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NEW DATA ABOUT EMPIDIDAE AND HYBOTIDAE (DIPTERA, EMPIDOIDEA) FROM CROATIA: NEW SPECIES, NEW NAME, NEW RECORDS

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Bicellaria croatica sp. nov. (Hybotidae) is described and illustrated from Croatia. In Empididae, new records for *Rhamphomyia brevis* Daugeron & Lefebvre, 2015 (preoccupied, *Rhamphomyia brevis* Loew, 1861) are presented and a new substitute name for this species is proposed: *Rhamphomyia daugeroni* nom. nov. The species is transferred to the subgenus Holoclera. Three species of Empididae are first recorded from Croatia: *Empis pleurica* (Collin, 1960), *Rhamphomyia* (*Amydroneura*) *pseudogibba* Strobl, 1910 and *Empis* (*Xanthempis*) *hypandrialis* Daugeron, 2000 (the female is described for the first time). It is hypothesised that *Empis pleurica* (Collin, 1960) is extending its distribution area northwest (from Israel through Turkey to Croatia), northwards (to the Caucasus) and eastward (to Iran), probably due to climate change.

Key words: *Bicellaria,* Hybotidae, *Rhamphomyia, Empis,* Empididae, Europe, distribution, new species, new name

Barták, M. & Kokan, B.: Novi podaci o porodicama Empididae i Hybotidae (Diptera, Empidoidea) iz Hrvatske: nova vrsta, novo ime, novi nalazi. Nat. Croat., Vol. 30, No. 2, 425–433, 2021, Zagreb.

U radu se opisuje i ilustrira *Bicellaria croatica* sp. nov. (Hybotidae) iz Hrvatske. Za porodicu Empididae donose se novi nalazi za *Rhamphomyia brevis* Daugeron & Lefebvre, 2015 (već postoji, *Rhamphomyia brevis* Loew, 1861) i predlaže se novo zamjensko ime za ovu vrstu: *Rhamphomyia daugeroni* nom. nov. Vrsta se seli u podrod Holoclera. Tri vrste iz porodice Empididae su prvi put zabilježene za Hrvatsku: *Empis pleurica* (Collin, 1960), *Rhamphomyia* (*Amydroneura*) *pseudogibba* Strobl, 1910 i *Empis* (*Xanthempis*) *hypandrialis* Daugeron, 2000 (ženka je opisana prvi put). Napominje se da se područje rasprostranjenosti vrste *Empis pleurica* (Collin, 1960) širi prema sjeverozapadu (od Izraela preko Turske do Hrvatske), sjeveru (do Kavkaza) i istoku (do Irana), vjerojatno zbog klimatskih promjena.

Ključne riječi: *Bicellaria,* Hybotidae, *Rhamphomyia, Empis,* Empididae, Europa, rasprostranjenost, nova vrsta, novo ime

INTRODUCTION

In the light of the unprecedented reduction in biodiversity and the possible further mass extinction of biota we should save species at least in collections for further studies. The superfamily Empidoidea comprises ca 12 000 described species worldwide. It comprises (depending on the classification scheme followed) 5 to 8 families: Atelestidae, Dolichopodidae (incl. Microphorinae and Parathalassiinae, sometimes

treated in separate family Microphoridae), Hybotidae, Ragadidae, Empididae, Brachystomatidae, Homalocnemidae, Oreogetonidae (see e.g. Pape *et al*., 2011 or Sinclair & Daugeron, 2017). Here we contribute to the knowledge of two out of the three most diverse ones, Empididae and Hybotidae. The family Hybotidae comprises ca 2000 described species worldwide (Yang *et al*., 2007) in almost 70 genera. Hybotid flies are stout flies, yellow to black, small (mostly 1–7 mm), and are distributed worldwide. The vast majority of known hybotid species are predators and are usually found on vegetation, logs, stones and other surfaces. The family Empididae comprises more than 3100 species in about 70 genera occupying all parts of the word. They are usually slender, 1–12 mm long. Adults are primarily predators, but they often visit flowers and predation occurs only in mating period in most groups, especially Empidinae. Larvae are poorly known and presumably all are predators of arthropods.

