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Biodiversity of flat-footed flies (Diptera: Opetiidae and Platypezidae) of the Jizerské hory Mts, Frýdlant region, and Liberec environs (northern Bohemia, Czech Republic)

Biodiverzita stlačenkovitých (Diptera: Opetiidae a Platypezidae) Jizerských hor, Frýdlantska a okolí Liberce (severní Čechy, Česká republika)

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Abstract. A total of 22 species of the families Opetiidae (1 species) and Platypezidae (21 species) have been recorded from the Jizerské hory Mts, Frýdlant region, and Liberec environs. This is 64.7 % of all species known from the Czech Republic, and 73.3 % of those known from Bohemia. Within the present research, one species, *Agathomyia cinerea* (Zetterstedt, 1852) (Platypezidae), was discovered in the Czech Republic for the first time. Eight species, *Microsania collarti* Chandler, 2001, *Microsania pectipennis* (Meigen, 1830), *Agathomyia elegantula* Chandler in Shatalkin, 1985, *Agathomyia unicolor* (Oldenberg, 1928), *Paraplatypeza bicincta* (Szilády, 1941), *Platypeza aterrima* Walker, 1836, *Polyporivora ornata* (Meigen, 1838) and *Polyporivora picta* (Meigen, 1838) have been recorded from the studied area for the first time. Differences between *Agathomyia boreella* (Zetterstedt, 1838) and *A. elegantula* are discussed and illustrated in detail. Also female morphological differences between *Platypeza aterrima* and *P. hirticeps* Zetterstedt, 1844 are presented. The species diversity of the two families in the study area is similar to that recorded in other regions of the Czech Republic where these families were investigated in detail. The reasons of absence of some other, rare and common species are discussed.

Key words: Diptera, Opetiidae, Platypezidae, faunistics, new record, species conservation, Jizerské hory Mts, Frýdlantská pahorkatina Hills, Liberecká kotlina Basin, Ještědský hřbet Ridge, biodiversity, threatened species

INTRODUCTION

This is the second study of the dipteran families of flat-footed flies (Opetiidae and Platypezidae) in the Jizerské hory Mts and the adjacent Frýdlant region (in the north) and Liberec environs (in the south) (Czech Republic: northern Bohemia). The first study (Tkoč & Vaňhara 2008) was based on a limited (70 specimens), but surprisingly diverse material with 12 species records, including one new species for Bohemia – *Agathomyia sexmaculata* (von Roser, 1840). This study is based mainly on the newly collected material, however specimens of *A. elegantula* Chandler in Shatalkin, 1985 from previous research (Tkoč & Vaňhara 2008) were reidentified as *A. boreella* (Zetterstedt, 1838).

The flat-footed flies, Opetiidae and Platypezidae, are small families from the superfamily Platypezoidea. The European species are small to medium-sized brachycerous flies ranging from 1.4 to 6.0 mm in wing length. The adults are humpbacked and slender to broad-bodied. Males are mostly dark or black coloured, females are often lighter in colour, variously marked with brown, black, orange and grey, some species have silvery grey reflective patterns. Males have holoptic eyes, the female eyes are dichoptic. The larvae are dorsoventrally depressed or cylindrical and are amphipneustic. Larvae and puparia usually bear a series of short marginal and dorsal processes (also known as lappets) on each body segment. All known larvae are mycophagous and live in the fruiting bodies of fungi or under the bark of dead trees on fungal mycelia; one species is gall-forming (*Agathomyia wankowiczii* (Schnabl, 1884)). The majority of the species are monophagous, oligophagy occurs rather rarely. Adults can be spotted on broad leaves in forested habitats during fast movements, females can be observed during oviposition on host fungi. Adults of smoke flies (*Microsania* sp.) are attracted to smoke and can be individually sweep-netted in smoke of bonfires, the larvae of *Microsania* are unknown. Adults of other species usually concentrate on certain spots in the landscape, often in shady valleys or on forested hills.

Formerly, the species number for these two families in Europe was 44 (Chandler 2001, 2005), however two new species have been recently added by Ståhls & Rättel (2013) and Ståhls et al. (2014). Further revision was made by Ståhls et al. (2015), who added 4 more species from the genus *Agathomyia* to the European fauna, two were described as new and two were resurrected from synonymy of *Agathomyia elegantula* Chandler in Shatalkin, 1985. In Europe, these two families currently comprise 50 species in 13 genera, 34 of them are known from the Czech Republic (30 from Bohemia and 32 from Moravia) (for detailed summary see Table 1). Moreover, a few additional species have been recently found and/or recognized (M. Tkoč, unpublished data), so the actual number of European species will increase in the near future.

Table 1. Species numbers of Opetiidae and Platypezidae in the Czech Republic and Slovakia, Czech Republic, Bohemia, Moravia, Slovakia and Europe. (* – Czech and Slovak Diptera Checklist; ** – Fauna Europaea; BOH – Bohemia; CZ – Czech Republic; MOR – Moravia; SK – Slovakia).

Reference / Area	**CZ & SK**	**CZ**	**BOH**	**MOR**	**SK**	**EUROPE**
Vaňhara 2009*	36	32	25	31	31	-
Roh. & Šev. 2011	-	-	-	-	+1	-
Tkoč 2011	-	+1	-	+1	-	-
Tkoč et al. 2012	-	-	+2	-	+1	-
Tkoč 2016	-	+1	+3	-	-	-
Chandler 2001	-	-	-	-	-	44
Chandler 2005**	-	-	-	-	-	44
Ståhls & Rättel 2013	-	-	-	-	-	+1
Ståhls et al. 2014	-	-	-	-	-	+1
Ståhls et al. 2015	-	-	-	-	-	+4
TOTAL	**36**	**34**	**30**	**32**	**33**	**50**

The monograph of the European species by Chandler (2001) summarizes all known data on adult and larval morphology, biology, distribution, systematics, including keys to the species. The phylogeny of flat-footed flies was analyzed using molecular genetic methods by Tkoč et al. (2016), where *Microsania* was placed outside of the main Platypezidae clade but it is treated traditionally within the family Platypezidae in this study.

The faunal survey below is based on the published records mentioned above, the material obtained by P. Vonička, J. Preisler and M. Tkoč during their field work in 2001–2019 and on specimens collected by M. Tkoč and J. Roháček and some other dipterists during one-week expeditions performed every year from 2011 to 2017. Altogether 22 species were recorded in the study area, 1 of the family Opetiidae and 21 of the family Platypezidae.

