

Flesh flies (Diptera: Sarcophagidae) of the Jizerské hory Mts, Frýdlant region and Liberec environs (northern Bohemia, Czech Republic)

Masařkovití (Diptera: Sarcophagidae) Jizerských hor, Frýdlantska a okolí Liberce (severní Čechy)

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Abstract. This paper deals with the faunistics of the family Sarcophagidae in the Jizerské hory Mts, Frýdlant region and Liberec environs (northern Bohemia). Altogether 23 species have been recorded from the area, mainly common and broadly distributed Palaearctic species. The most remarkable records are those of rare *Metopia grandii* Venturi, 1953 and of two species which are listed in the Red List of Invertebrates of the Czech Republic: *Discachaeta pumila* (Meigen, 1826) and *Rosellea aratrix* (Pandellé, 1896), although their recent findings from the Czech Republic indicate that their classification among the endangered species should be re-evaluated.

Key words: Diptera, Sarcophagidae, faunistics, Czech Republic, Jizerské hory Mts, Frýdlant region, Liberec environs

INTRODUCTION

Sarcophagidae is a large and important family of the Calyptrate section of Muscomorpha comprising almost 3,000 species. Adults reach a body length of 2 mm to 22 mm and their larvae have very diverse feeding habits. Some are schizophagous or predacious (i.e., devour other necro- or coprophagous larvae in substrates). The others are obligate or facultative parasitoids of insects (orthopterans, cicadas, beetles, honeybees, etc.), myriapods, terrestrial snails, predators of earthworms, larvae of soil-inhabiting noctuid caterpillars, and pupae of dendrophilous lepidopterans, kleptoparasites of solitary wasps, bees and, to a lesser extent, termites. Certain species are known to prey on the eggs of marine turtles and lizards, as well as spider egg cocoons and oothecae of locusts. Larvae of many species can facultatively produce wounds or occasional intestinal myiasis on various vertebrates, including humans. Obligate parasites of vertebrates include larvae of several species of *Wohlfahrtia* Brauer & Bergenstamm and some American specialized species with amphibian hosts.

Adult flies are distributed in various ecosystems, but the majority prefers humid warm forests, bushes, and meadows, or xerophytic sandy areas. Adults with schizobiotic or preda-

cious larvae feed on the liquids of decaying animal matter, sweat and slime of animals and humans, fallen fruit, honeydew, rarely nectar and pollen of flowers. Adult flies with parasitic and kleptoparasitic maggots prefer nectar and honeydew. Certain synanthropic species are considered mechanical vectors of various intestinal diseases, including poliomyelitis, leprosy, tuberculosis, and mycosis (Rohdendorf 1937; Pape 1996; Povolný & Verves 1997; Verves 1986; Verves & Khrokalo 2006a, b, 2015; Verves et al. 2015).

Altogether 143 species of the family Sarcophagidae are known from the Czech Republic, 105 of them from Bohemia (Kejval & Pape 2009; Verves et al. 2016). The Czech species can be identified using the key and figures in Pape (1987), Povolný and Verves (1997) and Richet et al. (2011).

This is a further contribution to the knowledge of the biodiversity of Diptera in the Jizerské hory Mts and adjacent Frýdlant region (in the north) and Liberec environs (in the south) (Czech Republic: northern Bohemia), focused on the family Sarcophagidae. The biodiversity of this family has not yet been studied in this area.

The faunal survey presented below is based on material obtained by P. Vonička and J. Preisler during their field work in 2002–2015. The biodiversity of this family in the study area is discussed.

DESCRIPTION OF THE STUDY AREA

The study area comprises the Jizerské hory Mts (Protected Landscape Area) and the Frýdlant region in the north. Geographically, it belongs to the Krkonoše-Jeseníky montane system and the Krkonoše Mts subsystem (Demek 1987). It is composed of the geomorphological complexes of the Jizerské hory Mts and Frýdlantská pahorkatina Hills. The surveyed territory is altitudinally diverse, ranging from the highest elevation on the top of Smrk Mt. (1124 m) in the Jizerské hory Mts to the lowest one at the Smědá river on the Czech-Polish boundary in the Frýdlant region (208 m).

Geologically, the area under study belongs to the Lugićum area, which forms the north-eastern part of the Bohemian Massif. The Jizerské hory Mts are a part of the Krkonoše-Jizerské hory crystalline complex, in the surveyed area composed of the Jizera gneiss complex and the Variscan Krkonoše-Jizerské hory granite massif (Chaloupský 1989). The Frýdlantská pahorkatina Hills is a part of the Lužice Massif, formed of Cadomian granitoids. Along the Smědá river in the Frýdlant region, Tertiary fresh-water sediments have been preserved. In the south-western part of the Frýdlantská pahorkatina Hills and sporadically in the Jizerské hory Mts, solitary Tertiary basaltic knobs protrude. In the Frýdlant region, Quaternary sediments (loess earth and glacial sediments) are represented. At higher altitudes in the Jizerské hory Mts, organic sediments (peat) occur.

