Additions to the Diptera Acalyptrata fauna (Anthomyzidae, Stenomicroidae, Carnidae, Milichiidae, Heleomyzidae) of the Czech Republic and Slovakia

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Abstract: Records of five species of Diptera Acalyptrata representing novelties for the faunas of Bohemia or Moravia (Czech Republic) and Slovakia are given with discussion on their significance to the biodiversity knowledge of local faunas and a summary of their biology, distribution and identification with new information obtained from the material examined. *Stiphrosoma humerale* Roháček & Barber, 2005 (Anthomyzidae) and *Stenomicroa cogani* Irwin, 1982 (Stenomicroidae) are new additions to the dipterous fauna of Slovakia. Records of *Meoneura alpina* Hennig, 1948 (Carnidae) and *Milichia speciosa* Meigen, 1830 (Milichiidae) are the first from Bohemia and represent new northernmost distribution limits of these species; those of *Heleomyza (Anypotacta) setulosa* (Czerny, 1924) are the first from Moravia. Macrophotographs of all these species are presented to document the specimens recorded and/or to facilitate identification of these uncommon species. In addition, new records of *S. humerale* from Russia: E Siberia and of *M. speciosa* from Greece: Peloponnesse are given.

Key words: Diptera, Anthomyzidae, Stenomicroidae, Carnidae, Milichiidae, Heleomyzidae, new records, Czech Republic, Bohemia, Moravia, Slovakia, biology, distribution, identification

Introduction

This is a further contribution (see Roháček *et al.* 2016) initiated by the contemporary preparation of the 3rd electronic version of the Checklist of Diptera of the Czech Republic and Slovakia. It includes new records of five generally (at least in Central Europe) rare and insufficiently known species of the acalyptrate families Anthomyzidae, Stenomicroidae, Carnidae, Milichiidae and Heleomyzidae so representing new additions to the dipterous fauna of the Czech Republic and Slovakia having been last summarized in version 2 of checklists of Anthomyzidae, Stenomicroidae, Carnidae and Milichiidae by Roháček (2009c) and of Heleomyzidae by Dvořáková (2009).

Material and methods

The material examined is deposited in collections as follows: MBP – collection of Prof. Dr. Miroslav Barták, CSc., Praha; JPL – collection of Jiří Preisler, Liberec, Czech Republic; NMPC – National Museum, Praha, Czech Republic; SMOG – Silesian Museum, Opava, Czech Republic; ZSMC – Zoologische Staatssammlung, München, Germany.

Specimens have been examined using binocular stereoscopic and compound microscopes (Reichert, Olympus SZX10, Jenaval). When necessary male genitalia and female terminalia were examined after detachment, treating in hot 10% KOH, washing in water and dissection of the whole abdomen in a drop of glycerine under a binocular microscope. After examination, all parts were transferred to a small plastic tube in glycerine and pinned below the respective specimens.

The specimens were photographed by Canon 5DSR with Nikon CFI Plan 10x/0.25NA 10.5mm WD objective attached on EF 70–200mm f/4L USM lens. The specimens were positioned upwards between each exposure by WeMacro Rail (<http://www.wemacro.com/>, each step was 5, 10, or 20 µm) and final photograph was stacked from multiple layers (50–150 layers) using Helicon Focus Pro 5.3. The final images were edited in Corel PHOTO-PAINT X6 and Adobe Photoshop CS6.