The purpose of this paper is to describe one new species of the genus *Bicellaria* (family Hybotidae) from Croatia and propose a new name for *Rhamphomyia brevis* Daugeron & Lefebvre, 2015 (family Empididae, preoccupied by *Rhamphomyia brevis* Loew, 1861). New distributional records are appended: *Empis* (*Euempis*) *pleurica* (Collin, 1960) was first recorded from Croatia and Iran, *Rhamphomyia* (*Amydroneura*) *pseudogibba* Strobl, 1910 was first recorded from Croatia, and *Empis* (*Xanthempis*) *hypandrialis* Daugeron, 2000 was first recorded from Croatia and the female of this species is now described for the first time.

Material and methods

The material studied originated from recent field work of the second author in the Split vicinity, Croatia, Barbara Sladonja and Nediljko Landeka in Pula vicinity, Croatia, and Dominique Langlois in France (Réserve naturelle nationale de Ristolas – Mont Viso). Material depositories: collection of the Czech University of Life Sciences, Prague (CULSP), collection of the Natural History Museum Split (NHMS), and the personal collection of Dominique Langlois (DLC, Ornans). The material with a new species of *Bicellaria* was collected at eastern part of Mt Svilaja near the locality Orlove Stine, by means of Malaise trap (Fig. 1). It was fixed in karst pasture (alliance *Saturejon subspicatae* Tomić & Stanković 1970) exposed to the north eastern wind the bora.

Voucher specimens were selected and dried using the method described by Barták (1997). Genitalia preparations and drawings: genitalia, together with the preceding 2–3 abdominal segments were removed from the rest of the body using small scissors and macerated in potassium hydroxide solution (approx. 10 %) in small vials submerged in hot water for 1–2 hours. After neutralizing with 8 % acetic acid (5 minutes), the genitalia were dissected in glycerine and photographed. The photos were produced using a Nikon SMZ 1500 stereomicroscope equipped with a Canon EOS 700D digital camera and were aligned and stacked using ® Adobe Photoshop. Images served as models for hand drawings, details were added whilethe objects were being directly observed.

The morphological terms used here follow Merz & Haenni (2000), Sinclair (2000), and Sinclair & Cumming (2006). All body measurements (including body and setae length) were taken from dry specimens (therefore the actual length may differ from that of fresh or wet-preserved material) by means of an ocular micrometer mounted

Fig. 1. The position of Malaise trap on Mt Svilaja, September 2019.

on a Nikon SMZ 1500 binocular microscope. Male body length was measured from antennal base to the tip of genitalia and female body length from base of antennae to the tip of cerci. Thoracic setae are counted on one side of body.

Taxonomy

Family: Hybotidae

Subfamily: Ocydromiinae

Genus: *Bicellaria* Macquart, 1823

***Bicellaria croatica* sp. nov.**

Type material: HOLOTYPE male, **Croatia**, Mt Svilaja, Orlove Stine, MT [= Malaise trap], 1100 m, 43.770N, 16.524E, B. Kokan, 11.–28.x.2019 (CULSP); **PARATYPES**: same data, 29 males, 12 females; same locality, 27.ix.–11.x.2019, 1 male, 1 female; same locality, 28.x.–18.xi.2019, 5 males, 2 females – (CULSP, NHMS).

Diagnosis: This species of *Bicellaria* is very similar to *B. kocoureki* Barták & Kubík, 2013 (shared characters: postpedicel without seta(e), hind basitarsus thin, fore tibia with short ventral pilosity and long posteroventral setae, all body black setose, knob of halter yellow); however, the newly described species has distinctly silvery microtrichose body, brown pattern on mesoscutum, male postgonites short and U-shaped and female last three abdominal segments mostly microtrichose.

Etymology: The species is named after country of its origin (Croatia).

Description: Male. Head black, silvery-grey microtrichose, holoptic, black setose. Eyes contiguous over long distance leaving only a very small triangle above antennal base, upper ommatidia larger than lower. Prominent and microtrichose ocellar triangle with a pair of black setae (about 0.15 mm long). Occiput silvery microtrichose, with black setae subequally long as ocellars, arranged in three irregular rows, postocular row present only in upper part. Face microtrichose 0.05–0.06 mm wide at nar-