The climate of the study area is significantly affected by the fact that the Jizerské hory Mts are situated on the windward side towards the prevailing western winds. They create a barrier to the moist and cold air currents from the Atlantic ocean, which results in high rainfall and snow cover. The total amount of precipitation in the Frýdlantská pahorkatina Hills is about 900 mm, in the warmer western part of the Frýdlant region 800 mm and in the eastern moist part almost 1000 mm. The Jizerské hory Mts are situated in a cold climatic region. The average annual temperature falls below 5 °C, in higher altitudes below 4 °C. The average annual temperature in the Frýdlant region ranges from 7.0 to 8.5 °C (Quitt 1971).

The rivers of the study area flow to the North and Baltic Seas. Many watercourses rise in the Jizerské hory Mts. The Lužická Nisa drains waters from the northern and western parts of the Jizerské hory Mts to the Odra (Oder) river and to the Baltic Sea; the most important tributary of the Lužická Nisa is the Smědá river in the Frýdlant region. The Jizera is the most significant river which drains waters from the southern and eastern parts of the Jizerské hory Mts to the Labe (Elbe) river and the North Sea; an important tributary of the Jizera is the Kamenice river. In the Jizerské hory Mts there are several artificial water reservoirs. In the Frýdlant region, several ponds can be found; the largest of them is the Dubák pond near Černousy. Natural water bodies occur in the Jizerské hory Mts – small pools in the raised peat-bogs.

From the phytogeographical point of view, the study area belongs largely to Oreophyticum, district No. 92. Jizerské hory Mts, the lower altitudes belong to Mesophyticum, district No. 49. Frýdlantská pahorkatina Hills (Skalický 1988). Except for the southern foothills, the Jizerské hory Mts are almost continuously forested. Modified by long-term forest management, the originally predominant beech forests were substituted by spruce woods. Remnants of beech forests have been preserved on the northern and northwestern slopes of the Jizerské hory Mts only. Original mixed forests were significantly changed, silver fir became almost extinct and even the native spruce declined markedly. Except for small fragments, the original mountane spruce woods have not been preserved. The forests in the central part of the mountains were destroyed during the ecological disaster resulting from high air pollution load and larch tortrix and bark beetle outbreaks in the 1970–90s. The damaged spruce stands have been preserved in protected areas (nature reserves) only. Extensive clearcuts were reforested mostly with spruce (*Picea excelsa*), partly with introduced exotic species of spruce and pine (*Picea pungens*, *Pinus* spp.). At present, the central part of the mountains is covered by young spruce stands under 40 years of age. Peat-bog ecosystems are the most valuable natural sites in the central part of the Jizerské hory Mts. They are represented by numerous peat bogs differing in size and quality. Mesophilic and hydrophilic meadows are present near the southern border of the mountains; the most valuable of them are developed in the Malá Strana and Bukovec Nature Reserves.

A major part of the Frýdlant region is covered by farmland. Besides arable land there are large areas of cultural meadows and pastures. Near-natural grasslands are found mostly in the floodplain of the Smědá river. Diverse aquatic and wetland plant communities are developed near ponds in the whole area, most significantly near the Dubák pond. Cultural meadows and pastures occur throughout the region. The forests in the Frýdlant region are mostly cultivated. Spruce (*Picea abies*) and Scots pine (*Pinus sylvestris*) predominate in the species composition, near-natural components include the sessile oak (*Quercus petraea*) and pedunculate oak (*Q. robur*), beech (*Fagus sylvatica*), small-leaved lime (*Tilia cordata*) and hornbeam (*Carpinus betulus*).

MATERIAL AND METHODS

List of localities

Data are presented in the following order: locality name, usually the name of the nearest municipality; geomorphological complex; grid mapping square code (see Pruner and Míka 1996); coordinates; altitude; specified location; habitat type (where appropriate). The localities are listed alphabetically.