Results

ANTHOMYZIDAE

Stiphrosoma humerale Roháček & Barber, 2005 (Fig. 1)

Material examined: CZECH REPUBLIC: Krkonoše Mts, Pekelský potok, 550 m, Malaise trap, nr. brook, 30.vi.–30.vii.2009, 1♀, J. Vaněk leg., J. Roháček det. (MBP). SLOVAKIA: C Slovakia: Muránska planina National Park, Zlatno 2.9 km SW, Havrania dolina res., 48°48'21" N, 20°03'52" E, 850 m, sweeping vegetation along brook, 15.vii.2016, 1♂, J. Roháček leg. et det. (SMOC). RUSSIA: Buryatia oblast, Tunkinsky district, 149 km W Lake Baikal, western bank of river Khalagun, 0.4 km N, 51°38'09"N, 101°33'18"E, 909 m, very diverse vegetation, swept and filled in eclector, 6.viii.2016, Ru2185, 2♂2♀, M. v. Tschirnhaus leg. (1♂1♀ ZSMC, 1♂1♀ SMOC); Irkutsk oblast: Kultuk, western end of Lake Baikal, below Transsiberian railway line, 51°43'36"N, 103°43'08"E, 458 m, meadow and swamp, ruderal area along path, swept and filled in eclector, 22.vii.2016, Ru2177, 1♂1♀, M. v. Tschirnhaus leg. (ZSMC).

Biology: One of the rarest anthomyzid species in Europe. Biological information for Nearctic populations are summarized by Roháček & Barber (2005). In the Nearctic Region *S. humerale* seems to be associated with tufts of graminoids in open habitats, often in drier habitats than those of other *Stiphrosoma* species. In the Palaearctic Region, on the contrary, it was mainly collected in humid forested habitats, usually from rich herbaceous undergrowth of mixed forests (Roháček 2006). This is also true for (rare) European records from Latvia and the Czech Republic including those listed above. The first specimen from Slovakia (Fig. 1) was swept from lush vegetation surrounding a brook in a forested ravine with only a negligible graminoid component (see Fig. 2) and the third specimen from the Czech Republic was caught in a Malaise trap installed at a submontane brook. Adults were only collected in VI–VIII in the Palaearctic Region.

Distribution: A Holarctic species widely distributed both in the Nearctic (see Roháček & Barber 2005) and the Palaearctic Regions. In the latter it seems to be more frequent in eastern Asian areas, viz. in E Siberia (see records listed above), Far East of Russia and North Korea (Roháček 2006, 2009a, unpublished records). The records from W Palaearctic are very scarce: besides a record from W Siberia (Altai Region), *S. humerale* was only found in Latvia (Roháček & Barber 2005; Roháček 2006) and the Czech Republic (Bohemia) where only 2 females have hitherto been collected, one in C Bohemia: Mnichovice nr. Praha (Roháček 2006), the other in N Bohemia: Hradčany nr. Mimoň (Roháček 2009a). The species is here recorded for the first time from Slovakia and for the third time from the Czech Republic (N Bohemia again).

Comments: The specimen (Fig. 1) from Slovakia is a first male found in Central Europe. Its colouration is typical for Palaearctic specimens having not only humeral but also notopleural area yellow. It can be easily recognized from the closely related *S. laetum* (Meigen, 1830) by the unspotted, uniformly dark brown mesonotum

STENOMICRIDAE

Stenomicra cogani Irwin, 1982 (Fig. 3)

Material examined: CZECH REPUBLIC: SW Moravia: Kostelní Myslová 1.4 km W, Hulišťata res., 49°09'02" N, 15°24'36" E, 525 m, sweeping over *Carex* boggy meadow, 9.vii.2015, 2♀, J. Roháček leg. et det. (SMOC); N Moravia: Opava, Palhanec, 49°57'50" N, 17°52'23" E, 258 m, sweeping over *Carex* boggy meadow nr. sedimentation basin, 17.vi.2015, 1♂, 4.vii.2016, 5♂3♀, J. Roháček leg. et det. (5♂2♀ SMOC, 1♂1♀ NMPC, used for barcoding); N Moravia: Bělá nr. Chuchelná 0.35 km E, nr. church, 49°58'22" N, 18°08'59" E, 240 m, sweeping *Carex acuta* in wet ditch, 9.vii.2013, 5♂, J. Roháček leg. et det. (SMOC). SLOVAKIA: C Slovakia: Poľana Biosphere Reserve, Čierny Potok, 48°41'01" N, 19°33'07" E, 730 m, sweeping *Scirpus sylvaticus* in boggy alder forest, 13.vii.2016, 1♂; Muránska planina National Park, Tisovec 1.7 km S, 48°39'56" N, 19°56'31" E, 385 m, sweeping *Carex acuta* & *Typha latifolia* on pond shore, 14.vii.2016, 2♀, all J. Roháček leg. et det. (SMOC).

