Silva Gabreta	vol. 2	p. 239–258	Vimperk, 1998

Diptera of the Bavarian forest

Diptera Bavorského lesa

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Abstract
Altogether 530 species of *Diptera* (*Insecta*) were found in four localities of Bavarian forest near Spiegelau, Germany, in 1995. Analysis of trophic relations of both imaga and larvae was performed based on quantitative subsamples.

Key words: *Diptera*, Germany, Bavarian forest, faunistics, trophic relations

Introduction

Research of *Diptera* in Bavarian/Bohemian forest

It is rather surprising that this important group of animals (comprising about 17 % of central European animal species) has never been studied systematically in the area of high conservatory status (biosphere reserve). Probably the first records from this territory are those of PREYSSLER, LINDACKER & HOFER 1793. Few records from the area are scattered in numerous papers, e.g. FRAUENFELD 1866a, 1866b, FRIČ & VÁVRA 1898, ŠÁMAL 1925, VIMMER 1927, WINKLER 1956, ŠIFNER 1965, MINÁŘ 1965, 1977, SKUHRAVÁ 1972, DIRLBEK 1985a, 1985b, ČEPELÁK 1985, etc. Modern research was impossible in the Czech part of this area (Bohemian forest – Šumava Mts.) due to the military restrictions. Practically no research of *Diptera* was also made in German part of this area (Bavarian forest) except for THIEM 1906 and SKUHRAVÁ & SKUHRAVÝ 1992.

Description of localities under study

All localities under study are situated in Bavarian forest, 3–4 km north of Spiegelau, 48. 57N, 13. 22E, in altitudes 760–890 m a. s. l. According to their numbers they are referred in the text. In parentheses there are square codes according to topography map 1: 25.000 TK 7046/7047. The detailed description of localities under study together with results of the same research concerning beetles has been given by KÖHLER (1997).

Loc. No 1 (45992–3/54237): Spiegelau–3 km N, 760 m a. s. l., About 12 years old windblow, fallen trees left undisturbed, now mostly dry, with new spontaneous growth of various trees. Opened, sunny locality. Yellow dishes used in core area, sweeping made also along the brook near the road.

Loc. No 2 (45997/54246): Spiegelau–4 km N, 790 m a. s. l. Mixed wood with remarkably large fallen trees, relatively opened, but extremely damp.

Loc. No 3 (46005/54242): Spiegelau–4 km N, 820 m a. s. l. Spruce plantation 1–2 years after bark beetle attack, spruce trees mostly dead, both fallen and standing, mostly without undergrowth. In the centre of the plot small patch of *Rubus* spp. Sweeping made also along the road.

Loc. No 4 (46012/54244): Spiegelau–4 km NNE, 890 m a. s. l. Primeval forest with very old and big fallen trees, almost without undergrowth. Without forestall management. Sweeping made also along the abandoned road bordering the locality.

Material and methods

Collecting methods

a) Sweeping: Material was collected by means of the sweeping net (50 cm diameter), each sample (about 800 strokes on each locality) was elaborated by means of photoeclector (triangular collapsible frame: 5 × 40 cm each arm, dark sack from one side, transparent sack from the other side, described by BARTÁK 1995), resulting material was killed by means of sulphurdioxide and stored in paper boxes 23 × 30 × 5 cm between individual layers of soft paper cellulose. Material was checked in laboratory under 1. 6 × 10 magnification of Technival (Zeiss Jena) microscope. Individual species were selected and representative specimens of each species were prepared for collection. Sweeping method was used within four excursions, on dates: 3. vi. 1995, 8. vi. 1995, 19. vii. 1995 and 7. ix. 1995. The total number of specimens collected was about 10 000 but only a few were selected for collection, the rest of this material was stored between layers of paper cellulose for possible future studies.

b) Yellow pan water traps (YPWT): Plastic dishes (pans) painted yellow on the inside with „Industrol 6200", were placed at 3 to 5 m distances across the biotope to cover all microhabitats of localities. Traps were filled with water with a few drops of detergent (Jar) and a spoonful of NaCl was added. After 3–6 days of exposition the content of traps was poured through a fine sieve, the materials were washed with water and preserved in 96 % ethylalcohol, which was changed after 24 hours for fresh, 70 % ethylalcohol. Pan traps method was used 3.–8. vi. 1995, 8.–14. vi. 1995, 14.–22. vi. 1995 (30 traps on each plot), 17.–19. vii. 1995 (30 traps on each plot), and 7.–11. ix. 1995 (20 traps on each plot). In the laboratory, insects were sieved (mesh 4 mm) and both fractions were treated separately under a stereoscopic microscope Technival (Zeiss, Jena), a small fraction being enlarged 10 × and a big one 5 ×. The realisation of a quantitative analysis was following: the material was spread out in parts as equally as possible on the photodish (10 × 10 cm) in a thin layer of 70 % ethanol and 1/10 of the sample was chosen by means of an incidentally placed small frame occupying exactly 10 % of a photodish area. All individuals of *Diptera* were counted inside this frame. The remaining material was examined in a cross way. Presentable representatives were prepared for the later exact determination by means of modified Vockeroth method (12 hours in the mixture of ethanol: ethyl acetate = 2: 1, next 12 hours in the mixture 1: 2 and last 12 hours in pure ethyl acetate, then dried and stuck on labels). Only species determinable without problems were filed. For details of the method and partial results of the quantitative analyses see BARTÁK (1997).

c) Other methods: A very small part of the material was obtained by means of other methods, aimed to collect other insect groups: pitfall traps (exposed 3. vi.–1. x. 95, 10 traps on each locality), sieving decaying wood and litter (performed once each months from June to September) and sticky traps inserted on tree trunks emptying on same intervals.

Determination of material

The material has been determined by many specialists, as given in the systematic part un-

der each family. Rich materials of many groups have not been determined up to now (e. g. most *Cecidomyiidae, Ceratopogonidae, Calliphoridae*, etc.). Nomenclature was accepted according to the „Check list of *Diptera* (*Insecta*) of the Czech and Slovak republics" (CHVÁLA 1997). All genera and species are arranged alphabetically. Documentary materials are deposited in the collection of the author, selected specimens also in the collection of Bavarian forest administration.

Results

***Limoniidae* (det. J. Starý)**
Dactylolabis sexmaculata (Macquart, 1826). L: 4. SO: vi.
Dicranomyia caledonica Edwards, 1926. L: 4. SO: vi.
Limonia hercegovinae (Strobl, 1898). L: 4. SO: vi.
L. nigropunctata (Schummel, 1829). L: 4. SO: vi.
Metalimnobia quadrinotata (Meigen, 1818). L: 1. SO: vi., ix.
Prionolabis hospes (Egger, 1863). L: 1, 4. SO: vi.
Rhypholophus haemorrhoidalis (Zetterstedt, 1838). L: 2. SO: ix.

***Tipulidae* (det. J. Martinovský)**
Tipula nubeculosa Meigen, 1804. L: 1. SO: vi.
T. submarmorata Schummel, 1833. L: 4. SO: vi.
T. varipennis Meigen, 1818. L: 1, 4. SO: vi.

***Pediciidae* (det. J. Starý)**
Pedicia rivosa (Linnaeus, 1758). L: 3. SO: ix.
Ula mixta Starý, 1983. L: 4. SO: vi.
U. sylvatica (Meigen, 1818). L: 3, 4. SO: vi.
Tricyphona contraria Berghroth, 1888. L: 1. SO: vi.

***Bolitophilidae* (det. J. Martinovský)**
Bolitophila austriaca (Mayer, 1950). L: 3. SO: vi.
B. basicornis (Mayer, 1951). L: 4. SO: vi.

***Mycetophilidae* (det. J. Martinovský)**
Phthinia humilis Winnerz, 1863. L: 3. SO: ix.

***Scatopsidae* (det. J. P. Haenni)**
Anapausis inermis (Ruthé, 1831). L: 1. SO: ix.
Apiloscatopse flavicollis (Meigen, 1818). L: 2, 3, 4. SO: ix.
Colobostema nigripenne (Meigen, 1830). L: 1. SO: vi.

***Bibionidae* (det. J. P. Haenni)**
Bibio nigriventris Haliday, 1833. L: 1, 4. SO: vi.
B. pomonae (Fabricius, 1775). L: 2, 3, 4. SO: vi., vii., viii., ix.
B. varipes Meigen, 1830. L: 1, 2, 3, 4. SO: vi.
Dilophus neglectus Haenni, 1982. L: 2. SO: vi.