The study area includes the Jizerské hory Mts (Protected Landscape Area) and two adjacent territories, the Frýdlant region and Liberec environs. The area is composed of the geomorphological complexes of the Jizerské hory Mts, Frýdlantská pahorkatina Hills, Liberecká kotlina Basin, Ještědský hřbet Ridge (a few localities) and Železnobrodská vrchovina Hills (one locality). A detailed description of the study area was given in some previous papers devoted to this territory (e.g. Vonička & Višňák 2008), most recently also by Roháček et al. (2017). Vonička (2008) summarized the results of a previous insect research in the Jizerské hory Mts.

MATERIAL AND METHODS

In the List of localities, data are presented in the following order: number (in brackets) and name of the locality (both in bold), grid mapping square code following Pruner & Míka (1996) (in parentheses), abbreviation of geomorphological complex, nearest settlement (where appropriate), coordinates, altitude, specified location and habitat type. The localities are listed alphabetically. In the systematic part, species within (sub)families are arranged in alphabetical order. With each species entry, faunal literature reference (if available) is given, followed by concise distributional (occasionally taxonomical) remarks, and conservation category is specified according to the Red List of Threatened Species of the Czech Republic, Invertebrates (Vaňhara & Ševčík 2005). Data for material examined are arranged in the following order: name of the locality and its number (in brackets, both in bold, repeated from List of localities), collecting method, date of collection, number of males and females, and collector′s name(s) (abbreviated or in full). Classification, nomenclature, and distribution of individual species are based on Chandler (2001) and Reemer & de Jong (2016).

List of localities

[1] Bedřichov (5156-5157): JH; 50º47′51.9″N, 15º07′31″E; 750 m.

[2] Bílý Potok (5157): JH; 50º52′49″N, 15º13′03″E; 450 m; small ponds NE of railway station, wetland, spring area.

[3] Bohuňovsko (5357): ŽV; Jesenný; 50º39′33″N, 15º19′33″E; 330 m; banks of Kamenice river, riverside vegetation.

[4] Bukovec NR (5158): JH; 50°48′44″N, 15°21′39.9″E; 900–925 m; deciduous forest, spring areas, quarry (Fig. 2) and northeastern slope (Fig. 1).

[5] Hamrštejn NR (5257): JE; Machnín env.; 50º46′48″N, 14º58′06″E; 400 m.

[6] Horní Maxov (5257): JH; near Malá Strana NR; 50º45′34″N, 15º12′37″E; 750 m; forest undergrowth.

[7] Jedlový důl NR (5257): JH; Josefův Důl; 50º47′22″N, 15º14′28″E; 700 m; Jedlová brook, mixed forest with dead tree trunks (Figs 3, 4).

[8] Jizerka (5158): JH; 50°49′29.4″N, 15°20′15″E; 868 m; field station of North Bohemian Museum in Liberec, attracted by smoke (Fig. 5).

[9] Jizerskohorské bučiny NNR (5157): JH; **[9a]**: Velký Štolpich brook; 50°51′28″N, 15°11′00″E; 575 m. **[9b]**: Štolpichy valley; 50°51′28″N, 15°11′11″E; 630 m. **[9c]**: Velký Štolpich waterfall; 50°51′06″N, 15°11′26″E; 750 m; sweeping in undergrowth of mixed forest.

[10] Karlovské bučiny NNR (5255): JE; Karlov pod Ještědem; 50º46′22″N, 14º58′37″E; 450 m; deciduous forest.

Figs 1–2. Bukovec NR. The northeastern slope (Fig. 1) and the old quarry (Fig. 2) of the Bukovec Mt. were the most productive localities concerning Platypezidae findings. Altogether 11 species were recorded there by sweeping. Photos by M. Tkoč.

Figs 3–4. Jedlový důl NR. Forested valley with flowing brook of Jedlová. *Picea abies*, *Fagus sylvatica* and to a lesser extent also *Abies alba*, *Acer pseudoplatanus* and *Sorbus aucuparia* grow in the valley. Altogether 6 species of Platypezidae were recorded there by sweeping. Photos by J. Roháček.

[11] Kořenov (5258): JH; **[11a]**: 50°46′44.4″N, 15º22′1.2″E; 710 m; banks of Jizera river and adjacent forest, riverside vegetation. **[11b]**: 50°46′18.3″N, 15º22′56.2″E; 640 m; banks of Jizera river and adjacent forest, riverside vegetation.
[12] Liberec (5256): LK; **[12a]**: sídliště Broumovská II.; small wetland; 50º45′38.16″N, 15º04′28.1″E; 380 m. **[12b]**: Růžodol; Opičák park; 50°46′19″N, 15°01′30″E; marshy forest with dead wood and small pools. **[12c]**: Nová Ruda, 50°45′30.7″N, 15°04′40.7″E; 395 m; small wetland. **[12d]**: ruderal secondary habitat; former property of Textilana factory; 50°45′46″N, 15°04′20″E; 320 m. **[12e]**: Lidové sady; 50°46′45″N, 15°05′29″E; 490 m. **[12f]**: Vesec; 50°44′07″N, 15°04′33″E; 380 m; wetlands in Vesecké údolí valley. **[12g]**: Vratislavice nad Nisou; 50º44′58″N, 15º05′11″E; 370 m; grounds of health centre.
[13] Ludvíkov pod Smrkem (5057): FP; **[15a]**: Lomnice river, 50º55′16″N, 15º10′57″E; 400 m; wetland, alder grove. **[15b]**: Lomnice river, 50º55′26.4″N, 15º11′32″E; 400 m; sweeping on riverbanks (Fig. 30).
[14] Meandry Smědé NR (5056): FP; **[14a]**: Černousy, Višňová; 50º59′54″N, 15º02′21″E; 220 m; small pond NE of Dubák pond, wetland, alder grove. **[14b]**: Černousy, 0.9 km SW of Černousy, 50º59′49″N, 15º02′39″E, Dubák pond, 240 m, sweeping in undergrowth of deciduous forest.
[15] Poustecká obora (5056): FP; Višňová; Poustka; 50°57′33.6″N, 15°03′50.9″E; 270 m; mixed forest.
[16] Ztracený potok (5057): JH; **[16a]**: 2 km south of Nové Město pod Smrkem, 50°54′14.4″N, 15°14′42″E; 580 m; Ztracený potok stream, confluence of two small streams. **[16b]**: Kyselka, Ztracený potok stream, 50°54′22.5″N, 15°14′33.4″E, 560 m.

Collecting methods and material

The material was obtained using the following collecting methods: Malaise traps, sweeping over vegetation and various substrates or individual netting. The majority of the material examined was collected by J. Preisler & P. Vonička (material preserved in ethanol, remounted to dry state) and J. Roháček & M. Tkoč (dry-mounted material). All specimens were identified by M. Tkoč. Voucher specimens are deposited in the National Museum, Prague, Czech Republic (NMPC), Silesian Museum, Opava, Czech Republic (SMOC) and the North Bohemian Museum in Liberec (SMLC). Where not indicated in the material section under each species, the specimens are deposited in NMPC.