Figs 1–2: Anthomyzidae. **1** – *Stiphrosoma humerale* Roháček & Barber, male sublaterally, body length 2.5 mm (Slovakia: Muránska planina NP: Havrania dolina); **2** – habitat of *S. humerale* in Havrania dolina valley. Photo by M. Tkoč (Fig. 1) and J. Roháček. (Fig. 2).

Biology: This tiny species is closely associated with tussocks of large sedge (*Scirpus* and *Carex*) species, preferably with *Scirpus sylvaticus*, in various swampy habitats (for detail see Roháček 2009b, 2011). It was repeatedly reared from clumps of *Scirpus sylvaticus* L. and once from *Carex elongata* L. (Roháček 2009b, 2011) but has been found in several other large *Carex* species and its larvae obviously live in phytotelmata formed in leaf axils of these sedges. Adults occur in V–VIII.

Distribution: This species seems to be widespread in Europe, now being known from S Spain, N Italy, Ireland, Great Britain (Wales, England), N Germany, S Sweden, Czech Republic (Bohemia, Moravia) and SW Romania (Roháček 2009b, 2011) and Slovakia (new records, see above). It has been for a long time only known from W Europe and although this inconspicuous species could have passed unnoticed in C Europe we have now strong indications about its spreading to the east. Both its new localities from Slovakia have been studied for flies in the past, that in Poľana BR (Čierny Potok, including the very same spot) for 11 years (1999–2009) during the survey by Roháček *et al.* (2009) so that its 2016 finding in this locality (at highest known altitude: 730 m) is considered a result of recent colonization. Also in the locality Tisovec 1.7 km S (Muránska planina NP) the same site and habitat was visited already on 23rd June 2012 (cf. Roháček 2012) but *S. cogani* was not found there.

CARNIDAE

Meoneura alpina Hennig, 1948 (Figs 4–6)

syn. *Meoneura ungulata* Carles-Tolrá & Ventura, 2002

Material examined: CZECH REPUBLIC: N Bohemia: Krkonoše Mts, Luční hora Mt. (maringotka), 50°43'14.4"N, 15°41'00.9"E, 1450 m, 3.–4.vii.2005, 17♂, M. Barták leg., J. Roháček & M. Tkoč det. (MBP, 2♂ NMPC, 3♂ SMOC).

Biology: Insufficiently known. The 3 type specimens were collected on flowers of umbellifers and *Veratrum album* on an alpine meadow at 1700–1900 m (Hennig 1948). In the Chočské vrchy Mts (cca 750 m), adults were caught on pasture on sheep dung (4♂1♀) and swept from low vegetation (3♂) or from flowering *Crataegus* (1♂2♀), see Roháček (1987, 1996). In the Moravskoslezské Beskydy Mts (Košařiska) only 1♂ was swept on margin of spruce wood at 550 m (Roháček 1996). The 2 male types of *M. ungulata* were captured in a white water pan trap in *Pinus mugo* growth at 2140 m in the Pyrenees Mts (Carles-Tolrá & Ventura 2002), while in the Schwarzwald Mts 7♂ were obtained by means of a Malaise trap installed at 1300 m (Stuke & Doczkal 2010). A more numerous material was collected in the Swiss Alps mainly by net-sweeping and window traps, at 1200–2300 m (Stuke & Bächli 2015). In the Krkonoše Mts all specimens were collected by sweeping and yellow pan traps on subalpine vegetation dominated by *Vaccinium myrtillus*, *V. vitis-idaea* and *Calluna vulgaris* at 1450 m. These data indicate that *M. alpina* is preferably associated with montane to alpine (550–2300 m) open habitats (meadows, pastures etc.) where it can develop in dung of ungulates and adults can visit flowers. The flight period of adults (obtained from all above records) ranges from VI to VIII, most specimens being collected in VII. Due to its scattered montane occurrence *M. alpina* is considered a vulnerable (VU) species in the Czech Republic (Roháček 2005a).