rowest point, clypeus microtrichose, genae linear. Palpus brown, circular, with 3–4 setae (and additional seta on palpifer). Proboscis brownish-black, shiny, very short (about a quarter of head height). Antenna black, scape very short (0.02 mm long), without setae; pedicel (0.05–0.06 mm) with circlet of short setae; postpedicel (0.20–0.21 mm long) with broader part (0.11–0.13 mm long) rather equally narrowing into apical narrow part (0.05–0.08 mm); stylus (0.14–0.16 mm long) with both basal segment and apical mechanoreceptor short (0.01–0.02 mm). **Thorax** slightly arched, black and silvery-grey microtrichose including pleura, black setose. Scutum with distinct brownish pattern consisting of two diffuse stripes between rows of setae and partly below dorsocentrals. Chaetotaxy: prosternum (isolated sclerite) without setae; anepronotum with a pair of small setae; no setae on proepisternum and upper part of propleuron; postpronotal seta long (1–4 additional shorter setae); acrostichals biserial, (about 0.15 mm long, 4–6 setae in a row); dorsocentrals uniserial, longer than acrostichals (up to 0.25 mm), last 2–3 pairs very long; usually 1 long and 1–3 shorter notopleurals; 2–4 setae outside dorsocentrals in presutural part of mesoscutum (in region of presutural supra- and intra-alars); 1 supra-alar; 1 postalar; scutellum with 2 pairs of setae. **Legs:** coxae black, concolorous with pleuron, rather densely and long setose. Femora and tibiae black, light grey microtrichose (hind femur posteriorly sublustrous in basal part), black setose. Fore femur with sparse row of anteroventrals about 1/3 as long as femur depth and a row of posteroventrals nearly as long as femur depth. Fore tibia with setae slightly shorter than tibia depth, with 2 (rarely 3) longer posterodorsals (one situated in basal third and one at about middle). Mid femur with a row of anteroventral setae half as long as femur depth and similar row of rather strong posteroventral setae nearly as long as femur depth. Mid tibia thin and short setose, dorsally usually with two pairs of longer setae (one subbasal and one submedian pair). Hind femur dorsally with setae slightly shorter than femur

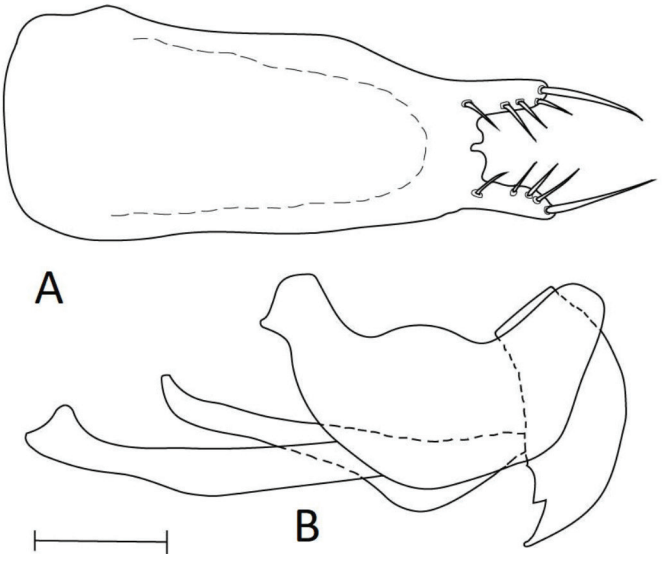

Fig. 2. *Bicellaria croatica* sp. nov. Detail of genitalia. A: hypandrium (ventral view). B: postgonites with phallic apparatus (lateral view). Scale = 0.1 mm.

depth, anteroventral row of rather strong setae about as long as femur depth, posteroventrals much shorter. Hind tibia only very slightly widened apically, dorsally with 2–3 pairs of setae subequally long as those on fore and mid tibiae. Tarsi thin and short setose. **Wing** clear, veins brownish-yellow to brown (usually darker anteriorly); pterostigma brown. Wing membrane entirely microtrichose; basal costal seta absent; Sc almost complete, apically merging with pterostigma; anal vein almost complete, axillary angle slightly obtuse. Halter yellow, with distinctly darkened stem (to various extent), calypter whitish-yellow with white margin and brown fringes. **Abdomen** black, silvery grey microtrichose (silvery reflections best visible in anterodorsal view), except shiny anterior parts of last segment (often hidden below 7th segment) and tips of hypandrial processes, whole abdomen black setose. Posteromarginal setae about as long as their segments, slightly shorter on last segments, discal setae slightly shorter than marginal, dorsum of tergites shorter setose, sternites short setose except somewhat longer posteromarginal medial pair especially on sternites 1–4, first sternite setose. Genitalia as in Fig. 2. Hypandrium long, with relatively short processes. Postgonites short, saddle-like. **Length:** body 2,3–3.0 mm, wing 2.5–3.0 mm.