Abbreviations used

Protected areas: NNR – National Nature Reserve; NR – Nature Reserve; PLA – Protected Landscape Area.

Geomorphological complexes: FP – Frýdlantská pahorkatina Hills; JE – Ještědský hřbet Ridge; JH – Jizerské hory Mts; LK – Liberecká kotlina Basin; ŽV – Železnobrodská vrchovina Hills.

Collecting methods: MT – Malaise trap; SW – sweeping or netting.

Collectors: JiP – Jiří Preisler; JiR – Jindřich Roháček; MiT – Michal Tkoč; PaV – Pavel Vonička (names of other collectors are given in full).

Other abbreviations: * – new species record for studied area, CR – critically endangered species, EN – endangered species, VU – vulnerable species (categories derived from the Red List of threatened invertebrates of the Czech Republic; Vaňhara & Ševčík 2005).

RESULTS

Opetiidae

Opetia nigra Meigen, 1830 (Figs 9, 10)

Lit.: Bílý Potok, Frýdlant, Hodkovice nad Mohelkou, Meandry Smědé NR (Tkoč & Vaňhara 2008).

Rare to uncommon species in the Czech Republic. West Palaearctic species with variable size and dark colouration of both sexes. The species is apparently bivoltine and the immature stages are unknown. This species was reared from rotten birch (*Betula pendula*) by Speight et al. (1990) and also collected by means of an emergence trap placed over a strongly decayed (brown-rot) and softened piece of trunk of spruce (*Picea abies*) by Ståhls & Kahanpää (2006).

Bohuňovsko [3]: SW, 27.v.2014, 1 ♂, MiT lgt. **Kořenov [11a]**: SW, 16.viii.2018, 1 ♂, JiP lgt. **Liberec-Vesec [12f]**: SW, 28.v.2015, 1 ♂, JiP lgt. **Poustecká obora [15]**: MT, 27.iv.–16.v.2012, 1 ♂, PaV & JiP lgt.

Figs 5–8. *Microsania* and collecting in smoke. 5 – M. Tkoč showing the technique of sweeping species of *Microsania* attracted by smoke at Jizerka settlement. 6–8 – *Microsania pectipennis* (Meigen, 1830), female during wing and body cleaning (7) and in two other views. Photos by J. Roháček.

Platypezidae

Microsania collarti* Chandler, 2001 RL: **CR

Uncommon Palaearctic species. Both species of *Microsania* recorded here were attracted to the smoke of bonfire in the evening of a sunny day (Fig. 5). The larvae and their habitat are unknown. *M. collarti* has been known from England, Belgium, Czech Republic, Slovakia, the Netherlands and European Russia (Chandler 2001, Reemer & de Jong 2016, Roháček & Ševčík 2007). This is the fifth known record of this species from the Czech Republic: the first was from Holešov – Přílepy in southeastern Moravia (Vaňhara 1982); the second and third were from the Hrubý Jeseník Mts (sweeping over peat-bog meadow) and Chvalíkovice (swarming in smoke) in north Moravia (Roháček & Ševčík 2007) and the fourth was from the Šumava Mts in southwestern Bohemia (Jezerní slať (mire) env., swarming in smoke) (Roháček & Ševčík 2007). **New record for studied area.**

Jizerka [8]: sweeping in smoke of bonfire, 22.vii.2013, 1 ♀, MiT lgt.

Microsania pectipennis* (Meigen, 1830) (Figs 6–8) RL: **CR

Most common European species of the genus. Netted in the smoke of bonfire (Fig. 5) together with the above mentioned species. **New record for studied area.**

Jizerka [8]: sweeping in smoke of bonfire, 22.vii.2013, 2 ♀♀, MiT lgt.

Platypezina connexa (Boheman, 1858) (Figs 11–13) RL: **CR**

Lit: Bukovec, Ovčí hora, U Kyselky (Tkoč & Vaňhara 2008).

Known mainly from northern Europe. Rare species, however adults could be locally abundant during the peak period of their activity. The flight period ranges from VIII to X. The host fungus and immature stages remain unknown, but the adults were repeatedly reared from strongly decayed (brown-rot) and softened trunk of spruce (*Picea abies*) (Ståhls & Kahanpää 2006), so it is very probable that larvae feed on fungal growth of dead *Picea* trunks or branches.

Bílý Potok [2a]: SW, 13.ix.2016, 1 ♂, MiT lgt. **Bukovec NR [4]**: SW, 30.viii.2015, 2 ♂♂, 1 ♀, JiP lgt.; SW, 30.viii.2015, 5 ♂♂, MiT lgt.; SW, 1.ix.2015, 1 ♂, JiP lgt.; SW, 1.ix.2015, 1 ♂, 1 ♀, MiT lgt.; SW, 27.viii.2016, 1 ♂, JiP lgt.; SW, 10.–16.ix.2016, 1 ♂, JiP lgt.; SW, 12.ix.2016, 1 ♀, MiT lgt.; SW, 14.ix.2016, 1 ♀, MiT lgt. (SMOC). **Jedlový důl NR [7]**: SW, 12.ix.2016, 3 ♂♂, MiT lgt.

Agathomyia antennata (Zetterstedt, 1819) (Fig. 14)

Lit: Harta, Ludvíkov pod Smrkem, Rejdice, Rudolfov (Tkoč & Vaňhara 2008).

Palaearctic species. One of the most common species of the genus. Larvae develop in the tree fungus *Bjerkandera adusta*. Males and females can be swept from leaves of various trees and other plants of forest undergrowth.

Bílý Potok [2a]: SW, 22.vii.2013, 1 ♂, M. Vála lgt. **Bukovec NR [4]**: SW, 15.viii.2017, 1 ♀, JiP lgt. **Jedlový důl NR [7]**: SW, 24.vii.2013, 1 ♀, MiT lgt. **Jizerskohorské bučiny NNR [9b]**: SW, 15.vi.2012, 1 ♀, JiR (SMOC). **Karlovské bučiny NNR [10]**: SW, 27.v.2016, 1 ♀, JiP lgt. **Kořenov [11a]**: SW, 24.vii.2013, 2 ♂♂, MiT lgt.; SW, 16.viii.2018, 1 ♂, JiP lgt. **Liberec [12a]**: SW, 21.v.2014, 1 ♂, JiP lgt. **[12f]**: SW, 28.v.2015, 2 ♂♂, JiP lgt. **Ztracený potok [16a]**: SW, 31.vii.2019, 1 ♂, MiT & JiP lgt. **[16b]**: SW, 31.vii.2018, 3 ♂♂, 2 ♀♀, MiT & JiP lgt.

