, Sirotek Castle, limestone slope, 390–430 m, 18.5.80 (Po) 1♂ b; Mikulov, Svatá hora Hill, limestone slope, 250–363 m, 25.4.62 (L) 1♂ b; ditto, Turold Hill, limestone slope, 280–383 m, 10.7.62 (L) 1♀ b; ditto, 11.9.62 (St, Po, T) 1♂ b; ditto, Děvín Mt., 350–400 m, limestone slope, 21.7.46 (St) 1♀ b; ditto, 31.7.46 (St) 1♀ b; ditto, 22.4.50 (St) 1♂ b 1♀ b; Perná, Kotelná Hill, limestone slope, 270–487 m, 12.5.62 (L) 1♀ b; ditto, 29.6.64 (Po) 1♀ b; Sedlec, Skalky Rocks, limestone slope, partially sand, 190–250 m, 25.7.68 (L) 3♂ m 6♀ m; ditto, 19.9.93 (St) 6♂ b 5♀ b 1 nymph (4. instar), 4 nymphs (5. instar). Bulhary, sand-pit by road 500 m NW of the village, 180 m, 29.6. 64 (Po) 2♂ b 1♂ m, 1♀ b 1♀ m; Sedlec, disused vineyards , Δ 253, 8.8.77 (Po) 1♀ b.

11b Březí, Liščí vrch Hill, 6.9.82 (St) 1♂ b 3♀ b; Dolní Dunajovice, hill NE from Slunečná Hill, sand, 280 m, 24.8.87 (St) 1♂ b 1 nymph (5. instar); ditto, steppe and ruderal right of the Dyje River, 190 m, 2 . 8 . 7 3 (Po) 1♂ b 1♀ b.

12 Archlebov, meadows and borders of the stone-pit, 200–250 m, 4.8.70 (St) 1♀ b; Bohuslavice Stará Hora Hill, 240–270 m, 10.6.87 (St) 1♀ b; Bořetice, Zázmoníky, steppe on slope, 200–270 m, 22.6.88 (St) 1 nymph (4. instar) 2 nymphs (5. instar); Čejč, loess slope, 190–250 m, 8.62 (Ko) 1♀ b; ditto, 7.8.57 (Ko) 1♂ b 1♀ m; ditto, 24.8.57 (Ko) 1♂ b; ditto, 8.58 (Ko) 1♀ b; Klobouky u Brna, grassy slope behind the brickyard, 280 m, 24.5.65 (Po) 1♀ b; Kobylí, 200–270 m, 5.63 (Ko) 1♂ b; ditto, 19.7.77 (St) 1♀ b; ditto, Velký vrch Hill, NW slopes, 200–264 m, 7.6.63 (L, Po) 5♀ b; ditto, Lecany, slope, 200–274 m, 17.7.68 (St, L, Po) 1♂ b 5♀ b; Kurdějov, Kamenný vrch Hill, Δ 343, 26.7.79 (Po) 1♀ b; Pouzdřany, slope with xerothermophilous vegetation, 250–290 m, 2.5.43 (Šn) 1♀ b; ditto, 23.3.47 (Pel) 1♂ b 1♀ b; ditto, sifting, 8.3.53 (L) 1♂ b; ditto, 20.7.54 (L) 1♀ b; ditto, 30.4. 57 (L) 1♀ b; ditto, 14.4.84 (Do) 1♂ b; Přítluky, Přítlucká Hill, 292 m, 20.8.63 (L) 1♂ b; ditto, 26.7.55 (H) 1♀ b; Židlochovice, Výhon Hill, 250–354 m, 7.67 (De) 1♂ b.

13 Bzenec-Přívoz, 185 m, 29.7.57 (Pa, Pal) 5♂ b 5♀ b; ditto, 30.7.57 (Pa) 3♀ b; ditto, sands by the railway line, 1.6.76 (St, Po) 2♂ b 1♀ b; ditto, 25.8.81 (St, Po) 2♂ b 6♀ b; Lednice, 165–180 m (K) 1♂ b; Milotice, Náklo Hill (Horky Hill), 240–265 m, 15.5.63 (L) 1♀ b; Mutěnice, 175 m, 2.8.60 (Do) 1♀ b; ditto, Srálek, sand pit, 175 m, 28.5. 63 (St) 2♀ b; ditto, 24.9.63 (Po) 2♂ b 2♀ b; Poštorná, 160–162 m, 28.5.61 (K) 1♂ b; ditto, 19.7.62 (K) 1♂ b 2♀ b; Přítluky, surroundings of the Kutnar Pond, 163 m, 22.6.88 (St) 1 nymph (5. instar); Ratíškovice, sands along the railway line, 185 m, 12.5.75 (St) 1♂ b; Rohatec-colony, Soboňky gamekeeper's lodge, sands along railway line, Δ 183.5, 12.5.75 (Po) 1♀ b; ditto, 26. 6.75 (Po) 2♀ b; ditto, 13.8.75 (St, D, Po) 6♂ b 8♀ b 1♀ m; Vacenovice, sands S of the village, 210–215 m, 16.9.76 (Po) 1♂ b 1♀ b .

14 Čelechovice na Hané, Vápenice Hill, top and S slopes, limestone, 290–318 m, 23.8.82 (St) 6♂ b 8♀ b; Grygov, 203 m, 2.9.58 (Pa) 1♀ b; Olomouc, 210–220 m, 30.9.55 (Pa) 1♀ b.