***Rhagionidae* (det. K. Spitzer)**
Rhagio latipennis (Loew, 1856). L: 1, 2, 3, 4. SO: vi., vii., viii., ix.
R. lineola Fabricius, 1794. L: 1, 2, 3, 4. SO: vi., vii., viii., ix.
R. notatus (Meigen, 1820). L: 2, 3, 4. SO: vi., vii.
R. scolopaceus (Linnaeus, 1758). L: 3. SO: vi.

***Xylophagidae* (det. R. Rozkošný)**
Xylophagus compeditus Meigen, 1820. L: 2. SO: vi.

***Stratiomyiidae* (det. R. Rozkošný)**
Beris chalybata (Forster, 1771). L: 1, 3, 4. SO: vi.

B. morrisii Dale, 1841. L: 1. SO: vi.
B. strobli Dušek & Rozkošný, 1968. L: 2. SO: vi.
Zabrachia tenella (Jaennicke, 1866). L: 2, 3, 4. SO: vi., viii.

***Tabanidae* (det. M. Chvála)**
Tabanus bovinus Linnaeus, 1758. L: 1. SO: vii.

***Asilidae* (det. M. Hradský)**
Choerades marginata (Linnaeus, 1758). L: 1. SO: ix.
Dioctria hyalipennis (Fabricius, 1794). L: 1. SO: vii.
D. sudetica Duda, 1940. L: 1. SO: vii.
Dysmachus picipes (Meigen, 1820). L: 3. SO: vii.
Lasiopogon cinctus (Fabricius, 1781). L: 2. SO: vi.
Neoitamus socius (Loew, 1871). L: 1, 2, 3. SO: vii., viii., ix.
Tolmerus atricapillus (Fallén, 1814). L: 1. SO: viii., ix.

***Therevidae* (det. K. Spitzer)**
Pandivirilia eximia (Meigen, 1820). L: 1. SO: vi.
Thereva handlirschi Kröber, 1912. L: 1, 4. SO: vii., ix. x.
T. inornata Verrall, 1909. L: 1. SO: x.
T. microcephala Loew, 1847. L: 1, 2, 4. SO: vi., vii.
T. nobilitata (Fabricius, 1775). L: 1. SO: ix.
T. valida Loew, 1847. L: 1, 2, 3, 4. SO: vi., vii., viii., ix.

***Empididae* (det. M. Barták, M. Chvála – *Empis, Hilara*)**
Anthepiscopus ribesii Becker, 1891. L: 1, 2, 3. SO: vi.
Chelifera flavella (Zetterstedt, 1838). L: 1. SO: vii.
Dryodromia testacea Rondani, 1856. L: 4. SO: vi.
Empis aequalis Loew, 1867. L: 3. SO: vi.
E. bistortae Meigen, 1822. L: 1, 3, 4. SO: vi.
E. bohemica Chvála &Syrovátka, 1989. L: 1, 4. SO: vi.
E. borealis Linnaeus, 1758. L: 1, 2, 3. SO: vi.
E. chioptera Meigen, 1804. L: 1, 2. SO: vi.
E. dasyprocta Loew, 1867. L: 3, 4. SO: vi.
E. grisea Fallén, 1816. L: 1. SO: vi.
E. nigripes Fabricius, 1794. L: 3. SO: vi.
E. pennipes Linnaeus, 1758. L: 1. SO: vi.
E. pseudoprodromus Collin, 1969. L: 1, 2, 3, 4. SO: vi.
Heleodromia immaculata Haliday, 1833. L: 1, 3. SO: vi., ix.
Hilara interstincta (Fallén, 1816). L: 1. SO: vi.
H. litorea (Fallén, 1816). L: 1, 2, 3, 4. SO: vii., ix.
H. nitidula Zetterstedt, 1838. L: 1, 2. SO: vi.
Iteaphila furcata (Zetterstedt, 1842). L: 3. SO: vi.
I. nitidula Zetterstedt, 1838. L: 1, 2, 3. SO: vi.
Oreogeton basalis (Loew, 1856). L: 1. SO: vi.
Phyllodromia melanocephala (Fabricius, 1794). L: 1. SO: vii.
Rhamphomyia albidiventris Strobl, 1898. L: 2. SO: vi.
R. albohirta Collin, 1926. L: 1, 2, 3, 4. SO: vi.
R. anomalipennis Meigen, 1822. L: 1, 2, 3. SO: vi.
R. argentata Röder, 1887. L: 4. SO: vi.
R. erythrophthalma Meigen, 1830. L: 1, 2, 3, 4. SO: ix.
R. gibba (Fallén, 1816). L: 4. SO: ix.
R. hirsutipes Collin, 1926. L: 4. SO: ix.
R. janovensis Barták, 1981. L: 1. SO: vi.
R. longipes (Meigen, 1804). L: 1. SO: vi.
R. marginata (Fabricius, 1787). L: 1, 2. SO: vi.
R. montana Oldenberg, 1915. L: 2, 4. SO: vii.
R. nitidula Zetterstedt, 1842. L: 1, 3. SO: vi.
R. pilifer Meigen, 1838. L: 1, 2. SO: vi.
R. pseudogibba Strobl, 1910. L: 2, 3, 4. SO: ix.

R. umbripennis Meigen, 1822. L: 1, 2, 3, 4. SO: vi.
R. umbripes Becker, 1887. L: 1, 2, 4. SO: vi.
R. unguiculata Frey, 1913. L: 1, 2, 3. SO: vi.
Trichopeza longicornis (Meigen, 1822). L: 2. SO: vii., ix.

***Hybotidae* (det. M. Barták)**
Bicellaria albopilosa Chvála, 1991. L: 3, 4. SO: ix.
B. austriaca Tuomikoski, 1955. L: 1, 3. SO: vi.
B. nigra (Meigen, 1824). L: 4. SO: vi.
B. vana Collin, 1926. L: 1. SO: vi.
Euthyneura albipennis (Zetterstedt, 1842). L: 1, 3. SO: vi.
E. gyllenhali (Zetterstedt, 1838). L: 1, 2, 3, 4. SO: vi.
E. myrtilli Macquart, 1836. L: 1, 2, 3. SO: vi.
Hybos culiciformis (Fabricius, 1775). L: 1, 2, 3, 4. SO: ix.
H. femoratus (Müller, 1776). L: 1, 2, 3. SO: vii., ix.
H. grossipes (Linnaeus, 1767). L: 1, 2. SO: vii.
Leptopeza borealis Zetterstedt, 1842. L: 1, 2, 3, 4. SO: vi., ix.
Oedalea montana Chvála, 1981. L: 1, 2, 4. SO: vi.
O. stigmatella Zetterstedt, 1842. L: 2. SO: vi.
O. tristis Scholtz, 1851. L: 1, 2, 3, 4. SO: vi.
O. zetterstedti Collin, 1926. L: 1, 2, 3, 4. SO: vi.
Platypalpus alpinus Chvála, 1971. L: 1, 4. SO: vi.
P. boreoalpinus Frey, 1943. L: 1. SO: vi.
P. brachystylus (Bezzi, 1892). L: 1, 2, 4. SO: vi., ix.
P. brevicornis (Zetterstedt, 1842). L: 1. SO: vi.
P. calceatus (Meigen, 1822). L: 4. SO: vi.
P. ciliaris (Fallén, 1816). L: 1, 2, 3, 4. SO: vi., vii., ix.
P. cruralis (Collin, 1961). L: 1, 3, 4. SO: vi.
P. ecalceatus (Zetterstedt, 1838). L: 1, 4. SO: vi., vii.
P. excisus (Becker, 1907). L: 1, 2, 3. SO: vi., ix.
P. exilis (Meigen, 1822). L: 4. SO: vi.
P. laticinctus Walker, 1851. L: 3, 4. SO: vi.
P. longicornis (Meigen, 1822). L: 2, 4. SO: vi., ix.
P. luteicornis (Meigen, 1838). L: 1, 4. SO: vi.
P. luteus (Meigen, 1804). L: 2. SO: vii.
P. major (Zetterstedt, 1842). L: 1, 3. SO: vi.
P. mikii (Becker, 1890). L: 4. SO: vi., vii.
P. minutus (Meigen, 1804). L: 1, 4. SO: vi.
P. nigritarsis (Fallén, 1816). L: 1, 2, 3. SO: vi., vii., ix.
P. parvicauda (Collin, 1926). L: 2, 4. SO: vii., ix.
P. pectoralis (Fallén, 1815). L: 2, 4. SO: vii., ix.
P. rapidoides Chvála, 1975. L: 3. SO: vi.
P. stigmatellus (Zetterstedt, 1842). L: 3, 4. SO: ix.
Tachypeza nubila (Meigen, 1804). L: 1, 2, 3, 4. SO: vi., ix.
Trichina elongata Haliday, 1833. L: 1. SO: vi.
Trichinomyia flavipes (Meigen, 1830). L: 1, 2, 3, 4. SO: ix.