Female: very similar to male except usual sexual differences, only setae slightly shorter on the mesoscutum and abdomen. Abdomen nearly completely microtrichose, last three segments lustrous only on basal part (usually hidden under preceding segments). Length: body 2.7–3.5 mm, wing 2.6–3.2 mm.

Remarks. *Bicellaria croatica* (BC) is very similar to B. *kocoureki* (BK). As well as the characters given here, and in the key below, there is a difference in the shape of antenna (postpedicel of BK with broad part about half as long as stylus, abruptly narrowing into narrow part, but subequally long as stylus and more equally narrowing in BC), and in the shape and colour of wing (wing distinctly dark infuscate in BK but clear in BC, length/width ratio usually less than 2.5 in BK but more than 2.6 in BC). Considering yellow halter and striped mesoscutum, BC shares these characters with *B. femorata* Collin, 1960; however, the latter species has quite different genitalia (compare Fig. 3. with figs 7–8 by Barták *et al*., 2013), greater number of setae on palpus (usually more than 6), multiserial dorsocentrals, body without silvery reflections, spinose setae on occiput and presence of dorsal seta on postpedicel.

The species described above leads to couplet 22 in the key by Barták & Kubík (2013) which should be modified as follows:

22 (20) Halter yellow; male hypandrium with long setose processes. 22a

– Halter brownish yellow to black; male hypandrium different 23

22a (22) Body black and sublustrous. Mesoscutum without brown pattern. Postgonites straight and narrow (see fig. 17 in Barták & Kubík, 2013). Female at last three abdominal segments nearly completely lustrous . . . . . ***B. kocoureki***

– Body black and silvery grey microtrichose. Mesoscutum with brown pattern. Postgonites U-shaped and short (Fig. 2B). Female at last three abdominal segments nearly completely microtrichose. . . . . ***B. croatica* sp. nov.**

Family: Empididae

Subfamily: Empidinae

Genus: *Rhamphomyia* Meigen, 1822

***Rhamphomyia* (*Holoclera*) *daugeroni* nom. nov.**

Rhamphomyia (*Lundstroemiella*) *brevis* Daugeron & Lefebvre, 2015: 607 (preocc. *Rhamphomyia brevis* Loew, 1861: 334)

Described from France, Parc national du Mercantour, Col de la Bonette, Larch forest, 2100 m, 44°21′32.90′′N, 6°47′03.16′′E (type locality), types are deposited in Muséum national d'Histoire naturelle, Paris (Daugeron & Lefebvre, 2015).

Material examined: **Croatia**: 3 males, 8 females, Mt. Svilaja, Orlove Stine, MT [= Malaise trap], 1100 m, 43.770N, 16.524E, B. Kokan, 11.–28.x.2019; 9 females, same locality, 28.x. – 18.xi.2019 (CULSP, NHMS), first record from Croatia. **France**: 4 males, 4 females, Ristolas (05), Réserve naturelle nationale de Ristolas – Mont Viso, 2230 m, alpine grassland, 44.4215N, 7.0231E, D. Langlois Malaise trap 20.ix.–12.x.2016; 1 male, 2 females, same data (CULSP); 1 male, 9 females, Saint-Pierre de Chartreuse (38), Réserve naturelle nationale des Hauts de Chartreuse, D. Langlois Malaise trap 10.x–30.x.2019.

Etymology: The species epithet, *daugeroni*, is a Latin genitive patronym in honour of French dipterist Christophe Daugeron who described (with his student Vincent Lefebvre) this species and recognising his contribution to the knowledge of world Empididae.

The species was originally assigned to the subgenus *Lundstroemiella* (probably according to long antennae) but in fact it belongs to the subgenus *Holoclera*, *R.* (*H.*) *variabilis* group. In the key to *Holoclera* by Barták & Kubík (2012), *R. daugeroni* leads to couplet 23 (*R. variabilis* (Fallén, 1816) and *R. subvariabilis* Barták & Kubík, 2012), however, it differs from both by the pale setose abdomen and thick phallus. Phallus has basal "window" (arrow on Fig. 3), a feature common in the subgenus *Holoclera* (and not illustrated by Daugeron & Lefebvre, 2015).

Distribution: France, Croatia (first record).