- [1] **Bukovec NR**: Jizerské hory Mts, 5158, 50°48'40"N, 15°21'21"E, 900 m, damp meadow, spring area.
- [2] **Černousy–Boleslav road**: Frýdlantská pahorkatina Hills, 4956, 51°00'26"N, 15°02'39"E, 255 m, flowering Apiaceae.
- [3] **Holubník Mt.**: Jizerské hory Mts, 5157, 50°50'01"N, 15°10'46"E, 900 m, Bílé bukovi, beech forest.
- [4] **Horní Rasnice**: Frýdlantská pahorkatina Hills, 5057, 50°58'38"N, 15°12'20"E, 400 m, sand pit.
- [5] **Jizerskohorské bučiny NNR**: Jizerské hory Mts, 5156–5157, 500–850 m; Špičák Mt., 50°51'51"N, 15°04'06"E (724 m, beech and mixed forest); Viničná cesta path, 50°51'49"N, 15°06'42"E (500 m, beech forest).
- [6] **Malá Strana NR**: Jizerské hory Mts, 5257, 50°45'58"N, 15°12'09"E, 700–720 m, damp meadow, wetland, stream, pond.
- [7] **Meandry Smědé NR**: Frýdlantská pahorkatina Hills, 5056, 50°59'54"N, 15°02'21"E 220 m, Dubák pond, Smědá river, alder grove, damp meadow, wetland.
- [8] **Panský lom NM**: Ještědský hřbet Ridge, 5256, 50°43'27"N, 15°00'54"E, 600 m, Horní Hanychov, SW part of Liberec, limestone pit, flowering Apiaceae.
- [9] **Poustecká obora game preserve**: Frýdlantská pahorkatina Hills, 5056, 50°57'33.6"N, 15°03'50.9"E, 280 m.
- [10] **Poustka**: Frýdlantská pahorkatina Hills, 5056, 50°57'36"N, 15°01'59"E, 235 m, flowering Apiaceae.
- [11] **Rašeliniště Jizery NNR**: Jizerské hory Mts, 5157–5158, 50°50'59"N, 15°21'10"E 830–870 m, peat bog, spruce forest, damp meadow, Jizera river.
- [12] **Rejdice**: part of Kořenov, Jizerské hory Mts, 5258, 50°44'12"N, 15°21'28"E, 650 m, Ješkrabec stream, spring area, wetland.
- [13] **Rudolfov**: NE part of Liberec, Jizerské hory Mts, 5256, 50°47'54.2"N, 15°07'10.4"E, 650 m, Černá Nisa stream, mixed forest.
- [14] **Rybí loučky NR**: Jizerské hory Mts, 5158, 50°50'46"N, 15°20'32"E, 850 m, peatbog.
- [15] **Šolcův rybník pond**: Jizerské hory Mts, 5156, S of Raspenava, 50°52'49"N, 15°06'52"E, 350 m, wetland, alder grove, Holubí potok stream.

Collecting methods and material

The material was obtained using the following collecting methods: Malaise traps, protein traps, yellow pan traps, pitfall traps (these methods are described in detail e. g. by Vonička 2008), sweeping over vegetation and various substrates, individual netting, etc.

The majority of the material examined was collected by J. Preisler and P. Vonička in the years 2002–2015. Selection of the material from the traps and its preparation were done by J. Preisler. The preserved (dry mounted or in ethanol) material was identified by Y. Verves, H. Šuláková, Z. Kejval and D. Povolný. Voucher specimens are deposited in the North Bohemian Museum in Liberec and in the private collection of M. Barták (Prague). Nomenclature is given after Verves (1986) and Povolný & Verves (1997).

Abbreviations used

RL – conservation status according to the Red List of Invertebrates of the Czech Republic (Povolný 2005): **CR** – critically endangered species, **EN** – endangered species.

Protected areas: **NM** – Natural Monument, **NNR** – National Nature Reserve, **NR** – Nature Reserve.

Traps: **CFT** – combined flight trap – stroke trap, **MT** – Malaise trap, **PT** – protein trap, **PYT** – pyramidal trap, **YPT** – yellow pan trap.

Collectors: **JP** – Jiří Preisler, **PV** – Pavel Vonička.

Determination: **DP** – Dalibor Povolný, **HŠ** – Hana Šuláková, **YV** – Yury Verves, **ZK** – Zbyněk Kejval.

Collections: **MBPC** – Miroslav Barták (Prague) collection, **SMLC** – North Bohemian Museum (Liberec) collection.

RESULTS

Miltogramminae

Metopia argyrocephala (Meigen, 1824)

Holarctic, Oriental and Neotropical Regions. In Central Europe very common from lowlands to mountains, in different meadow habitats and forest edges, including cultural landscapes, from April to October; adults feed on flowers.

Šolcův rybník pond [15]: MT, 11.–26.v.2011, 1 ♂, PV lgt., YV det. (MBPC).

Metopia campestris (Fallén, 1810)

Holarctic and Oriental Regions. In Central Europe very common from lowlands to mountains, in different meadow habitats and forest edges, including cultural landscapes, prefers rather moist biotopes near water; from March to October; adults feed on flowers

Šolcův rybník pond [15]: MT, 13.vi.–1.vii.2011, 1 ♂, 1 ♀, PV lgt., YV det. (MBPC).

Metopia grandii Venturi, 1953

Relatively rare Palaearctic species. In Central Europe rare, in different meadow habitats and forest edges, notably prefers rather moist biotopes near water; from April to September; adults feed on flowers.

Šolcův rybník pond [15]: MT, 26.v.–13.vi.2011, 1 ♂, PV lgt., YV det. (MBPC).

Paramacronychiinae

Brachicoma devia (Fallén, 1820)

Holarctic and Oriental Regions. In Central Europe common in lowlands in different meadow habitats and forest edges, including cultural landscapes, from April to October; adults feed on flowers.

Bukovec NR [1]: MT, 21.vii.–6.viii.2010, 1 ♂, PV lgt., YV det. (MBPC). **Holubník Mt. [3]:** PYT, 16.vi.–14.vii.2011, 1 ♀, PV lgt., YV det. (MBPC). **Šolcův rybník pond [15]:** MT, 13.vi.–1.vii.2011, 2 ♂♂, PV lgt., YV det. (MBPC); MT (baited with meat, beer), 1.vii.–3.viii.2011, 6 ♂♂, PV lgt., HŠ & YV det. (MBPC, SMLC); PYT (baited with meat), 26.v.–1.vii.2011, 1 ♂, PV lgt., YV det. (MBPC).