***Dolichopodidae* (det. J. Olejníček)**
Campsicnemus curvipes (Fallén, 1823). L: 3. SO: vi., vii.
C. loripes (Haliday, 1832). L: 1, 3, 4. SO: vi., vii., ix.
C. umbripennis Loew, 1856. L: 3. SO: ix.
Chrysotus cilipes Meigen, 1824. L: 1, 2. SO: vii., ix.
Dolichopus nigricornis Meigen, 1824. L: 1, 2, 3, 4., SO: vi., vii., viii., ix., x.
Hercostomus cupreus (Fallén, 1823). L: 2. SO: vi.
H. vivax (Loew, 1857). L: 1, 2, 3, 4. SO: vii., viii., ix.
Medetera pallipes (Zetterstedt, 1843). L: 4. SO: vi., viii.
M. truncorum Meigen, 1824. L: 1. SO: ix.
Neurigona quadrifasciata (Fabricius, 1781). L: 2, 3. SO: vi., vii., viii.
Rhaphium crassipes (Meigen, 1824). L: 2, 3. SO: vi.
R. longicorne (Fallén, 1823). L: 1. SO: vi.

Sciapus platypterus (Fabricius, 1805). L: 4. SO: vii.

***Lonchopteridae* (det. M. Barták)**
Lonchoptera bifurcata (Fallén, 1810). L: 1, 2, 3. SO: vi., vii., ix.
L. fallax De Meijere, 1906. L: 2, 3, 4. SO: vi., vii., ix.
L. lutea Panzer, 1809. L: 1, 2, 3, 4. SO: vi., ix.
L. nitidifrons Strobl, 1898. L: 2. SO: ix.
L. strobli De Meijere, 1906. L: 2. SO: vii., ix.
L. tristis Meigen, 1824. L: 2, 3, 4. SO: vi., vii., ix.

***Phoridae* (det. B. Mocek)**
Aenigmatias franzi Schmitz, 1950. L: 1. SO: vii.
Anevrina thoracica (Meigen, 1804). L: 2, 4. SO: vi., vii.
A. unispinosa (Zetterstedt, 1860). L: 1, 2, 3. SO: vii.
Borophaga carinifrons (Zetterstedt, 1848). L: 4. SO: ix.
Chaetopleurophora spinosissima (Strobl, 1892). L: 4. SO: vi.
Conicera floricola Schmitz, 1938. L: 1, 2, 3, 4. SO: vi., vii., ix.
C. tarsalis Schmitz, 1920. L: 2, 4. SO: vi.
Diplonevra florea (Fabricius, 1794). L: 2. SO: vii.
D. funebris (Meigen, 1830). L: 1. SO: ix.
Gymnophora integralis Schmitz, 1920. L: 1, 3, 4. SO: vi., ix.
G. nigripennis Schmitz, 1926. L: 1, 2, 3, 4. SO: vii., ix.
Gymnoptera vitripennis (Meigen, 1830). L: 1, 3, 4. SO: ix.
Hypocera mordellaria (Fallén, 1823). L: 3. SO: vi.
Metopina braueri (Strobl, 1880). L: 3. SO: ix.
M. oligoneura (Mik, 1867). L: 1, 3, 4. SO: vii., ix.
Phora convallium Schmitz, 1928. L: 2. SO: vi.
P. dubia (Zetterstedt, 1848). L: 1, 3, 4. SO: vi.
P. holosericea Schmitz, 1920. L: 1. SO: vii.
P. penicillata Schmitz, 1920. L: 1. SO: vi.
P. stictica Meigen, 1830. L: 1, 2, 3, 4. SO: vi., vii., ix.
P. tincta Schmitz, 1920. L: 1, 2, 3, 4. SO: vi., vii., ix.
Spiniphora jugorum (Schmitz, 1924). L: 4. SO: vii.
Triphleba bicornuta (Strobl, 1910). L: 3, 4. SO: ix.
T. distiguenda (Strobl, 1892). L: 2, 3, 4. SO: vi.
T. lugubris (Meigen, 1830). L: 1, 2, 3, 4. SO: vii., ix.
T. luteifemorata (Wood, 1906). L: 1, 2, 3, 4. SO: ix.
T. papillata (Wingate, 1906). L: 1, 3, 4. SO: vi.
T. renidens Schmitz, 1927. L: 1, 2. SO: vi.

***Syrphidae* (det. M. Barták)**
Baccha elongata (Fabricius, 1775). L: 4. SO: vi., vii.
B. obscuripennis Meigen, 1822. L: 1, 4. SO: vi., vii., ix.
Blera fallax (Linnaeus, 1758). L: 1, 3. SO: vi., vii.
Brachyopa vittata Zetterstedt, 1843. L: 2, 4. SO: vi., vii.
Brachypalpoides lentus (Meigen, 1822). L: 1, 2, 4. SO: vi., vii.
Cheilosia albitarsis (Meigen, 1822). L: 1, 2, 3. SO: vi.
C. barbata Loew, 1857. L: 1. SO: vi.
C. canicularis (Panzer, 1801). L: 1, 2, 3. SO: ix.
C. fraterna (Meigen, 1830). L: 1. SO: vi.
C. lenis Becker, 1894. L: 3, 4. SO: vi.
C. vernalis (Fallén, 1817). L: 1, 3. SO: vi.
C. vicina (Zetterstedt, 1849). L: 1, 3, 4. SO: vi.
Chrysogaster virescens Loew, 1854. L: 3. SO: vi.
Chrysotoxum fasciatum (Müller, 1764). L: 1, 3. SO: vi., ix.
C. intermedium Meigen, 1822. L: 1. SO: ix.
Criorhina ranunculi (Panzer, 1804). L: 3, 4. SO: vi.
Dasysyrphus pinastri (De Geer, 1776). L: 2. SO: vi.
D. tricinctus (Fallén, 1817). L: 3. SO: ix.
D. venustus (Meigen, 1822). L: 1, 2. SO: vi.