Distribution: The species seems to be restricted to montane ranges of Western and Central Europe. Based on the summary by Stuke & Doczkal (2010) *M. alpina* is currently known from Spain, Switzerland, Germany, Austria, Czech Republic and Slovakia. It was described from the Austrian Alps: Niedere Tauern Mts (Hennig 1948) and subsequently recorded from the Carpathians (Chočské vrchy Mts – Roháček 1987, Moravskoslezské Beskydy Mts – Roháček 1996), Pyrenees Mts (Carles-Tolrá & Ventura 2002, as *Meoneura ungulata*), Schwarzwald Mts (Stuke & Doczkal 2010), Swiss Alps (Stuke & Bächli 2015) and Krkonoše

Figs 3–6: Stenomicridae and Carnidae. **3** – *Stenomicra cogani* Irwin, female, laterally, body length 1.6 mm (Slovakia: Muránska planina NP: Tisovec); **4–6** *Meoneura alpina* Hennig, male (N Bohemia: Krkonoše Mts: Luční hora Mt.): **4** – external genitalia, laterally, **5** – abdomen and genitalia, dorsally; **6** – whole specimen, laterally, body length 1.6 mm. Photos by M. Tkoč.

Mts (recorded above). The later record, the first from Bohemia, represents a new northernmost occurrence limit of the species.

Comments: The species is somewhat variable in number and thickness of long setae on hypandrium (being 2 or 3, 1 or 2 of them long and robust) and also as regards the lanceolate curved setae on anteroventral corner of gonostylus which can be robust and strongly curved (in large specimens, Fig. 4–6) to shorter, pale and less curved in the smallest specimens. Also the shape of the large gonostylus is often broader (cf. Fig. 6) than that illustrated by Hennig (1948), but we found it is strongly dependent on the viewing angle. The former form (larger specimens) was described by Carles-Tolrá & Ventura (2002) as *Meoneura ungulata* from the Pyrenees Mts (Spain: Gerona) but Stuke (2009), who revised types of *M. alpina* Hennig from Niedere Tauern Mts, found these two species synonymous. Brake (2011) listed *M. ungulata* as a valid species but remarked that it possibly is a synonym of *M. alpina*.

MILICHIIDAE

Milichia speciosa Meigen, 1830 (Figs 7, 8)

Material examined: CZECH REPUBLIC: C Bohemia: Praha-Břevnov (5952a), v bytě na okně [in flat on a window], 18.v.1997, 1♀, Jan Růžička leg., M. Tkoč & J. Roháček det. (NMPC). GREECE: Peloponnesse, Valtessiniko, 37°42'11.0"N, 22°05'57.2"E, 1110 m a.s.l., on building, individually collected from wall, 24.iv.2016, 1♀, M. Tkoč leg. et det., J. Roháček rev. (NMPC).

Biology: A distinctly thermophilous species living in warm forests, often near water sources; adults are known to occur in V, VI and IX (Papp 1978). Males were observed by the late Doc. J. Čepelák to form small swarms of 5–10 specimens hovering about 2 m above the ground in insolated spots at forest edge (Roháček 1985). Life-history and preimaginal stages remain unknown. Because so rarely occurring on the northern border of its distribution *M. speciosa* is classified as an endangered (EN) species in the Czech Republic (see Roháček 2005b).