Sarcophaginae

Bercaea africa (Wiedemann, 1824)

Lit.: Bílý Potok (Čepelák 1983 as *Bercaea haemorrhoidalis* Fallén, 1816).

Holarctic, Afrotropical, Oriental and Neotropical regions. In Europe prefers warmer regions, common in the Mediterranean. In Central and northern Europe occurs mainly in urban areas. Adults feed on various types of animal excreta, animal carcasses and other decaying substrates, less at flowers; producing facultative myiasis in man and animals; species of forensic, medical and veterinary importance.

Discachaeta pumila (Meigen, 1826)

RL: EN

Lit.: Bílý Potok (Čepelák 1983).

Europe, including the British Islands. In Central Europe common from lowlands to mountains, accompanying both humid and mesophytic meadows, forests and limestone habitats from May to September; adults feed on flowers and dead snails. The number of findings in the Czech Republic has increased in recent years (e. g. Kejval 2011). Its classification among the endangered species (Povolný 2005) is certainly not justified.

Bukovec NR [1]: MT, 21.vii.–6.viii.2010, 1 ♂, PV lgt., YV det. (MBPC). **Malá Strana NR [6]:** YPT, 8.v.–17.vi.2002, 3 spec., JP lgt., DP det. (SMLC).

Helicophagella (s. str.) *agnata* (Rondani, 1860)

Western and Central Europe, northern Kazakhstan (Akmola region). In Central Europe common from lowlands to mountains, accompanying both deciduous and coniferous forests with highest population numbers in montane beech wood from May to September; adults feed on flowers.

Rybí loučky NR [14]: YPT, 17.–29.v.2003, 1 spec., JP & PV lgt., DP det. (SMLC).

Helicophagella (s. str.) *noverca* (Rondani, 1860)

Western and Central Europe eastward to the Dnipro River (absent from the British Islands), North Caucasus, Transcaucasus, Asia Minor, Israel, North Africa. In Central Europe very common, associated with meadows near woods, low and mid-elevation forests, flying period from May to September. Adults feed at flowers and are attracted to decaying mammalian flesh and various types of animal excreta; species of forensical, medical and veterinary importance.

Bukovec NR [1]: MT, 15.vi.–2.vii.2010, 1 ♂, PV lgt., YV det. (MBPC).

Helicophagella (*Parabellieria*) *melanura* (Meigen, 1826)

Holarctic, Oriental and Afrotropical (Mauritania) Regions. Hemisynanthropic species; in Central Europe prefers cities and villages, common from lowlands to mountains, accompanying meadows and bushes from April to October; adults feed on flowers, feces, dead snails and vertebrates; species of forensical, medical and veterinary importance.

Bukovec NR [1]: MT, 2.–21.vii.2010, 1 ♂, 1 ♀, PV lgt., YV det. (MBPC).

Heteronychia (s. str.) *chaetoneura* Brauer et Bergenstamm, 1889

Europe (Austria, Czech Republic, France, Belarus, Germany, Greece, Hungary, Italy, Slovakia, Ukraine); its distribution range is not well known. In Central Europe prefers humid meadows and coastal bushes from lowlands to hillsides; flying period in May – September; adults feed on flowers.

Malá Strana NR [6]: YPT, 5.–20.viii.2003, 1 spec., JP & PV lgt., DP det. (SMLC).

Heteronychia (s. str.) *depressifrons* (Zetterstedt, 1845)

Palearctic and Oriental Regions. In Central Europe common from lowlands to mountains, accompanying bogs, humid meadows, chalk grasslands, limestone hillsides, edges of humid forests from May to September; adults feed on flowers and honeydew.

Rejdice [12]: YPT, 3.–16.vi.2005, 5 spec., JP & PV lgt., ZK det. (SMLC).

Heteronychia (s. str.) *haemorrhoea* (Meigen, 1826)

Europe, including the British Isles, North Caucasus, Transcaucasus, Asia Minor. In Central Europe common and accompanying thin lowland forests, bushes, limestone associations and forest margins in lower vegetation tiers from April to October; adults feed on flowers.

Bukovec NR [1]: CFT, 23.vii.–5.viii.2003, 1 spec., JP & PV lgt., DP det. (SMLC).

Heteronychia (s. str.) *vagans* (Meigen, 1826)

Transpalearctic from the British Islands to Japan, in the north up to northern Norway and Yakutia; absent from North Africa, Middle East (except Asia Minor) and Central Asia. In

Central Europe common in meadows, bushes and mesophytic lowland forests; adults feed on flowers; flying period in April – October.