Episyrphus balteatus (De Geer, 1776). L: 1, 2, 3, 4. SO: vi., vii., ix.
Eristalis pertinax (Scopoli, 1763). L: 2, 4. SO: vii., ix.
E. tenax (Linnaeus, 1758). L: 1, 3. SO: ix.
Eupeodes corollae (Fabricius, 1794). L: 1, 2. SO: vi., vii., ix.
E. lapponicus (Zetterstedt, 1838). L: 2. SO: viii., ix.
Fagisyrphus cinctus (Fallén, 1817). L: 1, 2, 4. SO: vi., ix.
Helophilus pendulum (Linnaeus, 1758). L: 3. SO: ix.
Lejota ruficornis (Zetterstedt, 1843). L: 1, 2, 3. SO: vi.
Melanogaster parumplicata (Loew, 1840). L: 1, 2. SO: vi.
Melanostoma mellinum (Linnaeus, 1758). L: 1, 2, 3, 4. SO: vi., ix.
M. scalare (Fabricius, 1794). L: 1, 2, 3, 4. SO: vi.
Meliscaeva auricollis (Meigen, 1822). L: 2. SO: vii.
M. cinctella (Zetterstedt, 1843). L: 2, 3. SO: ix.
Myathropa florea (Linnaeus, 1758). L: 2, 3. SO: vii.
Neoascia annexa (Müller, 1776). L: 1, 4. SO: vi., ix.
N. podagrica (Fabricius, 1775). L: 1. SO: ix.
Neocnemodon pubescens (Delucchi & Pschorn – Walcher, 1955). L: 1. SO: vi.
Orthonevra brevicornis (Loew, 1843). L: 3. SO: vi.
O. geniculata (Meigen, 1830). L: 3. SO: vi.
O. tristis (Loew, 1781). L: 3. SO: vi.
Parasyrphus annulatus (Zetterstedt, 1838). L: 1. SO: ix.
P. macularis (Zetterstedt, 1843). L: 3. SO: vi.
P. vittiger (Zetterstedt, 1843). L: 3. SO: ix.
Platycheirus albimanus (Fabricius, 1781). L: 1, 3, 4. SO: vi., ix.
P. parmatus Rondani, 1857. L: 1, 2, 3. SO: vi.
P. scutatus (Meigen, 1822). L: 3. SO: vi.
Pipiza bimaculata Meigen, 1822. L: 1. SO: vi.
P. notata Meigen, 1822. L: 1. SO: vi.
P. quadrimaculata (Panzer, 1804). L: 1, 2, 3, 4. SO: vi.
Rhingia borealis Ringdahl, 1928. L: 2. SO: vi.
R. rostrata (Linnaeus, 1758). L: 1, 3, 4. SO: vi.
Scaeva pyrastri (Linnaeus, 1758). L: 1, 3. SO: ix.
S. selenitica (Meigen, 1822). L: 1. SO: viii., ix.
Sericomyia lappona (Linnaeus, 1758). L: 1, 2, 3. SO: vi., vii.
S. silentis (Harris, 1776). L: 1, 2, 3. SO: vii., ix.
Sphaerophoria scripta (Linnaeus, 1758). L: 1. SO: ix, x.
S. shirchan Violovitsh, 1957. L: 2. SO: vi.
S. taeniata (Meigen, 1822). L: 1. SO: ix.
Sphegina clunipes (Fallén, 1816). L: 1, 2, 3, 4. SO: vi.
S. latifrons Egger, 1865. L: 2, 3, 4. SO: vi.
S. montana Becker, 1921. L: 1, 2, 3. SO: vi., vii.
S. spheginea (Zetterstedt, 1838). L: 2, 3. SO: vi.
Syritta pipiens (Linnaeus, 1758). L: 1. SO: vi., ix.
Syrphus ribesii (Linnaeus, 1758). L: 1, 2. SO: vi., ix.
S. torvus Osten Sacken, 1875. L: 2. SO: ix.
S. vitripennis Meigen, 1822. L: 1, 3, 4. SO: ix.
Temnostoma vespiforme (Linnaeus, 1758). L: 2, 3. SO: vii.
Triglyphus primus Loew, 1840. L: 1. SO: vi.
Xylota coeruleiventris Zetterstedt, 1838. L: 2, 3. SO: vi.
X. florum (Fabricius, 1805). L: 1, 2, 3. SO: vi., vii.
X. sylvarum (Linnaeus, 1758). L: 4. SO: viii.
X. xanthocnema Collin, 1939. L: 2. SO: vii.

***Conopidae* (det. M. Barták)**
Myopa buccata (Linnaeus, 1758). L: 3. SO: vi.
Sicus ferrugineus (Linnaeus, 1761). L: 1. SO: vii.

***Opetiidae* (det. J. Vaňhara)**
Opetia nigra Meigen, 1830. L: 1, 2. SO: vi., ix.

***Platypezidae* (det. J. Vaňhara)**
Agathomyia antennata (Zetterstedt, 1819). L: 4. SO: vi.
Bolopus furcatus (Fallén, 1826). L: 4. SO: vi.
Callomyia amoena Meigen, 1824. L: 4. SO: vi.
Platypeza fasciata Meigen, 1804. L: 1. SO: ix.

***Pseudopomyzidae* (det. J. Roháček)**
Pseudopomyza atrimana (Meigen, 1830). L: 1, 3. SO: vi.

***Dryomyzidae* (det. V. Martinek)**
Dryomyza analis Fallén, 1820. L: 1, 4. SO: vi., ix.

***Sciomyzidae* (det. R. Rozkošný)**
Coremacera fabricii Rozkošný, 1981. L: 4. SO: vi.
Euthycera chaerophylli (Fabricius, 1798). L: 3, 4. SO: vii., ix.
Pherbellia albocostata (Fallén, 1820). L: 1. SO: vi.
P. annulipes (Zetterstedt, 1846). L: 4. SO: vii.
P. dubia (Fallén, 1820). L: 4. SO: vi.
P. nana (Fallén, 1820). L: 1. SO: vi.
P. steyskali Rozkošný & Zuska, 1965. L: 4. SO: vi.
P. ventralis (Fallén, 1820). L: 4. SO: vi.
Renocera pallida (Fallén, 1820). L: 3. SO: vi.
Tetanocera hyalipennis von Roser, 1840. L: 3. SO: vii., ix.
T. phyllophora Melander, 1920. L: 1. SO: vi., vii.
Trypetoptera punctulata (Scopoli, 1763). L: 2. SO: ix.

***Sepsidae* (det. M. Barták)**
Nemopoda nitidula (Fallén, 1820). L: 3. SO: vii., ix.
Sepsis cynipsea (Linnaeus, 1758). L: 1, 3. SO: ix.
S. duplicata Haliday, 1838. L: 3. SO: ix.
S. flavimana Meigen, 1826. L: 1, 3. SO: vi.
S. fulgens Hoffmannsegg in Meigen, 1826. L: 1. SO: vi., ix.
S. orthocnemis Frey, 1908. L: 1. SO: ix.
S. violacea Meigen, 1826. L: 1. SO: ix.

***Drosophilidae* (det. J. Máca)**
Drosophila alpina Burla, 1948. L: 2, 4. SO: ix.
D. histrio Meigen, 1830. L: 2, 3, 4. SO: vi., ix.
D. phalerata Meigen, 1830. L: 1, 2, 3, 4. SO: vi., vii., ix.
D. subobscura Collin in Gordon, 1936. L: 2, 3. SO: vii.
D. testacea von Roser, 1840. L: 3. SO: vii.
D. transversa Fallén, 1823. L: 1, 2, 3. SO: vi. vii., ix.
Hirtodrosophila confusa (Staeger, 1844). L: 2, 3, 4. SO: vi.
Leucophenga maculata (Dufour, 1839). L: 4. SO: vi.
L. quinquemaculata Strobl, 1893. L: 1. SO: vi.
Lordiphosa fenestrarum (Fallén, 1823). L: 1, 2, 3. SO: vii., ix.
Scaptomyza consimilis Hackman, 1955. L: 4. SO: vi.
S. graminum (Fallén, 1823). L: 1, 2, 3, 4. SO: vi., ix.
S. pallida (Zetterstedt, 1847). L: 1, 2, 3. SO: vi., vii., ix.

***Ephydridae* (det. T. Zatwarnicki)**
Hyadina guttata (Fallén, 1813). L: 1. SO: ix.
Hydrellia griseola (Fallén, 1813). L: 2. SO: vi.
Philygria maculipennis (Robineau – Desvoidy, 1830). L: 1, 3. SO: vi., ix.

***Diastatidae* (det. J. Máca)**
Campichoeta obscuripennis (Meigen, 1830). L: 1. SO: vi.
Diastata fuscula (Fallén, 1823). L: 1, 2, 3, 4. SO: ix.
D. costata Meigen, 1830. L: 1, 3. SO: vi., vii., ix.
D. vagans Loew, 1864. L: 1, 2, 3. SO: vii., ix.

***Tephritidae* (det. M. Barták)**
Acidia cognata (Wiedemann, 1817). L: 3. SO: vii.
Ensina sonchi (Linnaeus, 1767). L: 1. SO: ix.

***Pallopteridae* (det. V. Martinek)**
Eurygnathomyia bicolor (Zetterstedt, 1837). L: 4. SO: vi.

***Lonchaeidae* (det. J. Máca)**
Lonchaea stackelbergi Czerny, 1934. L: 3. SO: vi.

***Agromyzidae* (det. M. Černý)**
Agromyza mobilis Meigen, 1830. L: 4. SO: vi.
Chromatomyia opacella (Hendel, 1935). L: 1. SO: vi.
Liriomyza puella (Meigen, 1830). L: 3. SO: ix.
L. richteri Hering, 1927. L: 1. SO: vi.
L. strigata (Meigen, 1830). L: 2. SO: vi., vii.
Phytomyza lusatica Hering, 1955. L: 4. SO: vi.
P. ranunculi (Schrank, 1803). L: 2, 4. SO. vi.

***Lauxaniidae* (det. V. Martinek)**
Lauxania cylindricornis (Fabricius, 1794). L: 1, 3. SO: vi., vii.
Lyciella affinis (Zetterstedt, 1847). L: 1, 4. SO: vi., ix.
L. laeta (Zetterstedt, 1838). L: 1. SO: vi.
L. mihalyii Papp, 1978. L: 1. SO: vi.
L. platycephala (Loew, 1847). L: 2, 3, 4. SO: vi., vii., viii., ix.
L. rorida (Fallén, 1820). L: 4. SO: vi., ix.
L. subfasciata (Zetterstedt, 1838). L: 1. SO: ix.
Minettia lupulina (Fabricius, 1787). L: 1, 2, 3. SO: vi., vii., ix.
Sapromyza hyalinata (Meigen, 1826). L: 1, 4. SO: vi.