Figs 9–10. Family Opetiidae, *Opetia nigra* Meigen, 1830, male. 9 – laterally; 10 – dorsally. Photos by J. Roháček.

Figs 11–13. *Platypezina connexa* (Boheman, 1858). 11 – male laterally, hanging on a leaf; 12 – female dorsally; 13 – female laterally. Photos by J. Roháček.

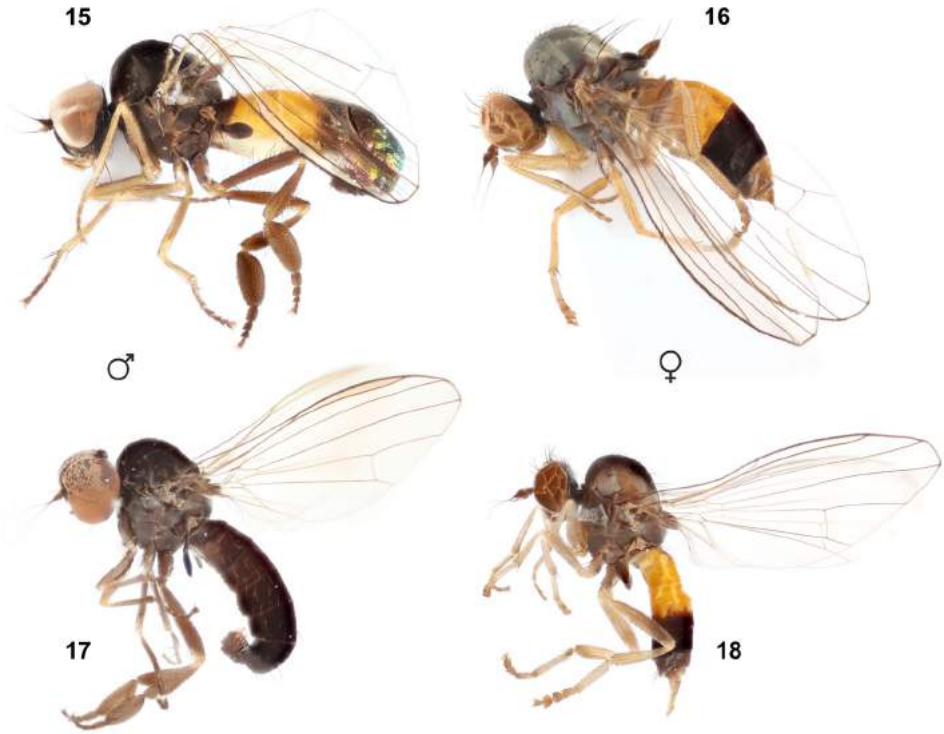
Fig. 14. *Agathomyia antennata* (Zetterstedt, 1819), female. Photo by J. Roháček.

Agathomyia boreella (Zetterstedt, 1838) (Figs 17, 18, 21, 22, 25, 26) RL: **VU**

Lit.: Jedlový důl, Liberec-Horní Hanychov, Ovčí hora, Špičák (Tkoč & Vaňhara 2008). Specimens were published under the name *A. elegantula*, but actually belong to the species *A. boreella* – see notes under *A. elegantula*, the material is deposited in SMLC.

Palaearctic species, probably more common than true *A. elegantula*. Distribution of *A. boreella* (including the occurrence in the Czech Republic) is not known because most of its records are probably hidden under published records of *A. elegantula*.

Notes on differences from *A. elegantula*. The males of *A. boreella* have the entire abdomen dark coloured, dark brown to black (Figs 17, 25), whilst males of *A. elegantula* have orange-yellow abdominal tergites T2–T3 and only the rest is dark (Figs 15, 23). The thorax of the male of *A. boreella* is more extensively black coloured, the lateral sides of thorax are greyish (Figs 17, 21), but less extensively than in *A. elegantula* (Figs 15, 19). The female abdomen of *A. boreella* has a yellow tergite T1 with a brown dorsal spot (Fig. 26), whereas the T1 of *A. elegantula* is completely yellow (Fig. 24). The rest of the abdomen is very similar in both species with yellow T2–T3 (part of the T3 may be also yellow in some specimens), black T4–T5 and shining grey T6–T7 (Figs 16, 18, 24, 26). The female thorax of *A. boreella* is grey with four more or less extensive black longitudinal stripes (Figs 18, 22, 26), whereas the thorax of *A. elegantula* is mainly grey with a darker dorsal area corresponding to the black stripes in *A. boreella* (Figs 16, 20, 24).



Figs 15–18. *Agathomyia elegantula* Chandler in Shatalkin, 1985 and *A. boreella* (Zetterstedt, 1838), differences in colouration, lateral views. 15 – *A. elegantula*, male; 16 – *A. elegantula*, female; 17 – *A. boreella*, male; 18 – *A. boreella*, female. Photos by M. Tkoč.

The female scutellum is very similar in both species with a black dorsal part, but laterally grey (Figs 20, 22, 24, 26).

Bedřichov [1]: SW, 3.vii.2014, 1 ♂, JiP lgt. **Bohuňovsko [3]**: SW, 27.v.2014, 1 ♂, MiT lgt. **Bukovec NR [4]**: SW, 20.vii.2013, 1 ♀, MiT lgt.; SW, 16.vii.2015, 1 ♀, MiT lgt.; SW, 30.viii.2015, 11 ♀♀, JiP lgt.; SW, 1.ix.2015, 1 ♂, 6 ♀♀, JiP lgt.; SW, 1.ix.2015, 1 ♂, 8 ♀♀, MiT lgt.; SW, 23.vi.2016, 1 ♀, JiP lgt.; SW, 11.ix.2016, 1 ♀, MiT lgt.; SW, 15.viii.2017, 1 ♀, JiP lgt.; SW, 30.vii.2018, 1 ♂, JiP lgt. **Jedlový důl NR [7]**: SW, 21.vii.2013, 4 ♂♂, 1 ♀, MiT lgt.; SW, 24.vii.2013, 4 ♂♂, 5 ♀♀, MiT lgt.; SW, 27.v.2014, 1 ♀, JiR lgt. (SMOC); SW, 15.vii.2015, 6 ♂♂, 14 ♀♀, MiT lgt. **Liberec [12f]**: SW, 16.v.2015, 1 ♀, JiP lgt. **Poustecká obora [15]**: SW, 12.vi.2012, 1 ♀, JiR lgt. (SMOC). **Ztracený potok [16a]**: SW, 31.vii.2018, 3 ♂♂, 2 ♀♀, MiT & JiP lgt. **[16b]**: SW, 31.vii.2018, 1 ♂, MiT & JiP lgt.