Bukovec NR [1]: CFT, 20.viii.–2.ix.2003, 2 spec., JP & PV lgt., DP det. (SMLC); MT, 15.vi.–2.vii.2010, 1 ♂, 2.–21.vii.2010, 1 ♂, 1 ♀, 21.vii.–6.viii.2010, 2 ♂♂, 1 ♀, all PV lgt., YV det. (MBPC). **Malá Strana NR [6]:** YPT, 8.v.–17.vi.2002, 3 spec., JP lgt., DP det. (SMLC); YPT, 10.–26.vi.2003, 6 spec., 5.–20.viii.2003, 3 spec., 20.viii.–2.ix.2003, 1 spec., all JP & PV lgt., DP & ZK det. (SMLC). **Rašeliníště Jizery NNR [11]:** YPT, 20.viii.–2.ix.2003, 1 spec., JP & PV lgt., DP det. (SMLC). **Rejdice [12]:** YPT, 3.–16.vi.2005, 1 spec., JP & PV lgt., ZK det. (SMLC).

Liosarcophaga (Pandelleisca) similis (Meade, 1876)

Palearctic, from the British Islands to Japan, and Oriental regions. In Central Europe common in mesophytic forest habitats and cultural landscapes (parks etc.), feeding at flowers, honeydew and on decaying organic material; species of forensic, medical and veterinary importance; flying period in April – October.

Šolcův rybník pond [15]: MT, 26.v.–13.vi.2011, 1 ♂, PV lgt., YV det. (MBPC).

Parasarcophaga (s. str.) *albiceps* (Meigen, 1826)

Palearctic, from the British Islands to Japan, Oriental, Australasian/Oceanian and Afrotropical (Kenya) regions. In Central Europe common in mesophytic meadow and forest habitats, cultural landscapes (parks etc.), and synanthropic locations (markets, garbage dumps etc.) feeding at flowers, honeydew and on decaying organic material; species of forensic, medical and veterinary importance; flying period in May – September.

Rudolfov [13]: PT, 31.v.–13.vi.2015, 1 ♂, JP lgt., HŠ det. (SMLC). **Šolcův rybník pond [15]:** MT (baited with meat, beer), 1.vii.–3.viii.2011, 6 ♂♂, PV lgt., HŠ & YV det. (MBPC, SMLC); PYT (baited with meat), 26.v.–1.vii.2011, 10 ♂♂, PV lgt., YV det. (MBPC); MT, 13.vi.–1.vii.2011, 1 ♂, PV lgt., YV det. (MBPC).

Robineauella (s. str.) *caerulescens* (Zetterstedt, 1838)

Lit.: Bílý Potok (Čepelák 1983 as *Robineauella scoparia*).

Widespread in Palearctic; locally in Nearctic (Canada: Yukon Territory; USA: Alaska) and Oriental (China: Yunnan) regions. In Central Europe common in mesophytic lowland and montane meadows, bushes and forests or cultural landscapes (parks etc.), species of forensic, medical and veterinary importance; feeding at flowers and on decaying organic material from May to September.

Holubník Mt. [3]: PYT, 11.v.–16.vi.2011, 1 ♀, PV lgt., YV det. (MBPC). **Malá Strana NR [6]:** YPT, 8.v.–17.vi.2002, 1 spec., JP lgt., DP det. (SMLC). **Panský lom NM [8]:** SW (flowering Apiaceae), 13.viii.2012, 1 ♂, JP lgt., HŠ det. (SMLC). **Rašeliníště Jizery NNR [11]:** YPT, 20.viii.–2.ix.2003, 1 spec., JP & PV lgt., DP det. (SMLC). **Šolcův rybník pond [15]:** MT (baited with meat, beer), 8.iv.–11.v.2011, 1 ♂, PV lgt., YV det. (MBPC).

Rosellea aratrix (Pandellé, 1896)

RL: CR

Lit.: Bílý Potok (Čepelák 1983 as *Parasarcophaga*).

Widespread in Palearctic (absent in arid zones and habitats); locally in Nearctic (Canada: Manitoba; USA: Alaska) and Oriental (Vietnam) regions. In Central Europe common in mesophytic forest habitats and cultural landscapes (gardens, parks etc.), adults feed at flowers and on decaying organic material; flying period in April – October. The number of findings in the Czech Republic has increased in recent years (f. e. Kejval 2011). Its classification among the endangered species (Povolný 2005) will have to be re-evaluated.

Horní Řasnice [4]: CFT (baited with beer), 24.iv.–29.v.2007, 1 ♂, JP & PV lgt., HŠ det. (SMLC). **Malá Strana NR [6]:** YPT, 20.viii.–2.ix.2003, 1 spec., JP & PV lgt., DP det. (SMLC). **Rašeliniště Jizery NNR [11]:** YPT, 20.viii.–2.ix.2003, 2 spec., JP & PV lgt., DP det. (SMLC). **Šolcův rybník pond [15]:** MT, 30.iv.–28.vi.2002, 2 spec., JP & PV lgt., ZK det. (SMLC); MT (baited with meat, beer), 11.v.–1.vii.2011, 4 ♂♂, 1.vii.–3.viii.2011, 3 ♂♂, 3.viii.–13.ix.2011, 1 ♂, all PV lgt., HŠ & YV det. (MBPC, SMLC).