Distribution: The species is mainly distributed in the Mediterranean subregion and has been recorded from Morocco, Spain (incl. Balearic Is.), France, Italy (incl. Sardinia), Balkan peninsula (Croatia, Serbia, Romania, Greece), SE European Russia, Turkey, Israel and reaching northerly to Switzerland, Hungary, Slovakia and the Czech Republic (Papp 1984, 1998; Carles-Tolrá 2013; Brake 2017). It is very rare in northernmost areas of its distribution. There are only a few previous records from the Czech Republic, all from S Moravia: Brno env. (Czižek 1908), Ivančice (Roháček & Gregor 1984), Havraníky nr. Znojmo (Roháček 1985). Thus, the above (first) record from Bohemia represents a new northernmost distribution limit of the species in Central Europe.

Comments: Hennig (1937: 25) redescribed the female of *M. speciosa* as having “gelbbräunliche Bestäubung des Thoraxrückens” but this is partly incorrect and hence misleading. The female mesonotum is in fact pale brown microtomentose only dorsally while the microtomentum on its sides and in front of the scutellum (see Figs 7, 8) is silvery grey as in the male.

HELEOMYZIDAE

Heleomyza (Anypotacta) setulosa (Czerny, 1924) (Figs 9–11)

Material examined: CZECH REPUBLIC: C Moravia: Nízký Jeseník Mts, Jívová 3 km SW (nr. Pohorany), Jívovský lom [quarry], 49°40'43"N, 17°22'5"E, 525 m, protein trap, 13.iii.–17.iv.2010, 1♂; Nízký Jeseník Mts, Jívová 2.5 km W (nr. Pohorany), Magdalenský mlýn [mill], 49°42'32"N, 17°26'16"E, 450 m, protein trap, 27.iii.–8.v.2016, 1♂, all H. Šuláková leg., J. Preisler det. (JPL).

Figs 7–10: Milichiidae and Heleomyzidae. **7–8** *Milichia speciosa* Meigen, female (C Bohemia: Praha-Břevnov): **7** – head and thorax, dorsolaterally; **8** – whole specimen, laterally, body length 4.4 mm; **9–11** *Heleomyza (Anypotacta) setulosa* (Czerny), male (N Bohemia: Jizerské hory Mts): **9** – whole specimen, laterally, body length 5.2 mm; **10** – prosternum, ventrally (prosternal setae arrowed); **11** – end of abdomen of another male, laterally. Photos by M. Tkoč.

Biology: This poorly known species is attracted to decayed meat and the majority of known specimens were caught into protein traps – consequently, it is probably a necrophagous species (Preisler & Dvořáková 2009). Also the two above specimens were collected by means of this method. Judging from available information adults preferably occur in autumn and spring but there are also (a few) records from summer (e.g. Dvořáková *et al.* 2009). In Central Europe the species seems to be associated with forested montane or submontane areas. Due to previous rare records it was considered an endangered (EN) species in the Czech Republic (Martinek & Barták 2005) but a number of additional recent records from protein traps (which were not formerly used) indicates that this classification should obviously be revised.

Distribution: *H. setulosa* has hitherto been only known from Central and North Europe (Sweden, Germany, Austria, Czech Republic, Poland, Slovakia, Romania) and Caucasus (Woznica 2013). In the Czech Republic it has been recorded from two localities in S Bohemia (Martinek 1994) and (more frequently) in the Jizerské hory Mts (Preisler & Dvořáková 2009) and the Krkonoše Mts (Preisler *et al.* 2013). First records from Moravia.

Comments: *H. setulosa* differs from all other species of the genus *Heleomyza* in having only 1 pair of prosternal setae (see Fig. 10) (other species possess a number of setae on prosternum) and by the distinctive external genitalia of the male (Fig. 11).

