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Heleomyzidae and Lauxaniidae (Diptera, Brachycera, Acalyptrata) trapped in the Czech Republic with syrup and fermented fruit

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A b s t r a c t : Twelve species of Heleomyzidae and twelve of Lauxaniidae were trapped in the Czech Republic and Slovakia with syrup as bait. *Suillia affinis* (7) from Heleomyzidae, *Lyciella decempunctata* (9) and *Tricholauxania praeusta* (8) from Lauxaniidae were captured at the most of localities. All species of Heleomyzidae belong to the genus *Suillia*. The method of syrup baited traps is suitable for trapping Heleomyzidae and Lauxaniidae only as addition to other research methods.

K e y w o r d s : *Heleomyzidae*, *Lauxaniidae*, bait, trap, syrup

Introduction

The family Heleomyzidae includes small, medium-sized and large species. They are usually dark yellow, ochre and grey, and their wings are often spotted. Members of this family are usually forest species. Their larvae are saprophagous, mycetophagous (*Suillia*), coprophagous, and necrophagous. Few species are also phytophagous. The larvae often develop in birds' nests and vertebrates' burrows. Most species are psychrophilous, and adults of some species regularly may enter subterranean areas during the warmest months. These shelters are also used for hibernation. Some species live in caves throughout their entire life cycle and their development is not restricted to any specific period. Current knowledge of biology and ecology were summarized by PAPP (1998), but life habitats are unknown for many species. Altogether 84 species are known from the Czech Republic (DVOŘÁKOVÁ 2006a, DVOŘÁKOVÁ & PREISLER 2007).

The family Lauxaniidae includes mostly medium-sized or small species, which are usually yellow, but some species are grey or black. Few species have spotted or clouded wings. The larvae usually develop in decaying leaves, where they can sometimes form mines. Others species develop in birds' nests. Adults fly in forest-meadow ecotones, along forest roads, and around streams, but they prefer moist and shaded places. A review of our knowledge of the family was presented by MERZ (2003). Altogether 72 species are known from the Czech Republic (DVOŘÁKOVÁ 2006b).

Both families are usually captured with Malaise traps, yellow pan water traps, emergent traps, and by sweeping (DVOŘÁKOVÁ-MARSOVÁ et al. 2006a,b, MARTINEK 1999a,b, MARTINEK & BARTÁK 2001a,b, BARTÁK 1998, ROHÁČEK et al. 1998, ROHÁČEK &

BARTÁK 1999). Apparently the largest diversity for Heleomyzidae can be obtained with Malaise trap, while sweeping is not suitable. In some studies, pitfall traps (MARTINEK 1994, 1996a, b, ROZKOŠNÝ & VAŇHARA 1995) and hanging trap with a bait (MARTINEK 1994, 1996a, b) were used. Pitfall traps are not suitable for Lauxaniidae and very selective for Heleomyzidae - mainly genus *Suillia* could be caught (MARSOVÁ 2003).

The syrup trap used in this study is well known method, used by gardeners to capture wasps and hornets. The similar type of trap (with wine solution as attractant) was used for capturing of beetles (ALLEMAND & ABERLENC 1991).

This trap with beer as attractant was used by MÁCA (1973) for capturing of Drosophilidae. The syrup trap as described below (or similar method) is a new method for collecting Heleomyzidae or Lauxaniidae.

Material and methods

Heleomyzidae were identified using PAPP (1981), Lauxaniidae using MERZ (2004), SHATALKIN (2000) and REMM & ELBERG (1979). The nomenclature follows Fauna Europaea (MERZ 2005, WOŹNICA 2005), except of *Minettia fasciata* group (MERZ 2004).

The trap was a standard pet bottle of 1,5-2 l volume filled with commercial syrup diluted 1:5 by water, with 3 to 5 small pieces of cut fruit (usually apples). A fermentation process behaved as attractant. The trap was hung from a branch of a tree ca. 1,5 m above the ground. The only trap was installed on each locality, it was recover every two weeks and the bait was replaced.

The localities include various types of habitats, natural and disturbed, and in various altitudes from 200 to 1165 m a.s.l. Six localities were in the area of the Bohemian Forest (= Šumava Mts.) and its foothills (localities 1-6), five traps in other parts of Bohemia (localities 7-11), and one trap each in Moravia (locality 12), and in Slovakia (locality 13).

For map of studied localities see Fig. 1 (locality 13 from Slovakia is not included). All localities are listed in order: part of country, locality, number of faunistic mapping code, description of trapping site, altitude, trapping period, and the name of collector.