Agathomyia cinerea (Zetterstedt, 1852) (Figs 27–28)

Lit.: Bukovec NR (Tkoč 2016). The species was found during the present research and has been published in advance as a new addition to the fauna of the Czech Republic. The records are repeated here and supplemented with two more specimens found in 2016.

Rare Palaearctic species distributed mainly in the northern part of Europe. Existing records are from Finland, Germany, Great Britain, Italy, Poland, Slovakia, Sweden, Switzerland,

Figs 19–26. *Agathomyia elegantula* Chandler in Shatalkin, 1985 and *A. boreella* (Zetterstedt, 1838), diferences in colouration. 19–20 – *A. elegantula*, dorsal view of head and thorax, 19 – male, 20 – female; 21–22 – *A. boreella*, dorsal view of head and thorax, 21 – male, 22 – female; 23–24 – *A. elegantula*, dorsal view of abdomen, 23 – male, 24 – female; 25–26 – *A. boreella*, dorsal view of abdomen, 25 – male, 26 – female. Photos by M. Tkoč.

the Netherlands, European Russia and the Far East of Russia. Although it is mostly found in mountains above 750 m a. s. l. in the Czech Republic, in other countries some specimens were recorded from lowlands (Claussen 2013, Reemer 2014, Reemer & de Jong 2016). Its host fungus is *Ischnoderma benzoinum* as recently discovered by Reemer (2014).

Bukovec NR [4]: SW, 30.viii.2015, 2 ♂♂, 1 ♀, MiT lgt.; SW, 1.ix.2015, 1 ♂, 1 ♀, MiT lgt.; SW, 1.ix.2015, 1 ♀, JiP lgt.; SW, 27.viii.2016, 1 ♂, 1 ♀, JiP lgt.

**Agathomyia elegantula* Chandler in Shatalkin, 1985 (Figs 15, 16, 19, 20, 23, 24)

Rare Palaearctic species, the larvae develop in *Antrodiella pallescens*. Recent molecular study (Ståhls et al. 2015) showed that four more species are hidden under the name *A. elegantula*. Two

Figs 27–28. *Agathomyia cinerea* (Zetterstedt, 1852), laterally. 27 – male; 28 – female. Photos by M. Tkoč.

Figs 29–30. *Agathomyia falleni* (Zetterstedt, 1819) and its habitat. 29 – male laterally; 30 – collecting locality of *A. falleni*, Ludvíkov pod Smrkem, Lomnice river. Photos by J. Roháček.

very similar species were described as new (*A. alneti* Ståhls & Rättel, 2015 and *A. shatalkini* Ståhls, 2015) and two were resurrected from synonymy (*A. boreella* (Zetterstedt, 1838) and *A. scutellaris* (Zetterstedt, 1838)). *A. elegantula* was previously recorded from the studied area (Tkoč & Vaňhara 2008), but after re-examination the voucher specimens proved to belong to *A. boreella* (see above). For differences between these two species see notes under *A. boreella*. Distribution of true *A. elegantula* (including occurrence in the Czech Republic) remains uncertain pending the revision of all previous records. **New records for studied area.**

Bukovec NR [4]: SW, 30.viii.2015, 1 ♀, JiP lgt.; SW, 30.viii.2015, 1 ♀, MiT lgt.; SW, 1.ix.2015, 1 ♂, JiP lgt. **Jizerskohorské bučiny NNR [9a]**: SW, 22.vii.2013, 1 ♀, MiT lgt. **Ztracený potok [16a]**: SW, 31.vii.2018, 1 ♂, MiT & JiP lgt.; SW, 31.vii.2019, 1 ♂, MiT & JiP lgt.

Agathomyia falleni (Zetterstedt, 1819) (Fig. 29) RL: **VU**

Lit.: Vratislavice nad Nisou (Tkoč & Vaňhara 2008).

Uncommon Palaearctic species. The adults have an autumnal flight period (IX to XI), its host fungus is *Bjerkandera adusta* (together with *A. unicolor* and *A. antennata*).

Ludvíkov pod Smrkem [13b]: SW, 13.ix.2016, 1 ♂, MiT lgt. (Fig. 30). **Meandry Smědé NR [14b]**: SW, 15.ix.2016, 1 ♀, JiR lgt. (SMOC).

Agathomyia sexmaculata (von Roser, 1840) (Fig. 31) RL: **CR**

Lit.: Vratislavice nad Nisou (Tkoč & Vaňhara 2008).

Palaearctic species. Rare species, host fungus is tree fungus *Bjerkandera fumosa*.

Agathomyia unicolor* (Oldenberg, 1928) (Fig. 32) RL: **VU

Palaearctic species. Common autumnal species, main flight period ranges from IX to X. Host fungus is *Bjerkandera adusta*. **New records for studied area.**

Bílý Potok [2a]: SW, 13.ix.2016, 1 ♂, MiT lgt. **Jedlový důl NR [7]**: SW, 12.ix.2016, 1 ♂, MiT lgt. **Karlovské bučiny NNR [10]**: SW, 13.ix.2015, 1 ♂, JiP lgt.

Agathomyia viduella (Zetterstedt, 1838) (Fig. 33)

Lit.: Rejdice (Tkoč & Vaňhara 2008).

Palaearctic species. Uncommon species, main flight period is from IV to VI. Host fungus is unknown.

Bukovec NR [4]: SW, 26.v.2014, 1 ♀, JiR lgt. (SMOC); SW, 26.v.2014, 2 ♀♀, MiT lgt.; SW, 23.vi.2016, 1 ♀, JiP lgt. **Kořenov [11b]**: SW, 31.v.2017, 1 ♂, JiR lgt. (SMOC). **Liberec [12f]**: SW, 16.v.2015, 1 ♀, JiP lgt.; SW, 28.v.2015, 1 ♂, JiP lgt. **Ludvíkov pod Smrkem [13a]**: SW, 10.v.2016, 3 ♀♀, JiP lgt. **Meandry Smědé NR [14a]**: SW, 30.v.2014, 1 ♀, MiT lgt.

Agathomyia wankowiczii (Schnabl, 1884) (Fig. 34, 35) RL: **VU**

Lit.: Raspenava (Tkoč & Vaňhara 2008).

Uncommon Palaearctic species. The larvae form typical galls on sporocarps of tree fungus *Ganoderma applanatum* (Fig. 35). The adult flight period ranges from VI to IX. For more detailed information on biology of this species see Struwe et al. (2010).

Bukovec NR [4]: SW, 24.vii.2013, 1 ♀, MiT lgt.; SW, 13.vii.2015, 1 ♀, JiP lgt. **Jedlový důl NR [7]**: SW, 21.vii.2013, 1 ♂, 1 ♀, MiT lgt.; SW, 24.vii.2013, 1 ♂, MiT lgt.; SW, 15.vii.2015, 3 ♀♀, MiT lgt.