***Clusiidae* (det. J. Roháček)**
Clusia flava (Meigen, 1830). L: 4. SO: vii.
Clusiodes geomyzinus (Fallén, 1823). L: 1. SO: vi.

***Micropezidae* (det. M. Barták)**
Compsobata cibaria (Linnaeus, 1761). L: 1. SO: vi.

***Psilidae* (det. V. Martinek)**
Chamaepsila atra (Meigen, 1826). L: 1, 4. SO: vi.
C. humeralis (Zetterstedt, 1847). L: 1. SO: vi.
C. nigricornis (Meigen, 1826). L: 4. SO: vi.
Loxocera sylvatica Meigen, 1826. L: 1, 2. SO: vi.

***Heleomyzidae* (det. V. Martinek)**
Eccoptomera pallescens (Meigen, 1830). L: 4. SO: vi.
Heleomyza modesta (Meigen, 1838). L: 4. SO: vi.
Morpholeria ruficornis (Meigen, 1830). L: 1, 2, 4. SO: ix.
M. variabilis (Loew, 1862). L: 1, 2, 3, 4. SO: vi., ix.
Neoleria inscripta (Meigen, 1830). L: 1. SO: vi.
N. ruficeps (Zetterstedt, 1838). L: 3. SO: ix.
Scoliocentra confusa (Wahlgren, 1918). L: 4. SO: vi.
Suillia affinis (Meigen, 1830). L: 1, 2. SO: vi., vii.
S. atricornis (Meigen, 1830). L: 2, 3, 4. SO: vi., vii., ix.
S. bicolor (Zetterstedt, 1838). L: 2, 4. SO: ix.
S. flava (Meigen, 1830). L: 1. SO: vi., ix., x.
S. fuscicornis (Zetterstedt, 1847). L: 1, 2, 3, 4. SO: vi., vii., ix.
S. inornata (Loew, 1862). L: 1, 3, 4. SO: ix., x.
S. laevifrons (Loew, 1862). L: 1. SO: ix.
S. mikii (Pokorny, 1886). L: 3. SO: vi.
S. nemorum (Meigen, 1830). L: 1, 2. SO: vi., vii., viii., ix., x.

S. pallida (Fallén, 1820). L: 3, 4. SO: vi., ix.
S. umbratica (Meigen, 1838). L: 1, 2, 3, 4. SO: vi., vii., viii., ix.
Tephrochlamys flavipes (Zetterstedt, 1838). L: 1. SO: viii.

***Sphaeroceridae* (det. J. Roháček)**
Apteromyia claviventris (Strobl, 1909). L: 3, 4. SO: ix.
Chaetopodella scutellaris (Haliday, 1836). L: 1. SO: vi.
Copromyza equina Fallén, 1820. L: 4. SO: vi.
C. stercoraria (Meigen, 1830). L: 1. SO: vi., vii.
Crumomyia fimetaria (Meigen, 1830). L: 2, 3, 4. SO: vi., vii., ix.
C. glabrifrons (Meigen, 1830). L: 1, 3, 4. SO: vi.
C. nigra (Meigen, 1830). L: 3, 4. SO: vi.
C. nitida (Meigen, 1830). L: 2, 4. SO: vi., viii., ix.
C. rohaceki Norrbom & Kim, 1985. L: 2, 3, 4. SO: vi.
Gigalimosina flaviceps (Zetterstedt, 1847). L: 4. SO: ix.
Gonioneura spinipennis (Haliday, 1836). L: 1, 3. SO: vi.
Ischiolepta micropyga (Duda, 1938). L: 1, 3. SO: vi.
I. nitida (Duda, 1920). L: 3, 4. SO: vi., vii.
Lotophila atra (Meigen, 1830). L: 1, 3. SO: vi., vii.
Minilimosina parvula (Stenhammar, 1855). L: 1. SO: vii.
Opacifrons coxata (Stenhammar, 1855). L: 1. SO: ix.
Opalimosina collini (Richards, 1929). L: 1. SO: vii.
O. mirabilis (Collin, 1902). L: 1. SO: vii.
O. trichopyga (Richards, 1952). L: 4. SO: vii.
Pseudocollinella humida (Haliday, 1936). L: 1, 2, 3, 4. SO: ix.
Pteremis fenestralis (Fallén, 1820). L: 1. SO: vii.
Spelobia clunipes (Meigen, 1830). L: 1, 2, 3, 4. SO: vi., vii., ix.
S. manicata (Richards, 1927). L: 4. SO: vii.
S. ochripes (Meigen, 1830). L: 1. SO: ix.
S. palmata (Richards, 1927). L: 1, 2, 3, 4. SO: vi., vii., viii., ix.
S. parapusio (Dahl, 1909). L: 1, 2, 3, 4. SO: vi., vii., ix.
S. rufilabris (Stenhammar, 1855). L: 3. SO: vi.
S. talparum (Richards, 1927). L: 1, 4. SO: vi., vii.
Telomerina pseudoleucoptera (Duda, 1924). L: 1. SO: vi.
Terrilimosina schmitzi (Duda, 1918). L: 3, 4. SO: vi., vii.

***Opomyzidae* (det. V. Martinek)**
Geomyza balachowskyi Mesnil, 1934. L: 3. SO: ix.
G. tripunctata Fallén, 1823. L: 3. SO: ix.
Opomyza florum (Fabricius, 1794). L: 1, 2, 3, 4. SO: ix.

***Anthomyzidae* (det. J. Roháček)**
Anthomyza gracilis Fallén, 1823. L: 1. SO: vi.
A. pleuralis Czerny, 1928. L: 1. SO: vi.

***Asteiidae* (det. J. Roháček)**
Asteia amoena Meigen, 1830. L: 1. SO: vi.
Leiomyza scatophagina (Fallén, 1823). L: 3. SO: vi.

***Acartophthalmidae* (det. J. Roháček)**
Acartophthalmus nigrinus (Zetterstedt, 1847). L: 1, 2, 3, 4. SO: vi., ix.

***Milichiidae* (det. J. Roháček)**
Neophyllomyza acyglossa (Villeneuve, 1920). L: 1. SO: vi.

***Chloropidae* (det. Š. Kubík)**
Aphanotrigonum nigripes (Zetterstedt, 1848). L: 1, 4. SO: vi, ix.
A. beschovskii Dely – Draskovits, 1981. L: 1. SO: vi, vii, ix.
Chlorops hypostigma Meigen, 1830. L: 1, 2, 3. SO: vi, ix.
C. pumilionis (Bjerkander, 1778). L: 1, 4. SO: vi.

C. scalaris Meigen, 1830. L: 1. SO: vi.
Conioscinella frontella (Fallén, 1820). L: 1. SO: vi, vii, ix.
C. sordidella (Zetterstedt, 1848). L: 4. SO: vii.
Elachiptera cornuta (Fallén, 1820). L: 1. SO: vi..
E. diastema Collin, 1946. L: 1, 3. SO: vi.
Incertella albipalpis (Meigen, 1830). L: 1. SO: vi, vii, ix.
I. kerteszi (Becker, 1910). L: 1, 2. SO: vi. vii, ix.
Lasiosina cinctipes (Meigen, 1830). L: 1. SO: ix.
Oscinella frit (Linaeus, 1758). L: 1, 3, 4. SO: vi, vii, ix.
Oscinisoma cognatum (Meigen, 1830). L: 1, 2. SO: vi.
Parectecephala longicornis (Fallén, 1820). L: 1. SO: ix.
Thaumatomyia notata (Meigen, 1830). L: 4. SO: ix.
Tricimba fungicolla Dely-Draskovits, 1983.L: 1. SO: vi, ix.
T. sulcella (Zetterstedt, 1848). L: 2. SO: ix.