1. SW Bohemia, Rohanov (6848), small orchard in the centre of a village, 740 m a.s.l. Trapping: 25 May to 18 Sep 2005, L. Dvořák.
2. SW Bohemia, Budětice (6747), small orchard in the centre of a village, 500 m a.s.l. Trapping: 27 May to 27 Sep 2005, V. Turek.
3. SW Bohemia, Kašperské Hory (6847), a complex of orchards on SW periphery of the town, 725 m a.s.l. Trapping: 30 May to 20 Sep 2005, L. Dvořák.
4. SW Bohemia, Modrava (6946), urban area on W periphery of the village, 990 m a.s.l. Trapping: 1 June to 5 Oct 2005, L. Dvořák.
5. SW Bohemia, Březník (7046), Norway spruce forest with most trees killed by bark beetle outbreak, 1165 m a.s.l. Trapping: 3 June to 9 Sep 2005, L. Dvořák.
6. SW Bohemia, Stožec (7148), urban area on N periphery of the village, 775 m a.s.l. Trapping: 11 Aug to 6 Oct 2005, L. Dvořák.
7. S Bohemia, Blatná (6549), cultivated garden area with fruit trees on W periphery of the town, 430 m a.s.l. Trapping: 28 May to 1 Oct, P. Bogusch.

8. W Bohemia, Čečovice (6447), small orchard on periphery of the village, 487 m a.s.l. Trapping: 5 June to 28 Aug 2005, I. Fenclová.
9. W Bohemia, Horní Bříza (6146), orchard in the centre of the town, 367 m a.s.l. Trapping: 4 June to 30 Aug 2005, I. Fenclová.
10. W Bohemia, Plzeň - Litice (6246), small orchard near Nad Přehradou street, 330 m a.s.l. Trapping: 8 to 28 Aug 2005, E. Honzíková.
11. Cent. Bohemia, Praha - Kunratice (5952), small uncultivated park with old trees in the centre of town, 270 m a.s.l. Trapping: 1 June to 3 Aug 2005, P. Kment.
12. S Moravia, Brno - Ořešín (6765), old cherry orchard, 400 m a.s.l. Trapping: 17 June to 30 Sep 2005, I. Malenovský.
13. SW Slovakia, Bratislava - Dúbravka (7868), small orchard, 200 m a.s.l. Trapping: 3 June to 20 Sep 2005, T. Čejka.

Results and discussion

The results are summarized in Tabs 1 and 2. In total, 181 flies of Heleomyzidae (12 species at 10 sites) and 163 Lauxaniidae (12 species at 11 sites) were trapped during this study. The richest sample of Heleomyzidae for one single locality was formed by *Suillia affinis* in Bratislava (locality 13, 60 ex.) and of the most abundant Lauxaniidae at one locality was *Sapromyzosoma quadricincta* in Brno (locality 12, 22 ex). The highest diversity of Heleomyzidae were collected in Stožec (locality 6, 7 species) and Modrava (locality 4, 6 species). Lauxaniidae were less diverse with the richest site Plzeň (locality 10, 6 species). The most frequent species were *Suillia affinis* (7 localities) in Heleomyzidae, and *Lyciella decempunctata* (9 localities) and *Tricholauxania praeusta* (8 localities) for Lauxaniidae.

It is very interesting to note that all species of Heleomyzidae belong to the mycetophagous genus *Suillia*. The similar experience has the author with formaldehyde pitfall traps. It is possible that adults seek fermented sap, in contrast to another genera which adults probably feeding on the same substrates as their larvae (dung and carrions).

The most compact sum of the data originates from the Bohemian Forest and its foothills which is therefore discussed more in detail. The data from the Bohemian Forest were published mainly in two systematic studies focussed on peat bogs (ROHÁČEK et al. 1998, ROHÁČEK & BARTÁK 1999) and one study on the neighbouring Bavarian Forest (BARTÁK 1998). MARTINEK (1971, 1975) published fractional data for some interesting species.

All species of Heleomyzidae trapped during this study were also trapped in the Bohemian Forest, except the two thermophilous species *Suillia gigantea* and *Suillia variegata*. This result is not surprising, because members of family Heleomyzidae are mainly psychrophilous. *Suillia affinis* and *Suillia umbratica* were trapped in the Bohemian Forest for the first time; both species were captured in the neighbouring Bavarian Forest (BARTÁK 1998). Seven species of Lauxaniidae were captured in the Bohemian Forest. *Calliopum similimum*, *Lyciella decempunctata*, *Peplomyza litura*, and *Tricholauxania praeusta* are new species of Lauxaniidae for the Bohemian Forest.

Peplomyza litura was captured during this study for the first time in South Bohemia and

for the first time in so high altitude (900 m a.s.l.) in the Czech Republic. It is the commonest species of the 3 known species of genus in the Czech Republic. *Lyciella decempunctata*, *Sapromyzosoma quadripunctata*, *Sapromyzosoma quadricincta* (all Lauxaniidae), and *Suillia affinis* (Heleomyzidae) have not been published from South Bohemia yet. All these species are common, probably captured in South Bohemia by other dipterologists, but these results are still unpublished.