Figs 31–32. Subfamily Callomyiinae, adults of *Agathomyia* spp. 31 – *A. sexmaculata* (von Roser, 1840), female; 32 – *A. unicolor* (Oldenberg, 1928), male. Photos by D. Gavryushin.

Figs 33–35. Subfamily Callomyiinae, *Agathomyia viduella* (Zetterstedt, 1838) and *A. wankowiczii* (Schnabl, 1884). 33 – *A. viduella*, female; 34 – *A. wankowiczii*, female laterally; 35 – larva of *A. wankowiczii* protruding from its host fungus *Ganoderma applanatum*. Photos by M. Tkoč (33) & J. Roháček (34, 35).

Figs 36–37. Subfamily Callomyiinae, females of the genus *Callomyia*. 36 – *C. speciosa* Meigen, 1804; 37 – *C. amoena* Meigen, 1824. Photos by J. Roháček.

Fig. 38. *Protoclythia modesta* (Zetterstedt, 1819), female laterally. Photo by J. Roháček.

Callomyia amoena Meigen, 1824 (Fig. 37)

Lit.: Bílý Potok, Harta, Jedlový důl NR, Ovčí hora, Paseky nad Jizerou, Plavy, Rejdice, Sklenařice, Špičák (Tkoč & Vaňhara 2008).

Common Palaearctic species, the larvae live on corticioid fungi *Phanerochaete velutina* or *P. sordida* growing on bark of fallen dead tree trunks or branches.

Bedřichov [1]: SW, 3.vii.2014, 1 ♂, JiP lgt. **Bílý Potok [2a]**: SW, 13.ix.2016, 1 ♀, MiT lgt. **[2b]**: SW, 1.vi.2017, 1 ♀, JiR lgt. (SMOC). **Bohuňovsko [3]**: SW, 23.vii.2013, 1 ♀, MiT lgt. **Bukovec NR [4]**: SW, 20.vii.2013, 1 ♂, MiT lgt.; SW, 26.v.2014, 3 ♀♀, MiT lgt.; SW, 31.v.2014, 1 ♂, JiP lgt.; SW, 7.vi.2014, 1 ♂, JiP lgt.; SW, 6.vi.2015, 1 ♂, JiP lgt.; SW, 16.vii.2015, 1 ♀, JiR lgt. (SMOC); SW, 16.vii.2015, 1 ♂, MiT lgt.; SW, 30.viii.2015, 1 ♂, JiP lgt.; SW, 1.ix.2015, 1 ♂, 1 ♀, JiP lgt.; SW, 30.viii.2015, 1 ♂, MiT lgt.; SW, 1.ix.2015, 1 ♂, 1 ♀, MiT lgt.; SW, 23.vi.2016, 4 ♀♀, JiP lgt.; SW, 23.vi.2016, 3 ♂♂, 1 ♀, MiT lgt.; SW, 27.viii.2016, 1 ♂, 2 ♀♀, JiP lgt.; SW, 15.viii.2017, 1 ♂, 1 ♀, JiP lgt. **Hamrštejn NR [5]**: SW, 19.vi.2013, 1 ♂, JiP lgt. **Horní Maxov [6]**: SW, 21.vii.2013, 1 ♀, MiT lgt. **Jedlový důl NR [7]**: SW, 21.vii.2013, 1 ♀, JiR lgt. (SMOC); SW, 21.vii.2013, 1 ♂, 3 ♀♀, MiT lgt.; SW, 27.v.2014, 1 ♂, MiT lgt.; SW, 15.vii.2015, 5 ♂♂, 4 ♀♀, MiT lgt.; SW, 27.v.2017, 1 ♂, 1 ♀, JiR lgt. (SMOC). **Jizerskohorské bučiny NNR [9a]**: SW, 22.vii.2013, 1 ♀, MiT lgt. **[9c]**: SW, 15.vi.2011, 1 ♀, JiR lgt. (SMOC). **Kořenov [11b]**: SW, 24.vii.2013, 1 ♂, JiR lgt. (SMOC); SW, 24.vii.2013, 3 ♂♂, 3 ♀♀, MiT lgt. **Liberec [12a]**: SW, 21.v.2014, 2 ♂♂, JiP lgt.; SW, vii.2014, 1 ♂, JiP lgt. **[12e]**: SW, 29.ix.2014, 1 ♂, JiP lgt. **[12f]**: SW, 16.v.2015, 4 ♂♂, 6 ♀♀, JiP lgt.; SW, 18.v.2015, 2 ♂♂, 3 ♀♀, JiP lgt.; SW, 28.v.2015, 4 ♂♂, 6 ♀♀, JiP lgt.; SW, 5.vi.2015, 1 ♂, JiP lgt.; SW, 24.vii.2015, 1 ♂, JiP lgt. **Ludvíkov pod Smrkem [13a]**: MT, 16.viii.–13.ix.2016, 1 ♀, PaV & JiP lgt. **[13b]**: SW, 13.ix.2016, 1 ♀, MiT lgt. **Meandry Smědé NR [14b]**: SW, 15.ix.2016, 1 ♀, JiR lgt. (SMOC). **Poustecká obora [15]**: SW, 12.vi.2012, 1 ♀, JiR lgt. (SMOC). **Ztracený potok [16a]**: SW, 31.vii.2018, 1 ♀, MiT & JiP lgt. **[16b]**: SW, 31.vii.2018, 6 ♂♂, 1 ♀, MiT & JiP lgt.

Figs 39–42. Subfamily Platypezinae, females of the genus *Platypeza*. 39 – *P. aterrima* Walker, 1836, habitus laterally; 40 – *P. hirticeps* Zetterstedt, 1844, habitus laterally; 41 – *P. aterrima*, anterior view of head; 42 – *P. hirticeps*, anterior view of head. Photos by M. Tkoč.

Callomyia speciosa Meigen, 1804 (Fig. 36)

Lit.: Karlov (Vaňhara 1984); Jedlový důl NR, Malá Strana NR, Rudolfov, Sklenařice, Špičák (Tkoč & Vaňhara 2008).

Palaearctic species. Not so common as *C. amoena*, the larvae live on corticioid fungi *Phanerochaete sanguinea* or *P. sordida* growing on bark of fallen dead tree trunks or branches.