Sarcophaga carnaria (Linnaeus, 1758)

Lit.: Bílý Potok, Hejnice (Čepelák 1983). Note: Čepelák (1983) reported *S. schulzi* Müller, 1922 from Bílý Potok as a new species for Bohemia (now a synonym of *S. carnaria*).

Europe, including the British Islands, north to Norway and the Kola Peninsula; North Caucasus, Transcaucasus, Asia Minor, Siberia to Baikal. In Central Europe common in vicinity of humid forests or sometimes the forest interior, meadows, margins of roads, parks and gardens up to 2500 m a.s.l.; adults feed at flowers, honeydew and on decaying organic material; species of forensic, medical and veterinary importance; flying period in April – October.

Bukovec NR [1]: CFT, 23.vii.–5.viii.2003, 5 spec., JP & PV lgt., DP det. (SMLC); YPT, 23.vii.–5.viii.2003, 1 spec., 2.–27.ix.2003, 1 spec., all JP & PV lgt., DP & HŠ det. (SMLC). **Černousy–Boleslav road [2]:** SW (flowering Apiaceae), 8.viii.2012, 2 ♂♂, JP & PV lgt., HŠ det. (SMLC). **Jizerskohorské bučiny NNR [5]:** Špičák Mt., YPT, 7.–20.vii.2003, 2 spec., JP lgt., ZK det. (SMLC); Viničná cesta path, 500 m, beech forest, YPT, 17.viii.–2.ix.2003, 1 spec., JP lgt., DP det. (SMLC). **Malá Strana NR [6]:** CFT, 23.vii.–5.viii.2003, 1 spec., JP & PV lgt., DP det. (SMLC); YPT, 10.–26.vi.2003, 1 spec., 5.–20.viii.2003, 6 spec., 20.viii.–2.ix.2003, 1 spec., all JP & PV lgt., DP det. (SMLC). **Meandry Smědé NR [7]:** MT, 31.v.–22.vi.2005, 1 spec., JP & PV lgt., ZK det. (SMLC). **Poustecká obora game preserve [9]:** MT, 27.iv.–16.v.2012, 1 ♂, PV & JP lgt., HŠ det. (SMLC). **Rašeliniště Jizery NNR [11]:** YPT, 20.viii.–2.ix.2003, 2 spec., JP & PV lgt., DP det. (SMLC). **Rudolfov [13]:** PT, 1.v.–30.v.2012, 1 ♂, JP lgt., HŠ det. (SMLC). **Rybí loučky NR [14]:** MT, 5.–20.viii.2003, 2 spec., JP & PV lgt., HŠ det. (SMLC); YPT, 17.–29.v.2003, 2 spec., JP & PV lgt., DP det. (SMLC); YPT, 23.vii.–5.viii.2003, 3 spec., JP & PV lgt., HŠ det. (SMLC); CFT, 5.–20.viii.2003, 1 spec., JP & PV lgt., DP det. (SMLC). **Šolcův rybník pond [15]:** MT (baited with meat, beer), 30.iv.–28.vi.2002, 5 spec., JP & PV lgt., HŠ & ZK det. (SMLC); MT, 13.vi.–1.vii.2011, 1 ♂, PV lgt., YV det. (MBPC); MT (baited with meat, beer), 26.v.–13.vi.2011, 1 ♂, 13.vi.–1.vii.2011, 2 ♂♂, 1.vii.–3.viii.2011, 18 ♂♂, 3.viii.–13.ix.2011, 1 ♂, PV lgt., HŠ det. (SMLC).

Sarcophaga lehmanni Müller, 1922

Lit.: Bílý Potok (Čepelák 1983 as a new species for Bohemia).

Western Palaearctic species. In Central Europe common in lowland dry meadows, steppe, bushes and cultural landscapes; adults feed at flowers, honeydew and on decaying organic material; species of forensic, medical and veterinary importance; flying period in May – December.

Malá Strana NR [6]: CFT, 23.vii.–5.viii.2003, 1 spec., 5.–20.viii.2003, 1 spec., all JP & PV lgt., DP det. (SMLC); YPT, 5.–20.viii.2003, 2 spec., 20.viii.–2.ix.2003, 1 spec., all JP & PV lgt., DP det. (SMLC); **Šolcův rybník pond [15]:** MT (baited with meat, beer), 26.v.–13.vi.2011, 1 ♂, 13.vi.–1.vii.2011, 1 ♂, 1.vii.–3.viii.2011, 1 ♂, PV lgt., HŠ det. (SMLC).

Sarcophaga schusteri Lehrer, 1959

Lit.: Bílý Potok (Čepelák 1983 as *S. susteri* – a new species for Czechoslovakia).

Validated as a separate species by Lehrer (2006). Recorded in Europe (Austria, Bulgaria, France, Hungary, Italy and Sicily, Ukraine).

Sarcophaga subvicina Rohdendorf, 1937

Europe including the British Isles and Fennoscandia, North Africa, North Caucasus, Transcaucasus, Central Asia. In Central Europe common in lowland humid limestone territories,

meadows, bushes, forests and cultural landscapes; adults feed at flowers, honeydew and on decaying organic material; species of forensical, medical and veterinary importance; flying period in April – September.