The members of several families of Diptera (mainly Sciaridae, Calliphoridae and Drosophilidae), Hymenoptera, and Lepidoptera represent the major part of the trapped insect. Representatives of other groups became in smaller numbers, e.g. Coleoptera, Mecoptera or Ensifera.

Conclusions

Syrup traps are only suitable as an additional collecting method, mainly for Heleomyzidae (Lauxaniidae are often damaged due to their soft bodies). It is necessary to confirm the effectivity of this type of trap in comparison with other types of traps at the same locality and installing the trap in various seasons.

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Zusammenfassung

Je zwölf Arten der Fliegenfamilien Heleomyzidae und Lauxaniidae wurden im Gebiet der Tschechischen Republik sowie der Slowakei mittels Sirup geködert. Besonders häufig festgestellt wurden dabei die Arten *Suillia affinis* (Heleomyzidae) und *Lyciella decempunctata* sowie *Tricholauxania praeusta* (Lauxaniidae). Alle Arten der Heleomyzidae stammen aus der Gattung *Suillia*. Heleomyzidae und Lauxaniidae mittels Sirup zu ködern eignet sich neben herkömmlichen Techniken nur als zusätzliche Fangmethode.

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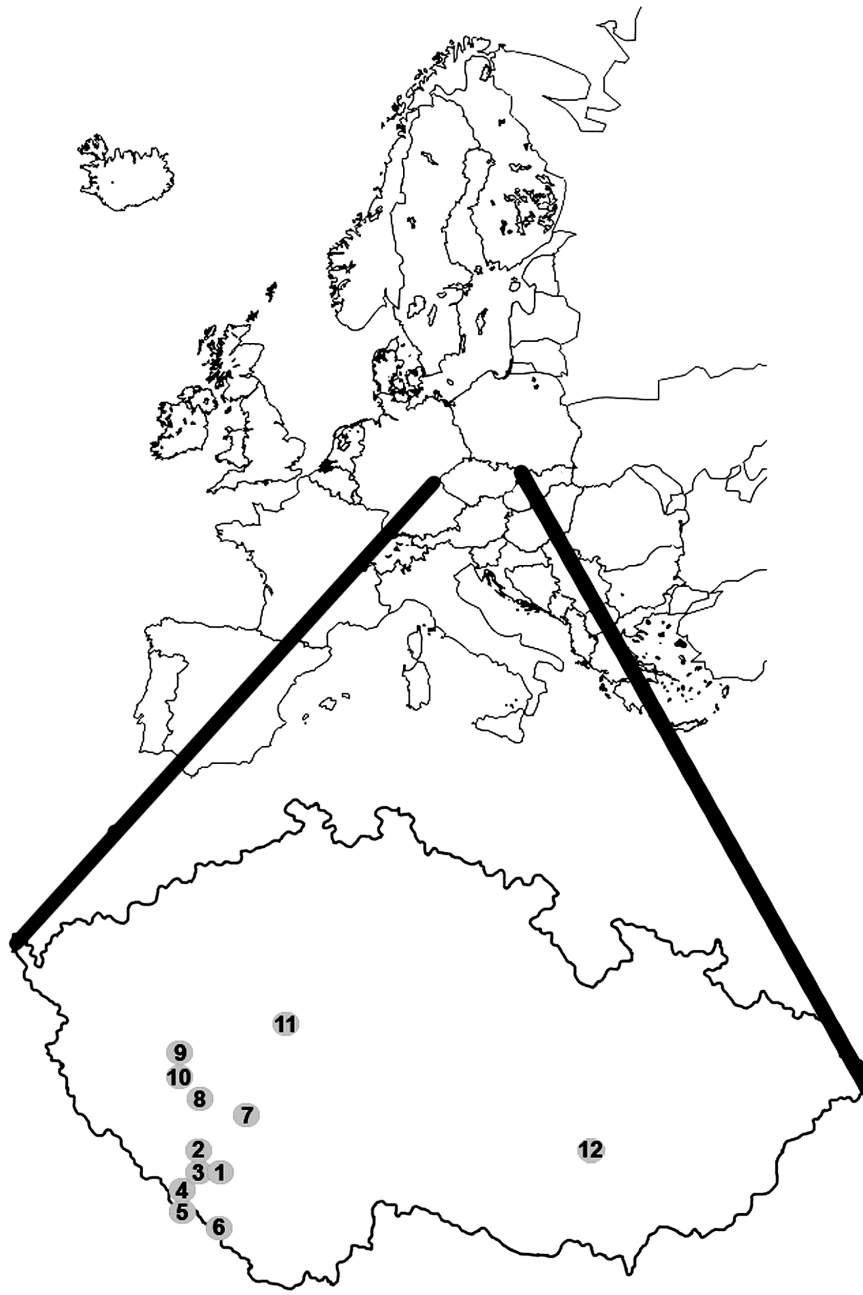

Fig. 1: A schematic map of localities. Locality from Slovakia is not included.