Bedřichov [1]: SW, 3.vii.2014, 1 ♂, JiP lgt. **Bukovec NR [4]**: SW, 20.vii.2013, 2 ♂♂, MiT lgt.; SW, 13.vii.2015, 1 ♂, JiP lgt.; SW, 16.vii.2015, 2 ♂♂, JiR lgt. (SMOC); SW, 16.vii.2015, 1 ♀, MiT lgt.; SW, 30.viii.2015, 7 ♀♀, JiP lgt.; SW, 30.viii.2015, 1 ♂, 3 ♀♀, MiT lgt.; SW, 1.ix.2015, 3 ♀♀, JiP lgt.; SW, 1.ix.2015, 14 ♀♀, MiT lgt.; SW, 23.vi.2016, 1 ♂, JiP lgt.; SW, 30.vii.2018, 2 ♂♂, 1 ♀, MiT & JiP lgt. **Jedlový důl NR [7]**: SW, 21.vii.2013, 1 ♂, 1 ♀, MiT lgt.; SW, 24.vii.2013, 1 ♂, MiT lgt.; SW, 27.v.2014, 1 ♂, JiR lgt. (SMOC); SW, 15.vii.2015, 5 ♂♂, 2 ♀♀, MiT lgt. **Karlovské bučiny NNR [10]**: SW, vii.1966, 1 ♂, J. Macek lgt. **Ztracený potok [16b]**: SW, 31.vii.2018, 1 ♂, MiT & JiP lgt.

**Protoclythia modesta* (Zetterstedt, 1844) (Fig. 38)

Palaearctic species. Common species, larvae live in fruiting bodies of *Armillaria* spp. The adult flight period ranges from VIII to X.

Meandry Smědé NR [14b]: SW, 15.ix.2016, 1 ♀, JiR lgt. (SMOC).

Platypeza aterrima* Walker, 1836 (Figs 39, 41) RL: **CR

Palaearctic species. Rare species, the host fungus is not known with certainty, probably also associated with *Armillaria* spp. The flight period is from VIII to X, which correlates with growing period species of *Armillaria* spp. **New record for studied area.**

Notes to differences from *P. hirticeps.* The females of *P. aterrima* and *P. hirticeps* are generally very similar and not easily distinguishable. Here we repeat some morphological characters known from literature (Chandler 2001, Reemer & de Jong 2016) and provide some new detailed morphological differentiation of head colouration and setation (Table 2).

Bukovec NR [4]: SW, 14.ix.2016, 1 ♀, MiT lgt.

Table 2. Morphological differences between females of *Platypeza aterrima* Walker, 1836 and *Platypeza hirticeps* Zetterstedt, 1844.

Character / Species	***Platypeza aterrima***	***Platypeza hirticeps***
Face	Narrowed to mouth margin, broader than parafacial (Fig. 41).	A little narrower than parafacial or of same width (Fig. 42).
Parafacial setae	Not so densely distributed, ascending to level of antennae (Fig. 41).	Densely distributed, not ascending level of antennae (Fig. 42).
Frons colouration	Shiny grey with greenish or brownish spot. This spot of different colour than face (Fig. 41).	Shiny grey, same colour as on face (Fig. 42).
Frontal setae	Longer, more curved. Also long, thin setae present.	Shorter, less curved. No long, thin setae present.
Dorsocentral setae (dc)	Tri- to pluriserial before suture, tri- to biserial behind suture.	Bi- to triserial before suture, biserial behind suture.
Costa	Straight about tip of subcostal vein (Sc) (Fig. 39).	Slightly convex about tip of subcostal vein (Sc) and subcostal cell broader basally (Fig. 40).
Tergite 1 (T1)	Broadly black.	Black area less extensive, broader grey margins.

Platypeza hirticeps Zetterstedt, 1844 (Figs 40, 42) RL: **EN**

Lit.: Ovčí hora, Stržový vrch (Tkoč & Vaňhara 2008).

Palaearctic species. Rare species, the host fungus is *Armillaria mellea* s. str. (Reemer & Jong 2016) and probably also other common *Armillaria* species. The flight period ranges from VIII to X.

Bukovec NR [4]: SW, 14.ix.2016, 1 ♀, MiT lgt.

Polyporivora ornata* (Meigen, 1838) (Fig. 43) RL: **EN

Palaearctic species, immature stages develop in the polypore fungus *Trametes versicolor*. Adult flight period ranges from V to X, the species is bivoltine. **New records for studied area.**

Jedlový důl NR [7]: SW, 29.v.2017, 1 ♂, JiR lgt. (SMOC). **Liberec [12b]**: SW, 3.vii.2015, 1 ♂, JiP lgt. **Ztracený potok [16a]**: SW, 31.vii.2018, 1 ♀, MiT & JiP lgt.

Polyporivora picta* (Meigen, 1838) (Fig. 44) RL: **EN

European species with most records from central and northern Europe, for detailed distribution see Tkoč (2011). Immature stages develop in *Trametes versicolor*. Adult flight period ranges from V to X and the species is bivoltine, similarly as the above species. **New records for studied area.**

Bukovec NR [4]: SW, 30.viii.2015, 1 ♂, MiT lgt. **Liberec [12g]**: SW, 20.ix.2006, 1 ♂, JiP lgt.

Figs 43–44. Subfamily Platypezinae, genus *Polyporivora*. 42 – *P. ornata* (Meigen, 1838), male dorsally; 43 – *P. picta* (Meigen, 1838), female laterally. Photos by D. Gavryushin (43) & J. Roháček (44).

Paraplatypeza atra (Meigen, 1804) (Fig. 45)

Lit.: Rudolfov (Tkoč & Vaňhara 2008).

Common species in Palaearctic region, larvae develop in sporocarps of *Pluteus cervinus*. Adult flight period ranges from IV to XI.

Bohuňovsko [3]: SW, 23.vii.2013, 1 ♀, MiT lgt. **Bukovec NR [4]**: SW, 16.vii.2015, 1 ♂, 1 ♀, MiT lgt.; SW, 30.viii.2015, 1 ♂, MiT lgt.; SW, 1.ix.2015, 1 ♂, JiP lgt. **Jedlový důl NR [7]**: SW, 21.vii.2013, 2 ♂♂, MiT lgt.

Jizerskohorské bučiny NNR [9a]: SW, 22.vii.2013, 1 ♂, MiT lgt. **Liberec [12c]**: SW, 13.vii.2013, 1 ♂, JiP lgt. **[12d]**: SW, 10.viii.2015, 1 ♂, JiP lgt. **[12f]**: SW, 16.v.2015, 1 ♂, JiP lgt.; SW, 28.v.2015, 1 ♂, JiP lgt. **Meandry Smědé NR [14a]**: SW, 30.v.2014, 1 ♀, MiT lgt.