***Scathophagidae* (det. F. Šifner)**
Americina vittata (Meigen, 1826). L: 1, 2. SO: vi., vii.
Megaphthalmoides unilineata (Zetterstedt, 1838). L: 1. SO: vi.
Nanna articulata (Becker, 1894). L: 2, 3, 4. SO: vi.
N. flavipes (Fallén, 1819). L: 2, 3, 4. SO: vi.
N. tibiella (Zetterstedt, 1838). L: 1, 2, 3. SO: vi.
Norellisoma nervosum (Meigen, 1826). L: 1, 2, 3, 4. SO: vi.
N. striolatum (Meigen, 1826). L: 2. SO: vi.
Parallelomma albipes (Fallén, 1819). L: 1, 2, 3, 4. SO: vi., vii., ix.
Scathophaga furcata (Say, 1823). L: 1, 2, 3, 4. SO: vi., vii., ix.
S. pictipennis (Oldenberg, 1923). L: 2, 4 SO: vi.
S. stercoraria (Linnaeus, 1758). L: 3. SO: vi.
S. suilla (Fabricius, 1794). L: 1, 2. SO: vi., vii., ix.

***Anthomyiidae* (det. V. Michelsen)**
Alliopsis billbergi (Zetterstedt, 1838). L: 3, 4. SO: vi.
A. silvestris (Fallén, 1824). L: 1, 2, 3. SO: vi., vii., ix.
Anthomyia liturata (Robineau – Desvoidy, 1830). L: 1. SO: vi.
A. monilis (Meigen, 1826). L: 4. SO: vi.
Botanophila dissecta (Meigen, 1826). L: 1. SO: vi.
B. fugax (Meigen, 1826). L: 1, 2, 3, 4. SO: vi., vii., ix.
Chirosia betuleti (Ringdahl, 1935). L: 1, 2. SO: vi.
C. latipennis (Zetterstedt, 1838). L: 3. SO: vi.
Delia frontella (Zetterstedt, 1838). L: 3, 4. SO: vi.
D. lineariventris (Zetterstedt, 1845). L: 1, 2, 3, 4. SO: vi.
D. longicauda (Strobl, 1898). L: 1, 4. SO: vi.
D. platura (Meigen, 1826). L: 1. SO: vii.
Emmesomyia grisea (Robineau – Desvoidy, 1830). L: 3. SO: vii.
Eutrichota pilimana (Ringdahl, 1918). L: 3. SO: vi.
Heterostylodes nominabilis (Collin, 1947). L: 1. SO: vi.
H. obscura (Macquart, 1835). L: 1. SO: vi.
Hydrophoria lancifer (Harris, 1780). L: 1, 2, 3, 4. SO: vi., vii.
H. linogrisea (Meigen, 1826). L: 2, 3, 4. SO: vi.
H. ruralis (Meigen, 1826). L: 1. SO: vi.
Hylemya nigrimana Meigen, 1826. L: 1, 2, 3, 4. SO: vi., vii., ix.
Hylemyza partita (Meigen, 1826). L: 1. SO: vii.
Pegomya bicolor (Wiedemann, 1817). L: 1, 2. SO: vi.
P. fulgens (Meigen, 1826). L: 2. SO: ix.
P. geniculata (Bouché, 1834). L: 4. SO: ix.
Pegoplata aestiva (Meigen, 1826). L: 1. SO: vi.
P. infirma (Meigen, 1826). L: 3. SO: vi.
P. nigroscutellata (Stein, 1920). L: 1, 3. SO: vi.
P. palposa (Stein, 1897). L: 1, 2, 3, 4. SO: vi., vii.
Phorbia fumigata (Meigen, 1826). L: 1. SO: vi.
Zaphne nuda (Schnabl in Schnabl & Dziedzicki, 1911). L: 1. SO: vi.

***Fanniidae* (det. F. Gregor)**
Fannia minutipalpis Stein, 1895. L: 1. SO: vi.
F. mollissima (Haliday in Westwood, 1840). L: 1, 2, 3, 4. SO: vi.
F. ornata (Meigen, 1826). L: 4. SO. ix.
F. parva (Stein, 1895). L: 4. SO: vi.
F. serena (Fallén, 1825). L: 1, 4. SO: vi.
F. similis (Stein, 1895). L: 1, 4. SO: vi.
F. sociella (Zetterstedt, 1845). L: 2. SO: ix.

***Muscidae* (det. F. Gregor)**
Azelia cilipes (Haliday, 1838). L: 1, 3. SO: vi.
A. gibbera (Meigen, 1826). L: 1. SO: vi.
A. nebulosa Robineau – Desvoidy, 1830. L: 4. SO: vii.
Coenosia agromyzina (Fallén, 1825). L: 1, 3. SO: vi.
C. flavicornis (Fallén, 1825). L: 4. SO: vii.
C. means Meigen, 1826. L: 1, 2, 3, 4. SO: vi., vii., ix., x.
C. pumila (Fallén, 1825). L: 3. SO: vi.
C. rufipalpis Meigen, 1826. L: 2. SO: ix.
C. tigrina (Fabricius, 1775). L: 1. SO: ix.
Eudasyphora cyanicolor (Zetterstedt, 1845). L: 1. SO: vii., ix.
Graphomya maculata (Scopoli, 1763). L: 1. SO: ix.
Hebecnema vespertina (Fallén, 1823). L: 1, 3. SO: vi., ix.
Helina annosa (Zetterstedt, 1838). L: 1, 2, 3, 4. SO: vi., ix.
H. concolor (Czerny, 1900). L: 4. SO: vi.
H. deleta (Stein, 1914). L: 4. SO: vi.
H. evecta (Harris, 1780). L: 1, 4. SO: ix.
H. maculipennis (Zetterstedt, 1845). L: 4. SO: ix.
H. pertusa (Meigen, 1826). L: 4. SO: ix.
H. pubiseta (Zetterstedt, 1845). L: 2, 3, 4. SO: vii., ix.
H. reversio (Harris, 1780). L: 2. SO: ix.
Hydrotaea militaris (Meigen, 1826). L: 3. SO: vi.
Lispocephala pallipalpis (Zetterstedt, 1845). L: 3. SO: vi.
Musca autumnalis De Geer, 1776. L: 1, 4. SO: ix.
Muscina levida Harris, 1780. L: 2, 3. SO: vii., ix.
M. pascuorum (Meigen, 1826). L: 2, 3, 4. SO: vii., ix.
Mydaea ancilla (Meigen, 1826). L: 2, 3. SO: vi., ix.
M. corni (Scopoli, 1763). L: 2, 3 SO: vi., ix.
M. electa (Zetterstedt, 1860). L: 3. SO: ix.
M. humeralis Robineau – Desvoidy, 1830. L: 2. SO: vii., ix.
M. nebulosa (Stein, 1893). L: 1. SO: vi.
M. orthonevra (Macquart, 1835). L: 1, 2, 3. SO: vii., ix.
M. setifemur Ringdahl, 1924. L: 1. 2. SO: vii.
M. urbana (Meigen, 1826). L: 2, 3. SO: vii., ix.
Phaonia angelicae (Scopoli, 1763). L: 1, 2, 3, 4. SO: vi., vii., viii., ix.
P. consobrina (Zetterstedt, 1838). L: 1, 2, 3, 4. SO: vi.
P. czernyi Hennig, 1963. L: 3. SO: vi.
P. errans (Meigen, 1826). L: 1, 2, 3, 4. SO: vi., ix., x.
P. hybrida (Schnabl, 1888). L: 1, 2, 3, 4. SO: vi., vii.
P. lugubris (Meigen, 1826). L: 1, 2, 3, 4. SO: vi., vii.
P. pallida (Fabricius, 1787). L: 1, 2, 3, 4. SO: vii., viii., ix.
P. rufiventris (Scopoli, 1763). L: 1, 2, 3, 4. SO: vi., vii., ix.
P. serva (Meigen, 1826). L: 1, 2, 3, 4. SO: vi., vii.
P. subventa (Harris, 1780). L: 1, 2, 3, 4. SO: v., vi., ix.
P. valida (Harris, 1780). L: 2. SO: ix.
P. wahlbergi Ringdahl, 1930. L: 2, 3, 4. SO: vi.
P. zugmayeriae (Schnabl, 1888). L: 2, 4. SO: vi., ix.
Polietes lardarius (Fabricius, 1781). L: 1, 2, 3, 4. SO: vi., ix., x.
Schoenomyza litorella (Fallén, 1823). L: 1. SO: vi.
Spilogona atricans (Pandellé, 1899). L: 4. SO: vii.
S. contractifrons (Zetterstedt, 1838). L: 1. SO: ix.