Bukovec NR [1]: YPT, 2.–27.ix.2003, 1 spec., JP & PV lgt., DP det. (SMLC); CFT, 20.viii.–2.ix.2003, 1 spec., JP & PV lgt., DP det. (SMLC); MT, 2.–21.vii.2010, 1 ♂, PV lgt., YV det. (MBPC). **Jizerskohorské bučiny NNR [5]:** Viničná cesta path, 500 m, beech forest, YPT, 17.viii.–2.ix.2003, 6 spec., 2.–19.ix.2003, 2 spec., all JP lgt., DP det. (SMLC). **Malá Strana NR [6]:** YPT, 8.v.–17.vi.2002, 6 spec., JP lgt., DP det. (SMLC); CFT, 5.–20.viii.2003, 3 spec., JP & PV lgt., DP det. (SMLC); YPT, 10.–26.vi.2003, 1 spec., 5.–20.viii.2003, 3 spec., 20.viii.–2.ix.2003, 3 spec., all JP & PV lgt., DP det. (SMLC). **Poustecká obora game preserve [9]:** MT, 27.iv.–16.v.2012, 2 ♂♂, PV & JP lgt., HŠ det. (SMLC). **Rašeliniště Jizery NNR [11]:** YPT, 20.viii.–2.ix.2003, 2 spec., JP & PV lgt., DP det. (SMLC). **Rybi loučky NR [14]:** MT, 5.–20.viii.2003, 2 spec., JP & PV lgt., HŠ det. (SMLC); YPT, 23.vii.–5.viii.2003, 1 spec., 12.–20.viii.2003, 3 spec., all JP & PV lgt., DP det. (SMLC); **Solcův rybník pond [15]:** MT, 30.iv.–28.vi.2002, 5 spec., JP & PV lgt., ZK det. (SMLC); MT (baited with meat, beer), 26.v.–13.vi.2011, 1 ♂, 13.vi.–1.vii.2011, 1 ♂, 1.vii.–3.viii.2011, 3 ♂♂, PV lgt., HŠ det. (SMLC).

Sarcophaga variegata (Scopoli, 1763)

Transpalaeartic (absent from the British Islands, Japan and arid districts) species. In Central Europe flies prefer various types of meadows, mesophytic and humid forests, parks and gardens, chalk grasslands and limestone hillsides up to 2300–2500 m a.s.l.; adults feed at flowers, honeydew and on decaying organic material; flying period in April – September; species of forensical, medical and veterinary importance.

Bukovec NR [1]: CFT, 5.–20.viii.2003, 1 spec., 20.viii.–2.ix.2003, 1 spec., all JP & PV lgt., DP & HŠ det. (SMLC). **Jizerskohorské bučiny NNR [5]:** Viničná cesta path, 500 m, beech forest, YPT, 17.viii.–2.ix.2003, 6 spec., JP lgt., DP & HŠ det. (SMLC). **Malá Strana NR [6]:** YPT, 8.v.–17.vi.2002, 2 spec., JP lgt., DP det. (SMLC); CFT, 23.vii.–5.viii.2003, 3 spec., 5.–20.viii.2003, 3 spec., all JP & PV lgt., DP & HŠ det. (SMLC); YPT, 16.–29.v.2003, 2 spec., 10.–26.vi.2003, 2 spec., 5.–20.viii.2003, 4 spec., 20.viii.–2.ix.2003, 3 spec., all JP & PV lgt., DP & HŠ det. (SMLC). **Meandry Smědý NR [7]:** MT, 31.v.–22.vi.2005, 1 spec., JP & PV lgt., HŠ det. (SMLC). **Poustecká obora game preserve [9]:** MT, 27.iv.–16.v.2012, 5 ♂♂, PV & JP lgt., HŠ det. (SMLC). **Pouстка [10]:** SW (flowering Apiaceae), 8.viii.2012, 1 ♂, JP lgt., HŠ det. (SMLC). **Rašeliniště Jizery NNR [11]:** YPT, 20.viii.–2.ix.2003, 1 spec., JP & PV lgt., DP det. (SMLC). **Rejdice [12]:** YPT, 3.–16.vi.2005, 2 spec., JP & PV lgt., HŠ det. (SMLC); **Rudolfov [13]:** PT, 20.v.–6.vi.2009, 2 ♂♂, JP lgt., HŠ det. (SMLC). **Solcův rybník pond [15]:** MT (baited with meat, beer), 26.v.–13.vi.2011, 1 ♂, 13.vi.–1.vii.2011, 2 ♂♂, 1.vii.–3.viii.2011, 8 ♂♂, PV lgt., HŠ det. (SMLC).

Thyrsocnema incisilobata (Pandellé, 1896)

Widespread in West Palaearctic, from Sweden and Ireland to western Siberia and from southern Scandinavia to North Africa. In Central Europe common in variable, secondary changed habitats and cultural landscapes, adults feed at flowers, ripe fruits, feces and on decaying meat; species of forensical, medical and veterinary importance.