Discussion and conclusions

The five species dealt with above represent additions to the Diptera fauna of the Czech and Slovak Republics, contributing to the enlargement and precision of information about biodiversity of the order Diptera in these countries. New faunal data obtained from the specimens studied are also important as regards the biogeography of these species filling the blank spots in their distribution in Central Europe (*Stiphrosoma humerale*, *Stenomicra cogani*, *Heleomyza setulosa*) or extending limits of their distribution areas to the north as is true for *Meoneura alpina* and *Milichia speciosa* which could be (in the last species) caused by warming of climate, similarly as recently noted e.g. in Sphaeroceridae for *Norrbomia hispanica* (Duda, 1923) and *N. somogyii* (Papp, 1973) by Roháček (2013) or *Copromyza pseudostercoraria* Papp, 1976 by Roháček *et al.* (2016).

Because practically all these species are rarely ascertained (at least in Central Europe) also the biological information obtained from some of the specimens are valuable. Particularly, the preferred habitat of *Stiphrosoma humerale* was again confirmed as moist undergrowth of mixed forest, differing so markedly from that of the closely related *S. laetum* which is mainly associated with graminoids in open grassland (cf. Roháček 2006, 2009a). *Meoneura alpina* was confirmed as a montane species associated with open habitats, usually above the timber line and *Stenomicra cogani* is considered a species naturally penetrating to the east and distinctly increasing its frequency and abundance in Central Europe.