S. denigrata (Meigen, 1826). L: 3. SO: ix.
Thricops cunctans (Meigen, 1826). L: 1, 2, 3, 4. SO: vi., vii., ix.
T. diaphanus (Wiedemann, 1817). L: 1, 2, 3, 4. SO: vi., vii., ix.
T. genarum (Zetterstedt, 1838). L: 3, 4. SO: vii., ix.
T. innocuus (Zetterstedt, 1838). L: 2, 3. SO: vi.
T. longipes (Zetterstedt, 1845). L: 1, 4. SO: vi. vii.
T. semicinereus (Wiedemann, 1817). L: 1, 2, 3, 4. SO: vi., vii., ix.
T. simplex (Wiedemann, 1817). L: 1, 2, 3, 4. SO: ix., x.
T. sudeticus (Schnabl, 1888). L: 2, 3, 4. SO: vii. ix.

***Calliphoridae* (det. M. Barták)**
Calliphora uralensis Villeneuve, 1922. L: 2, 3 SO: vii.
Cynomya mortuorum (Linnaeus, 1761). L: 3. SO: vi.
Lucilia caesar (Linnaeus, 1758). L: 4. SO: vii.

***Rhinophoridae* (det. M. Barták)**
Oplisa tergestina (Schiner, 1862). L: 4. SO: vii.
Rhinomorinia sarcophagina (Schiner, 1862). L: 1, 2, 3, 4. SO: vi., vii.

***Tachinidae* (det. H. P. Tschorsnig)**
Actia lamia (Meigen, 1838). L: 1. SO: vi.
Admontia grandicornis (Zetterstedt, 1849). L: 2, 4. SO: vii.
Bothria subalpina Villeneuve, 1910. L: 1. SO: vi.
Carcelia puberula Mesnil, 1941. L: 1, 2, 3. SO: vi., vii.
Ceranthia siphonoides (Strobl, 1898). L: 1. SO: ix.
Dinera carinifrons (Fallén, 1816). L: 1. SO: ix.
Macquartia grisea (Fallén, 1810). L: 4. SO: vi.
M. nudigena Mesnil, 1972. L: 4. SO: vi.
M. tenebricosa (Meigen, 1824). L: 4. SO: vi.
M. viridana Robineau – Desvoidy, 1863. L: 2. SO: vi.
Microsoma exiguum (Meigen, 1824). L: 2. SO: vii.
Ocytata pallipes (Fallén, 1820). L: 3. SO: ix.
Pseudopachystylum gonioides (Zetterstedt, 1838). L: 1. SO: vi.
Ramonda spathulata (Fallén, 1820). L: 1, 2. SO: vi.
Siphona flavifrons Staeger, 1849. L: 1, 2. SO: vii., ix.
S. geniculata (De Geer, 1776). L: 1, 3. SO: ix.
S. maculata Staeger, 1849. L: 2, 4. SO: vi.
Smidtia conspersa (Meigen, 1824). L: 1. SO: vi.
Synactia parvula (Rondani, 1861). L: 2. SO: ix.
Triarthria setipennis (Fallén, 1810). L: 3. SO: vi.
Voria ruralis (Fallén, 1810). L: 1, 2. SO: vi., ix.

Discussion

The total number of *Diptera* species found in all four experimental plots within one year study is rather high (530 spp.). This high biodiversity is surely due to the number of old trees, fallen trees, decaying woods and overall habitat diversity of these plots given by minimal forestall management and/or successional character.

Analysis of trophic relations is difficult in *Diptera* partly because especially the larval biology remains unknown in many species. The trophic relations of the dipteran groups under study have been evaluated on the basis of the quantitative samples (results have been published by Barták 1997). Main emphasis was placed on the trophic preference of larvae which, very often, markedly differs from that of adults. As a rule, the importance of adults in the respective trophic webs is smaller but it is far from being negligible (Rozkošný & Vaňhara, 1993).

Adults. Of undeniable ecological importance are mainly the predaceous, haematophagous

and anthophilous species (ROZKOŠNÝ & VAŇHARA, 1993). Predaceous adult *Diptera*, namely *Rhagionidae, Asilidae, Empididae, Hybotidae, Dolichopodidae,* and *Scathophagidae* dominated in all habitats under study, species of the genera *Platypalpus*, *Rhamphomyia*, *Empis*, *Dolichopus* and *Hercostomus* being especially rich mostly both in species and specimens. *Platypalpus ciliaris* being present in all samples in localities under study and *Dolichopus nigricornis* eudominant in summer months. Among haematophages, the most striking result was minimum number of some usually important groups of muscids (*Hydrotaea).* Also tabanids were rare as well as *Lipotena* spp. Maybe this was due to the absence of pastured animals in close vicinity of these localities and small populations of large animals (red deer, roe deer) or by occasional depression in population fluctuations. In our material, the most abundant were anthophilous forms (YPWT as visual superstimuli of flowers are exceptionally attractive to anthophilous insects). Such groups were for example *Syrphidae, Muscidae* (*Phaonia lugubris* being eudominant in spring, *Coenosia means, Thricops cunctans* and *Phaonia angelicae* being eudominant in summer), *Anthomyiidae* (dominant in spring), *Tachinidae*, etc. No superdominancy was observed in anthophilous flies within autumn months. Anthophilous forms are regarded as important pollinators of flowers, joining the well known aculeate *Hymenoptera* in this respect (BÄHRMANN 1976). Important food source for many adult *Diptera* are drops of honeydew produced by colonies of aphids (e. g. for some *Stratiomyiidae, Hybotidae, Sepsidae, Chloropidae, Syrphidae, Tachinidae, Muscidae, Calliphoridae*, etc.) (BEUK 1990). Tree sap is consumed by many *Drosophilidae, Diastatidae, Anthomyiidae, Mycetophilidae, Fanniidae*. Finally, many substrates used for egg – laying (especially decaying matters of vegetable and animal origin, excrements) may be taken as a food (e. g. by many *Sepsidae, Heleomyzidae, Drosophilidae, Muscidae, Sphaeroceridae*). In our studies, especially coprobiontic species and species laying eggs into decaying fungi were abundant (e. g. *Thricops simplex, Polietes lardarius, Sepsis* spp., *Drosophila transversa, Copromyza stercoraria, Lotophila atra).*

Larvae. The larvae of *Diptera* act in ecosystems as consumers of various orders and decomposers. Besides narrow trophic specialisation, they often show considerably wide polyphagy (ROZKOŠNÝ & VAŇHARA 1992). A precise differentiation between groups is complicated by the still insufficiently detailed information on the biology of many species. In several cases one must extrapolate from the knowledge on several most abundant species of the particular group.

Many larvae of *Diptera* are important predators of other insect larvae, acting as bioregulators in ecosystems. With 62.1 % in terms of No of specimens and 37.9 % species, this group was the largest also in this study. Some mycetobiontic or coprobiontic dipteran larvae are in fact also predators. Predominantly soil larvae are those of *Rhagionidae, Asilidae, Therevidae, Empididae, Hybotidae* and *Dolichopodidae*. From these groups, empidids was exceptionally numerous as to the number of species and, *Dolichopus nigricornis*, was eudominant species in summer (2.5 % group dominance within *Diptera* in July). Most genera of *Muscidae* living in soil or in forest litter (*Coenosia means* being eudominant in summer together with *Thricops cunctans*, but also species of the genera *Helina* and *Hebecnema*), under moss, in the tree trunks, in fungi, under bark or in decaying wood (*Phaonia,* e. g. *Phaonia lugubris* being eudominant in spring, *Phaonia angelicae* being eudominant in summer, the group dominance of *Phaonia* among *Diptera* was 3.9 % in June and 1.6 % in July, *Mydaea* spp., etc.), represent carnivorous forms at least in last larval instars. Some coprobiontic larvae (*Polietes lardarius, Scathophaga stercoraria, Thricops simplex, Azelia* spp.) are also carnivorous. An important role is plaied by aphidophagous larvae of syrphids (*Episyrphus balteatus, Meliscaeva auricollis, Pipiza quadrimaculata, Melanostoma* spp., *Platycheirus spp.*), in spite of being rather rare in our samples. Ecologically close are parasitoids and parasites. Of a special interest is *Teta-*

nocera phyllophora, parasitizing *Molluscs*. Very important bioregulators are tachinids (*Macquartia grisea, M. nudigena, Carcelia puberula, Triarthria setipennis, Siphona geniculata, Pseudopachystylum gonioides, Siphona flavifrons,* and *Admontia gradicornis* in our samples).