Paraplatypeza bicincta* (Szilády, 1941) (Fig. 46) RL: **CR

Palaearctic species. Rare species associated with *Pluteus* sp. The adults were reared from *Pluteus cervinus* several times by the first author (pers. observation, unpublished). Adult flight period is VII–X. **New records for studied area.**

Bukovec NR [4]: SW, 30.viii.2015, 1 ♀, MiT lgt.; SW, 1.ix.2015, 1 ♂, 1 ♀, JiP lgt.; SW, 30.vii.2018, 1 ♂, MiT & JiP lgt.

DISCUSSION AND CONCLUSIONS

Altogether 22 species of the families Opetiidae and Platypezidae are reported from the studied area (Jizerské hory Mts, Frýdlant region, and Liberec environs), representing 73.3 % of all flat-footed flies known from Bohemia (64.7 % of the fauna of the Czech Republic).

Comparing the species spectrum of the families Opetiidae and Platypezidae from the present research with that from previous complex studies of biodiversity of Diptera (Pálava BR – 19 species, Bílina and Duchcov environs – 13 species, Podyjí NP – 19 species, Poľana – 23 species: Vaňhara 1998, Vaňhara & Barták 2000, Vaňhara et al. 2005, Roháček & Ševčík, 2009, respectively), it is an average number of species, but some of them (*Platypezina connexa*, *Agathomyia wankowiczii*, *Paraplatypeza bicincta, Platypeza aterrima* and *P. hirticeps*) could be considered as bio-indicators of well-preserved forests.

Twelve species found in the target area are listed in a recent national Red List (Vaňhara & Ševčík 2005) as threatened taxa: *Microsania collarti* (CR), *Microsania pectipennis* (CR), *Platypezina connexa* (CR), *A. boreella* (formerly recorded under name *A. elegantula*) (VU), *A. falleni* (VU), *A. sexmaculata* (CR), *A. unicolor* (VU), *A. wankowiczii* (VU), *Paraplatypeza bicincta* (CR), *Platypeza aterrima* (CR), *Platypeza hirticeps* (EN) and *Polyporivora ornata* (EN).

Members of the family Platypezidae are generally rarely collected. Quantitative collecting methods (Malaise traps, yellow pan traps, flight intercept traps) are little effective and the best way to collect a more numerous material is a combination of qualitative methods like individual sweeping (Vaňhara 1995, Vaňhara et al. 2005, Tkoč & Vaňhara 2008) and rearing from fungi (Ševčík 2010, Tkoč & Vaňhara 2006, 2008, Tkoč 2011).

Some species have not been recorded during the present research, which was most probably caused by their general rarity in central Europe, i.e. *Seri obscuripennis*, *Bolopus furcatus*, *Kesselimyia chandleri*, *Platypeza consobrina* and *P. fasciata.* The absence of several, elsewhere common, species *Lindneromyia dorsalis*, *L. hungarica* and *Protoclythia rufa*, is also remarkable. This was probably caused by the combination or only one of the following factors: 1) insufficiently intensive field research in the autumn period; 2) insufficiently intensive field research in places with host fungi; 3) the non-use of the methods of rearing from fungi and direct individual collecting from host fungi. All missing species discussed above (both rare and common) are expected to be found in the study area in the future, using and following the above-mentioned methods and conditions.

Figs 45–46. Subfamily Platypezinae, genus *Paraplatypeza*. 45 – *P. atra* (Meigen, 1804), dry-mounted male laterally; 46 – *P. bicincta* (Szilády, 1941), live female. Photos by M. Tkoč (45) & D. Gavryushin (46).

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SOUHRN

V této práci byla zpracována biodiverzita stlačenkovitých čeledí z řádu dvoukřídlí (Diptera: Opetiidae a Platypezidae) oblasti Jizerských hor, Frýdlantska a okolí Liberce. Celkem bylo zaznamenáno 22 druhů, z toho druh *Agathomyia cinerea* byl v rámci tohoto výzkumu poprvé nalezen v České republice, což již bylo publikováno dříve (Tkoč 2016). Osm druhů bylo ze studovaného území zaznamenáno poprvé: *Microsania collarti*, *M. pectipennis*, *Agathomyia elegantula*, *A. unicolor*, *Paraplatypeza bicincta*, *Platypeza aterrima*, *Polyporivora ornata* a *P. picta*.

Z ekologického hlediska jsou významné nálezy druhů *Platypezina connexa*, *Agathomyia wankowiczii*, *Paraplatypeza bicincta, Platypeza aterrima* a *P. hirticeps*. Tyto druhy se nalézají zcela výjimečně a žijí pouze v dobře zachovalých lesních biotopech a pralesích.

Z hlediska ochrany přírody byl výzkum také velmi přínosný. Celkem 12 nalezených druhů figuruje v Červeném seznamu ohrožených druhů České republiky (Vaňhara & Ševčík 2005). Jsou to druhy *Microsania collarti* (CR – kriticky ohrožený), *M. pectipennis* (CR – kriticky ohrožený), *Platypezina connexa* (CR – kriticky ohrožený), *Agathomyia boreella* (dříve pod jménem *A. elegantula*) (VU – zranitelný), *A. falleni* (VU – zranitelný), *A. sexmaculata* (CR – kriticky ohrožený), *A. unicolor* (VU – zranitelný), *A. wankowiczii* (VU – zranitelný), *Paraplatypeza bicincta* (CR – kriticky ohrožený), *Platypeza aterrima* (CR – kriticky ohrožený), *P. hirticeps* (EN – ohrožený) a *Polyporivora ornata* (EN – ohrožený).

Některé druhy nebyly ve studované oblasti zaznamenány vůbec, což je pravděpodobně způsobeno jejich vzácností ve střední Evropě. Jsou to *Seri obscuripennis*, *Bolopus furcatus*, *Kesselimyia chandleri*, *Platypeza consobrina* a *P. fasciata.* Zajímavá je také absence několika běžných druhů: *Lindneromyia dorsalis*, *L. hungarica* a *Protoclythia rufa*, která je nejspíše způsobena jedním z těchto faktorů nebo jejich kombinací: 1. nedostatečně intenzivní terénní výzkum v podzimním období; 2. nedostatečně intenzivní terénní výzkum na lokalitách s hostitelskými houbami; 3. nepoužití metod chovu z hub a individuálního přímého sběru z plodnic hostitelských hub. Předpokládáme, že všechny zmíněné chybějící druhy (jak ty vzácné, tak i běžné) budou na tomto území v budoucnu nalezeny, a to za použití a dodržení výše zmíněných metod a podmínek.

V článku jsou dále podrobně popsány rozdíly mezi příbuznými druhy *Agathomyia elegantula* a *A. boreella*, včetně detailních fotografií všech důležitých morfologických rozdílů. Detailní morfologické rozdíly jsou vyobrazeny a okomentovány dále také pro druhy *Platypeza aterrima* a *P. hirticeps*.