Tab. 1: Numbers of flies of family Heleomyzidae on localities during the study. Explanations: Roh - 1. Rohanov, Kaš - 3. Kašperské Hory, Mod - 4. Modrava, Bře - 5. Březník, Sto - 6. Stožec, Čeč - 8. Čečovice, Plz - 10. Plzeň, Pra - 11. Praha, Brn - 12. Brno, Bra - 13. Bratislava. Species are listed according to total specimen numbers from the lowest number to the highest

	locality											
species	Roh	Kaš	Mod	Bře	Sto	Čeč	Plz	Pra	Brn	Bra	items	localities
Suillia humilis (MEIGEN 1830)	0	0	0	0	1	0	0	0	0	0	1	1
Suillia umbratica (MEIGEN 1838)	1	0	0	0	0	0	0	0	0	0	1	1
Suillia nemorum (MEIGEN 1830)	0	0	0	0	2	0	0	0	0	0	2	1
Suillia atricornis MEIGEN 1830	0	0	4	0	0	0	0	0	0	0	4	1
Suillia gigantea (MEIGEN 1830)	0	0	0	0	0	0	0	0	0	4	4	1
Suillia flava (MEIGEN 1830)	0	0	2	0	3	0	0	0	0	0	5	2
Suillia variegata (LOEW 1862)	0	0	0	0	0	0	0	0	1	5	6	2
Suillia pallida (FALLÉN 1820)	0	0	1	0	7	0	0	0	0	0	8	2
Suillia laevifrons (LOEW 1862)	0	0	6	1	4	0	0	0	1	0	12	4
Suillia vaginata (LOEW 1862)	0	0	8	0	6	0	0	0	0	0	14	2
Suillia bicolor (ZETTERSTEDT 1838)	0	0	26	0	2	0	9	0	1	0	38	4
Suillia affinis (MEIGEN 1830)	1	2	0	0	0	1	13	2	7	60	60	7
items	2	2	47	1	25	1	22	2	10	69	181	
species	2	1	6	1	7	1	2	1	4	3		

Tab. 2: Numbers of flies of family Lauxaniidae on localities during the study. Explanations: Roh - 1. Rohanov, Bud - 2. Budětice, Kaš - 3. Kašperské Hory, Mod - 4. Modrava, Sto - 6. Stožec, Bla - 7. Blatná, Čeč - 8. Čečovice, Bří - 9. Horní Bříza, Plz - 10. Plzeň, Brn - 12. Brno, Bra - 13. Bratislava. Species are listed according to total specimen numbers from the lowest number to the highest.

	locality												
species	Roh	Bud	Kaš	Mod	Sto	Bla	Čeč	Bří	Plz	Brn	Bra	items	localities
Lyciella stylata PAPP 1978	0	0	0	0	0	0	0	0	0	0	2	2	1
Minettia fasciata (FALLÉN 1826)	0	0	0	0	0	0	0	0	2	0	0	2	1
Sapromyzosoma quadripunctata (LINNÉ 1767)	0	0	0	0	0	1	0	0	0	1	0	2	2
Peplomyza litura (MEIGEN 1826)	0	0	0	1	0	0	0	0	2	0	0	2	2
Lyciella affinis (ZETTERSTEDT 1847)	1	0	0	5	0	0	0	0	0	0	0	0	2
Calliopum aeneum (FALLÉN 1820)	4	3	0	0	0	0	0	0	1	0	0	1	3
Lyciella subfasciata (ZETTERSTEDT 1838)	0	0	0	2	5	1	0	0	0	0	0	1	3
Homoneura limnea (BECKER 1895)	0	0	0	0	0	0	0	0	0	0	9	9	1
Calliopum simillimum (COLLIN 1933)	2	0	2	0	0	0	4	1	1	0	0	6	5
Sapromyzosoma quadricincta (BECKER 1895)	0	0	0	0	0	1	0	1	0	22	1	25	4
Tricholauxania praeusta (FALLÉN 1820)	4	0	2	5	1	4	0	3	6	13	0	26	8
Lyciella decempunctata (FALLÉN 1820)	5	0	1	1	1	3	0	2	19	2	16	42	9
items	16	3	5	14	7	10	4	7	31	38	28	163	
species	5	1	3	5	4	5	1	4	6	4	4		