The base of the trophic pyramid in localities under study is constituted with saprophages (second greatest group in our samples with 20.1 % of specimens (19.3 % of species). Larvae of this group develop in decaying organic matter, mainly in the forest litter (xylobiontic, necrophagous and coprophagous specialists are treated separately). Saprophagous larvae are frequent in *Sciaridae, Phoridae, Sphaeroceridae, Stratiomyiidae, Lonchopteridae, Lauxaniidae, Fanniidae, Diastatidae*, but some of them occur in *Syrphidae, Drosophilidae, Heleomyzidae* and *Anthomyiidae*. Many of them are food sources of predaceous *Diptera* and *Hymenoptera* both in larval and adult stage.

Relatively abundant were species with mycetophagous larvae (7.6 % of species, 3.1 % of specimens), the most important were *Mycetophilidae, Platypezidae, Sphaeroceridae* (*Crumomyia fimetaria, Spelobia parapusio, Minilimosina parvula*), *Drosophilidae* (*Drosophila transversa*) and *Heleomyzidae (Suillia* spp.*)*. Roughly the same dominance was observed in species with phytophagous larvae (7.6 % of species, 2.1 % of specimens), the most important groups were *Cecidomyiidae* (not determined into species), *Drosophilidae* (*Scaptomyza* spp.*)*, *Agromyzidae, Scathophagidae* and *Chloropidae* (*Oscinella, Conioscinella, Incertella*, many of them feed on grasses and, obviously, especially abundant on loc. 1).

Among true xylobiontic larvae belong those of *Sphegina* spp., *Clusiodes geomyzinus, Clusia flava,* and *Xylota* spp. Other groups listed above were necrophagous (some Phoridae), polyphagous (some *Heleomyzidae, Phoridae, Sphaeroceridae, Anthomyiidae* – e. g. *Hylemya nigrimana*), coprophagous (*Sepsidae*, some *Sphaeroceridae* and *Muscidae*) or microphagous (*Drosophila subobscura*) or even myrmecophile (*Metopina oligoneura*).

Appendix

The vegetation of the experimental plots is summarised in Table 1.

Loc. No 1 (Plot I – Main clear – cut plot (canopy density 0; nearly flat), plot IA – forest closely north behind the research plot (canopy density 90 %; side light from a clear – cut plot; slope 30 deg), plot IB1 – right (road) streamside near parking for researchers (canopy density 0; side shadow from the forest; about 2 m narrow, 80 deg slope from the road to stream), plot IB2 – left (forest) streamside near parking for researchers (canopy density 90 deg; side light from the road)).

Loc. No 2 (Plot II – Main clear – cut plot (canopy density 0; slope about up to 5 deg), plot IIA – road behind the main research plot (canopy density 0; slope up to 5 deg)).

Loc. No 3 (Plot III – main research plot (canopy density 0; slope up to 10 deg), plot IIIA – along a border road in direction to research plot (canopy density 0; slope of the amplitude 0–60 deg, depending on a high of the bank between the forest periphery and the road), plot IIIA – along a border road in direction to research plot (canopy density 0; slope of the amplitude 0–60 deg, depending on a high of the bank between the forest periphery and the road)).

Loc. No 4 (Plot IV – Main research plot (canopy density 70 %; stony slope 60 deg), plot IVA – road bordering the research plot (canopy density 50 %; slope up to 10 deg)).

Table 1. – The vegetation of experimental plots. Explanation in the text.
Tabulka 1. – Vegetace zkoumaných ploch. Vysvětlivky v textu.

Plot no.	I	IA	IB1	IB2	II	IIA	III	IIIA	IV	IVA
E3 (etage higher of 4 m)										
Acer platanoides						+			+	
Acer pseudoplatanus									1	3
Fagus sylvatica					1	1	r	r	4	
Fraxinus excelsior										3
Picea abies		5		5	+		died	died	2	
Ulmus scabra										+
E2 (etage 1 – 4 m)										
Abies alba		r								
Acer platanoides									+	
Acer pseudoplatanus									+	
Fagus sylvatica		+				3	3	2	2	
Betula pubescens	4									
Picea abies	+	+	3	2	1	1		r		
Salix caprea		5	2							
Sambucus racemosa						+				
Sorbus aucuparia	2	+	+			+	+	r		
E1 (etage up to 1 m)										
Abies alba		+					1			
Acer platanoides									2	
Acer pseudoplatanus							r		2	1
Achillea xantochlora						+				
Aconitum spp.			+							
Aegopodium podagraria										r
Agrostis capillaris						3			+	4
Alsinulla media						+				
Ajuga reptans			+							
Athyrium filix femina	r		1	+	r		+	+	1	1
Betula pendula						+				
Betula pubescens	3									
Calamagrostis villosa	5	3		5	1	3	2	5		+
Cardamine amara			r							
Carex brizoides	1		2		2	3		1		1
Carex ovalis								+		
Carex pairaei										r
Carex pilulifera					+		+	+		
Carex sylvatica						r				r
Chaerophyllum hirsutum			2							
Chamaenerion angustifolium	r		3		1	+	1			

Plot no.	I	IA	IB1	IB2	II	IIA	III	IIIA	IV	IVA
Circaea lutetiana									+	1
Clinopodium vulgare										r
Dactylis glomerata						r				
Deschampsia caespitosa						r		+		
Daschampsia flexuosa		+	+			r				
Dryopteris dilatata	1			r	1		2		+	
Dryopteris filix mas								1	2	1
Epilobium montanum						r				r
Fagus sylvatica		+			2	1	1	1	2	r
Festuca gigantea									r	
Fragaria vesca						2				
Fraxinus excelsior									r	1
Galeobdolon luteum									2	2
Galeopsis pubescens	r				r	+			r	r
Galeopsis tetrahit						r		r		
Galium hercynicum								+		
Galium mollugo			+							
Galium odoratum									2	2
Geranium pratense						r				
Glycera fluitans								r		
Hieracium sylvaticum								+		
Hypericum montanum						r				
Impatiens noli tangere								+	+	2
Juncus conglomeratus	+							+		
Knautia sylvatica										+
Luzula luzuloides							+	+		
Luzula sylvatica				+						
Lysimachia nummularia								+		
Mainthemum bifolium		1						1		
Mercurialis perennis										2
Mycelis muralis					r	+			r	r
Nardus stricta	r									
Omalotheca sylvatica						1				+
Oxalis acetosella				1	2			2	r	
Petasites albus			2	1		1		+		3
Phegopteris connectilis				3						
Picea abies	2	4			4	1	4	3		+
Plantago minor						3				
Poa palustris								1		
Poa trivialis			+							
Polygonatum verticillatum									r	+
Potentilla erecta						+				
Prenanthes purpurea					1	1		1	+	1

Plot no.	I	IA	IB1	IB2	II	IIA	III	IIIA	IV	IVA
Prunella vulgaris						2				
Pulmonaria officinalis										1
Ranunculus repens						2		2		4
Rubus fruticosus agg.					2	+	2			
Rubus idaeus	3		2	+	4	1	3	1	1	+
Rumex acetosella						+				
Rumex alpestris								1		
Salix caprea						r				
Scophularia nodosa			r			r				
Sambucus racemosa							r		r	+
Senecio fuchsii					1	1	r	1	+	3
Sorbus aucuparia		1			1	+	+	+	+	
Stellaria nemorum			1			2		1		4
Steris viscaria						r				
Tanacetum vulgare						+				
Taraxacum officinale						+				
Trifolium repens						1				
Ulmus scabra									r	
Urtica dioica			+			+				+
Vaccinium myrtillus	1	2			2		2	3		
Veronica chamaedrys										r
Veronica officinalis						1				
Vicia dumetorum			+							
Viola reichenbachiana									+	2
EO (mosses and lichenes etage)										
Atrichum undulatum	+	1						+	1	
Cetraria spp.		+								
Cladonia spp.	1									
Hylocomium splendens		+			+			+	1	
Hypnum cupressiforme									1	
Dicranum scoparium	1	+								
Mnium affine	+			1						
Mnium punctatum				+						
Pleurozium schreberi	+				+				1	
Polytrichum formosum	1			+	2				+	
Sphagnum spp.	+			1				1		
Thuidium tamariscinum									+	

Acknowledgements I would like to thank at first Dr. W. Scherzinger (Bavarian Forest administration) for arranging the research of Diptera near Spiegelau and for all his help given to us within the study. I thank also Government of Bavaria and Bavarian forest administration for financial support. My thanks are due to Ing. J. Viewegh (Faculty of Forestry, Czech University of Agriculture, Prague) for vegetation analysis of experimental plots and an unknown reviewer for helpful comments. This paper was partly supported by grant No 206/95/0970 of Czech Grant Agency.

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