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References

- Brake I. (2011): World catalog of the family Carnidae (Diptera, Schizophora). – *Myia* 12: 112-169.
- (2017): Milichiidae online. <http://www.milichiidae.info/taxonomy/term/446/maps>; accessed 20.iii.2017.
- Carles-Tolrá M. (2013): Fauna Europaea: Milichiidae. In Beuk P. & Pape T. (eds): Fauna Europaea: Diptera Brachycera. Fauna Europaea version 2.6, <http://www.fauna-eu.org>; accessed 20.iii.2017.
- Carles-Tolrá M. & Ventura D. (2002): Two new *Meoneura* Rondani species from Spain (Diptera, Carnidae). – *Studia Dipterol.* 9: 289-292.
- Czižek K. (1908): II. Nachtrag zu den „Beiträgen zu einer Dipterenfauna Mährens“. – *Mitt. Kom. Naturwiss. Durchforsch. Mährens, Zool. Abt.* 13: 1-26.
- Dvořáková K. (2009): Heleomyzidae Bezzi, 1911. In Jedlička L., Kúdela M. & Stloukalová V. (eds): Checklist of Diptera of the Czech Republic and Slovakia. Electronic version 2. <http://www.edvis.sk/diptera2009/families/heleomyzidae.htm> + CD-ROM: ISBN 978-80-969629-4-5; accessed 23.iii.2017.
- Dvořáková K., Preisler J. & Roháček J. (2009): Heleomyzidae. Pp. 254-259. In Roháček J. & Ševčík J. (eds): Diptera of the Pořana Protected Landscape Area - Biosphere Reserve (Central Slovakia). SNC SR, Administration of the PLA – BR Pořana, Zvolen, 340 pp.
- Hennig W. (1937): 60a. Milichiidae et Carnidae. In Lindner E. (ed.): Die Fliegen der Palaearktischen Region. Lieferung 116. E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, 91 pp.
- (1948): Eine neue Art der Gattung *Meoneura* aus den Niederen Tauern. – *Zeitschr. Wien. Entomol. Ges.* 33: 138-139.
- Martinek V. (1994): Further finds of new species of Diptera Acalyptrata on the territory of Czecho-Slovakia and nomenclatorial corrections in some species. Pp. 95-102. In Jedlička L. (ed.): *Dipterologica Bohemoslovaca* 6. Slovak Entomological Society, Bratislava, 126 pp.
- Martinek V. & Barták M. (2005): Heleomyzidae (lanýžkovití). P. 342. In Farkač J., Král D. & Škorpík M. (eds): Červený seznam ohrožených druhů České republiky. Bezobratlí. Red list of threatened species in the Czech Republic. Invertebrates. Agentura ochrany přírody a krajiny České republiky, Praha, 760 pp.
- Preisler J. & Dvořáková K. (2009): Lanýžkovití (Diptera: Heleomyzidae) Jizerských hor a Frýdlantska. Heleomyzidae (Diptera) of the Jizerské hory Mts And Frýdlant region (northern Bohemia, Czech Republic)]. – *Sbor. Severočes. Muz. Přír. Vědy, Liberec* 27: 149-171 (in Czech, English summary).
- Preisler J., Vaněk J., Barták M. & Flousek J. (2013): Lanýžkovití (Diptera, Heleomyzidae) české části Krkonoš. Heleomyzidae (Diptera) of the Czech part of the Krkonoše Mts. *Opera Corcontica* 50: 185-198 (in Czech, English summary).
- Papp L. (1978): 72. család: Milichiidae. Pp. 9-32. In Dely-Draskovits Á. & Papp L.: *Taplólegyek – Gabonalegyek, Odiniidae – Chloropidae. Fauna Hungariae* 133, XV. Kötet, 9. Füzet. Akadémiai Kiadó, Budapest, 202 pp. (in Hungarian).
- (1984): Family Milichiidae. Pp. 110-118. In Soós Á. & Papp L. (eds): *Catalogue of Palaearctic Diptera. Vol. 10 Clusiidae – Chloropidae. Akadémiai Kiadó, Budapest*, 402 pp.
- (1998): 86. Milichiidae. P. 295. In Merz B., Bächli G., Haenni J.-P. & Gonseth Y. (eds): *Diptera - Checklist. Fauna Helvetica* 1, Centre suisse de cartographie de la faune & Schweizerische Entomologische Gesellschaft, Neuchâtel, 369 pp.
- Roháček J. (1985): New and/or interesting records of Diptera Acalyptrata (Strongylophthalmyiidae, Megamerinidae, Chamaemyiidae, Trixoscelididae, Chyromyidae, Anthomyzidae, Asteiidae, Milichiidae, Carnidae) from Czechoslovakia. – *Čas. Slez. Muz. Opava (A)* 34: 193-201.
- (1987): Druhý doplněk k faunistice Diptera Acalyptrata v Československu (Pseudopomyzidae, Strongylophthalmyiidae, Chamaemyiidae, Anthomyzidae, Aulacigastridae, Periscelididae, Carnidae, Milichiidae). Second supplement to the acalyptrate Diptera fauna (Pseudopomyzidae, Strongylophthalmyiidae, Chamaemyiidae, Anthomyzidae, Aulacigastridae, Periscelididae, Carnidae, Milichiidae) of Czechoslovakia. – *Čas. Slez. Muz. Opava (A)* 36: 97-108 (in Czech, English summary).
- (1996): Fourth supplement to the acalyptrate Diptera fauna of the Czech Republic and Slovakia. – *Čas. Slez. Muz. Opava (A)* 45: 17-28.
- (2005a): Carnidae (peřivkovití). P. 336. In Farkač J., Král D. & Škorpík M. (eds): Červený seznam ohrožených druhů České republiky. Bezobratlí. Red list of threatened species in the Czech Republic. Invertebrates. Agentura ochrany přírody a krajiny České republiky, Praha, 760 pp.
- (2005b): Milichiidae (zavalitkovití). P. 338. In Farkač J., Král D. & Škorpík M. (eds): Červený seznam ohrožených druhů České republiky. Bezobratlí. Red list of threatened species in the Czech Republic. Invertebrates. Agentura ochrany přírody a krajiny České republiky, Praha, 760 pp.
- (2006): A monograph of Palaearctic Anthomyzidae (Diptera) Part 1. – *Čas. Slez. Muz. Opava (A)* 55, supplement 1: 1-328.
- (2009a): A monograph of Palaearctic Anthomyzidae (Diptera) Part 2. – *Čas. Slez. Muz. Opava (A)* 58, supplement 1: 1-180.