15 Brno-Bosonohy, stone quarry, 280–300 m, 29.8.85 (St) 1♀ b; Brno-Kamenný kopec Hill, 340–380 m, 29.7.47 (Do) 1♂ b 1♀ b; ditto, 18.8.76 (Po) 1♀ b; ditto, 17.8.83 (St) 8♂ b 11♀ b; Brno-Masarykova čtvrt, S slope, 300–330 m. 9.9.69 (Po) 1♂ b; Brno-Mokrá Hora, slope, orchards above the village, 270–300 m, 24.4.87 (St) 2♂ b 2♀ b; Brno-Palackého vrch Hill, 330–380 m, 27.6.65 (Do) 1♀ b; Brno-Vinohrady, 1 km N, Δ 261, hill with xerothermophilous vegetation, 3.5.84 (St) 4♂ b 2♀ b; ditto, 1.8.90 (St) 1♂ b 2♀ b 1 nymph (4. instar) 2 nymphs (5. instar); Brno-Žlutý kopec Hill, 270 m, 7.4.50 (St) 1♂ b; Černín, steppe above the Jevišovka River, 290–340 m, 17.7.63 (Po) 1♀ b; Chudčice, NE of the village, conglomerate slope, 250–270 m, 4.9.85 (St) 1 nymph (5. instar); Drásov, Drásovský kopec Hill, Δ 349, 2.4.53 (St) 6♂ b 2♀ b; Dyje (→ Tasovice), steppe on S slope above the Dyje River, 220–250 m, 14.5.64 (St) 1♀ b; Havraníky, Havranické vřesoviště Heath, 29.7.70 (St) 1♀ b; ditto, Skalky Rocks, Δ 308, 24.8.76 (St) 2♀ m; Hlína, Stará hora Hill, grassy stands on slope, 320–370 m, 26.5.87 (St) 2♂ b; ditto, 21.8.87 (St) 2♂ b 3♀ b; Hostěradice, Paseka, steppe on slope, Δ 289, 24.5.77 (St) 1♂ b 3♀ b; ditto, 9.8.77 (St) 1♂ b 1♀ b; Ivančice, 210–320 m, 30.7.50 (Do) 1♂ b; Ivančice-Letkovice, Pekárka, conglomerate slope, 250–277 m, 29.6.92 (St) 1♂ b (dead); Miroslav, Vyhlídka Hill and Markův kopec Hill, 240–324 m, 6.6.63 (Po) 1♂ b; ditto, 14.7.65 (Po) 1♀ b; ditto, 29.7.70 (St) 4♂ b 2♀ m; ditto, Markův kopec Hill, Δ 300, 13.8.92 (St) 1♂ b; Mohelno, Mohelská hadcová step Steppe, serpentine slope, 250–380 m, 6.6.62 (L) 1♂ b; Moravské Bránice, remains of steppe on slope, 220–285 m, 1.6.82 (St) 1♂ b; Nebovidy, Nebovid Hill, Δ 370;2, 13.9.45 (Do) 1♂ b; ditto, 17.7.46 (St, Do) 7♂ b 7♀ b; Nová Ves u Oslavan, hill above the village, 218–315 m, 3.8.76 (St) 1♂ b 2♀ b; ditto, 22. 6.76 (St) 1♀ b; Oblekovice, Načeratický kopec Hill, steppe, 250–270 m, 11.8.76 (Po) 1♂ b; Olbramovice, Leskoun Hill, surroundings of the stone quarry, 270–350 m, 10.9.92 (St) 3♀ b; Ostopovice, slope, 250–330 m, 13.5.69 (Po) 1♀ b; ditto, 3.9.69 (St) 20♂ b 9♀ b; Plenkovice, hill SE of the village, 310–330 m, 15.8.84 (St) 1♂ b; Řeznovice, Skala Rock, steppe above the Jihlava River, Δ 278.7, 29.6.92 (St) 1 nymph (5. instar); Rokytná, conglomerate slope, 330 m, 21.9.65 (Po) 1♂ b; Rudlice, steppe on slope above the Jevišovka River, 290–330 m, 11.6.64 (L) 1♀ b; Silůvky, Volhausy (Volovčiny), 270–320 m, 5.5.86 (St) 3♂ b 1♀ b; Studenec, 430 m, 30.8.60 (Do) 1♀ b; Výrovice, slope 500 m SW and S of the village, 300–340 m, 4.8.76 (St, Po, Vě) 7♂ b 6♀ b; Žerotice, slope W of the village, 230 m, 24.9.74 (Po) 1♂ b 3♀ b.

17 Brno-Hády, 290–380 m, 8.4.63 (L) 1♀ b; Brno-Líšeň, Kopaniny, limestone, 400 m, 4.5.78 (Po) 1♀ b; Brno-Líšeň, surroundings of the Lesní lom Quarry, 370 m, 18.7.93 (St) 1♂ b 1♀ m 1 nymph (5. instar); Brno-Stránská skála Rock, limestone slope, 204–307 m, 16.4.50 (St) 1♂ b; ditto, 6.8.75 (L) 2♂ m; ditto, 28.8.84 (St) 1♂ m.

HM (1) + CA. The species hibernates as an adult. In the wild it occurs early, in similar fashion to *P. apterus* (L.). It can be observed from the third tenth of March. The development is prolonged, teneral adults can be observed from the third tenth of June to the third tenth of September. In the wild it can occur as late as the first tenth of October. Most specimens are brachypterous. An interesting population was found in Skalky near

Sedlec, where all 9 specimens, which were collected on 25 July 1968, were macropterous. The species occurs in warm localities, especially in dunes, sandpits, in lowlands on hillsides where the substrate is formed by light soils (e.g. loess) but also in localities with stony substrate (limestone, conglomerates, biotitic granodiorites and diorites, etc.) It often occurs in ruderal stands with enough seeds, for example under *Echium*. Its occurrence is limited to southern Moravia. In northern Moravia it can be observed on warm limestone (Štramberk). The species was found at altitudes from 170 to 400 m in both warm climatic regions T 4, 2 and the moderately warm MT 9, 11.

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