Poustecká obora game preserve [9]: MT, 27.iv.–16.v.2012, 1 ♂, PV & JP lgt., HŠ det. (SMLC).

DISCUSSION

The faunal survey presented above is based on the material obtained by P. Vonička and J. Preisler during their field work in 2002–2015 that is deposited in the North Bohemian Museum in Liberec and in the private collection of M. Barták in Prague.

In total, 23 species have been recorded from the Jizerské hory Mts, Frýdlant region and Liberec environs, the northern part of the Czech Republic. These species represent only 16 %

(143 in total) of all species known from the Czech Republic and 22 % (105 in total) of the species known from Bohemia (Kejval & Pape 2009; Verves et al. 2016). In spite of the rather low amount of recorded species, these data extend the known number of Sarcophagidae from the Jizerské hory Mts. The only paper published by Čepelák (1983) included 7 species so far.

A majority of the species (19 of the 23 species) are widely distributed throughout the Palaearctic and are common, mainly in warmer lowlands. One recorded species, *Metopia grandii* Venturi, 1953, is rare, and two species are listed in the Red List of Threatened Invertebrates in the Czech Republic (Povolný 2005): *Discachaeta pumila* (Meigen, 1826) as endangered (EN) and *Rosellea aratrix* (Pandellé, 1896) as critically endangered (CR), although their recent findings from the Czech Republic indicate that their classification among the endangered species should be re-evaluated. Two species, *Bercaea africa* (Wiedemann, 1824) and *Sarcophaga schusteri* Lehrer, 1959, were not found during the survey and are listed only based on the previously published record (Čepelák 1983).

The recorded species are parasites of earthworms or attack molluscs. Some of them are necrophagous or coprophagous and their larvae develop in carcasses of insects or vertebrates as well as in feces. Altogether 11 species are considered as forensically, medically or veterinary important.

On that account, it is disputable to compare these results on the family Sarcophagidae with similar complex investigations carried out in the Czech Republic: e.g. Bílina and Duchcov (49 species: Pape et al. 2001), Pálava Biosphere Reserve (89 species: Povolný 1999), Podyjí National Park (49 species: Richet et al. 2005), Vráž near Písek (49 species: Verves et al. 2015) or western Bohemia (47 species: Kejval 2011). Our data are entirely comparable with the results of faunal surveys from the Czech part of the Krkonoše Mts (the Giant Mts) (25 species: Verves et al. 2016) based on the same collecting methods.

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SOUHRN

V oblasti Jizerských hor, Frýdlantska a Liberecka doposud nebyla provedena cílená faunistická studie zaměřená na čeleď masařkovití (Diptera: Sarcophagidae). V minulosti byla publikována jediná práce, která uváděla výskyt sedmi druhů masařek ze severního podhůří

Jizerských hor (Čepelák 1983). Na základě nově studovaného materiálu se navýšil počet na 23 druhů, které představují 16 % ze 143 druhů známých v současné době z České republiky a 22 % ze 105 druhů známých z území Čech.

Výsledky jsou založeny na materiálu získaném během entomologického průzkumu Jizerských hor, Frýdlantska a okolí Liberce v letech 2002–2015 uloženém ve sbírce Severočeského muzea v Liberci a v soukromé sbírce M. Bartáka v Praze. Druhové spektrum zahrnuje většinou běžné a v Palearktu široce zastoupené druhy. Zajímavý je nález vzácného druhu *Metopia grandii* Venturi, 1953 a potvrzený výskyt dvou druhů zařazených v aktuálním červeném seznamu (Povolný 2005) do kategorie ohrožený (EN): *Discachaeta pumila* (Meigen, 1826), a kriticky ohrožený (CR): *Rosellea aratrix* (Pandellé, 1896), přestože současné nálezy z České republiky ukazují, že jejich zařazení mezi ohrožené druhy se musí přehodnotit. Dva druhy, *Bercaea africa* (Wiedemann, 1824) a *Sarcophaga schusteri* Lehrer, 1959, nebyly během průzkumu zjištěny a jsou v této práci uvedeny na základě dřívějších publikovaných nálezů (Čepelák 1983).

Ke sběru studovaného materiálu byly použity rozdílné metody: Malaiseho pasti, proteinové pasti (návnada maso, event. pivo), žluté misky, padací pasti (viz Vonička 2008) a smýkání vegetace. Přesto žádná z metod nebyla zaměřena cíleně na čeleď masařkovití. Z uvedeného důvodu je obtížnější porovnat zjištěné druhové spektrum s faunistickými výzkumy dvoukříd-
lých dřívě provedenými v České republice: např. na Bílinsku a Duchcovsku (49 druhů: Pape et al. 2001), v CHKO a Biosférické rezervaci Pálava (89 druhů: Povolný 1999), v Národním parku Podyjí (49 druhů: Richet et al. 2005), ve Vráži u Písku (49 druhů: Verves et al. 2015) nebo v západních Čechách (47 druhů: Kejval 2011). Data jsou srovnatelná s faunistickými záznamy z české části Krkonoš (Verves et al. 2016), kde byly použity stejné metody sběru a zjištěn přibližně stejný počet druhů (25).