- (2009b): New biological and biogeographical data about two European species of Stenomicridae (Diptera). – Čas. Slez. Muz. Opava (A), 58: 1-8.
- (2009c): Anthomyzidae Czerny, 1903, Carnidae Newman, 1834, Milichiidae Schiner, 1862, Stenomicridae Papp, 1984. In Jedlička L., Kúdela M. & Stloukalová V. (eds): Checklist of Diptera of the Czech Republic and Slovakia. Electronic version 2. <http://www.edvis.sk/diptera2009/families.htm> + CD-ROM: ISBN 978-80-969629-4-5; accessed 23.iii.2017.
- (2011): Taxonomy of *Stenomicra cogani*, with description of *S. gracilior* sp. nov. from Turkey and comparative morphology of terminalia in Stenomicridae (Diptera). – Acta Entomol. Mus. Natn. Pragae 51: 697-722.
- (2012): The fauna of the opomyzoid families Clusiidae, Acartophthalmidae, Anthomyzidae, Opomyzidae, Stenomicridae, Periscelididae, Asteiidae (Diptera) in the Gemer area (Central Slovakia). – Čas. Slez. Muz. Opava (A): 61: 97-111.
- (2013): The fauna of Acalyptrate families Trixoscelididae, Chyromyidae and Sphaeroceridae (Diptera) in the Gemer area (Central Slovakia): supplement 2. – Čas. Slez. Muz. Opava (A): 62: 155-172.
- Roháček J. & Barber K. N. (2005): Revision of the New World species of *Stiphrosoma* Czerny (Diptera: Anthomyzidae). – Beitr. Entomol. Keltern 55: 1–107.
- Roháček J., Barták M. & Preisler J. (2016): New records of Psilidae, Piophilidae, Lauxaniidae, Cremifaniidae and Sphaeroceridae (Diptera) from the Czech Republic and Slovakia. – Acta Mus. Siles. Sci. Nat. 65: 51-62.
- Roháček J. & Gregor F. (1984): Nové nebo faunisticky zajímavé nálezy druhů čeledi Milichiidae a Carnidae (Diptera) z Československa. New and/or interesting records of Milichiidae and Carnidae (Diptera) from Czechoslovakia. – Čas. Slez. Muz. Opava (A) 33: 17-21 (in Czech, English summary).
- Roháček J., Starý J., Ševčík J. & Vála M. (2009): Localities studied. Pp. 16-23. In Roháček J. & Ševčík J. (eds): Diptera of the Poľana Protected Landscape Area - Biosphere Reserve (Central Slovakia). SNC SR, Administration of the PLA – BR Poľana, Zvolen, 340 pp.
- Stuke J.-H. (2009): Zum Status von *Meoneura unguolata* Carles-Tolrá & Ventura, 2002 (Diptera: Carnidae). – Studia Dipterol. 16: 153-154.
- Stuke J.-H. & Bächli G. (2015): Faunistical data of Carnidae (Diptera) from Switzerland and additional countries with description of three new *Meoneura* species. – Mitt. Schweiz. Entomol. Ges. 88: 379-401.
- Stuke J.-H. & Doczkal D. (2010): Bemerkenswerte Funde von Carniden aus Deutschland (Diptera: Carnidae), mit einer aktualisierten Liste der aus Deutschland nachgewiesenen Arten. – Studia Dipterol. 17: 28-32.
- Woźnica A. J. (2013): Fauna Europaea: Heleomyzidae. In Beuk P. & Pape T. (eds): Fauna Europaea: Diptera Brachycera. Fauna Europaea version 2.6, <http://www.fauna-eu.org>; accessed 22.iii.2017.

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