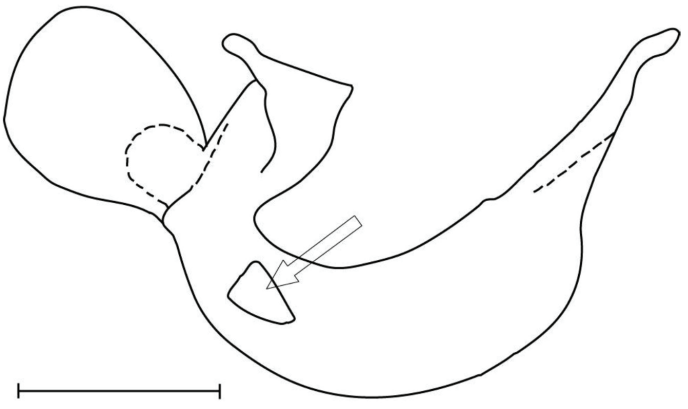

Fig. 3. *Rhamphomyia* (*Holoclera*) *daugeroni* nom. nov. Phallus, lateral view. Scale = 0.1 mm.

Faunistic records

***Empis* (*Euempis*) *pleurica* (Collin, 1960)**

Material examined: **Croatia**: Gornji Muć, abandoned garden, 500 m, MT, 43°41'27"N, 16°29'44"E, 11.–27.iv.2014, 44 males, 16 females, Kokan leg. (coll. CULSP, NHMS); Iran: Fars prov., Yasuj Sarab-e Taveh, 2390 m, 30.49N, 51.658E, 1 male, M. Kafka, 4.v.2016 (det. Shamshev and Barták, coll. CULSP).

Distribution. Israel, Turkey and Russia. First record for Croatia and Iran.

***Rhamphomyia* (*Amydroneura*) *pseudogibba* Strobl, 1910**

Material examined: **Croatia**, 1 male, Mt. Svilaja, Orlove Stine, MT [= Malaise trap], 1100 m, 43.770N, 16.524E, B. Kokan, 28.x.–18.xi.2019 (CULSP).

Distribution. The species was previously known only from Czech Republic, Austria, and Germany. First record from Croatia and southernmost record.

***Empis* (*Xanthempis*) *hypandrialis* Daugeron, 2000**

Material examined: **Croatia**, Vodnjan, MT [= Malaise trap], 147 m, 44.973N, 13.859E, 3 males, 1 female, N. Landeka, 6.iii.–5.v.2020; same locality, 5.v.–13.vii.2020; **France**, Col de Tourniol, 1050m, pasture + wood, 44°55´6´´N, 5°11´4´´E, 26.v.2006, 3 males, 2 females, M. Barták; Sainte Baume, edge of forest, 400–600m, 43°20´N, 5°44´E, 15.–16.v.2012, 3 males, 3 females, M. Barták – (all CULSP).

Distribution. The species was previously known only from France. First record from Croatia.

Remarks. The species was described after the male only (Daugeron, 2000). Here we first describe the female and add some variations of characters. Only those female characters different from male description or previously not described ones are given.

Female (described for the first time). Head: antenna entirely black, first two antennomeres at most slightly paler (brownish), the same in male (but described as "scape and pedicel yellowish"). Length of antennal segments (scape: pedicel: postpedicel: style) = 0.27–0.34 mm: 0.08–0.13 mm: 0.45–0.55 mm: 0.13–0.18 mm (same in male). Labrum 2.0–2.2X longer than head height (measured from lower margin of gena). Frons (at the level of front ocellus) 1.5–1.6X wider than outer distance between upper ocelli. **Thorax**: Black broad median stripe appears darker just below dorsocentrals. Chaetotaxy: antepronotum with 8–13 strong setae and additional 4–6 finer and smaller ones; prosternum without setulae, several (4–8) very short black setulae irregularly scattered between proepisternum and upper part of propleuron; notopleuron sometimes with 1 strong and 1–3 additional smaller setae but also with 4 equally small setae on posterior part, anteriorly with several very short setulae; presutural area with only several very short setulae; no supra-alar (rarely 1 very short seta present just in front of postalar callus); laterotergite with 5–6 setae (rather short) and 2–4 additional smaller and finer setae. **Legs**: fore and mid tibiae with 2–4 setae dorsally (from anterodorsal to posterodorsal position), hind tibia with 5–7 such similar setae. **Abdomen**: yellow, dorsally with brown stripe usually parallel sided and broadest on basal segments (occupying up to 2/3 of abdomen width in dorsal view), narrowing apically, last segment and apex of sternite 8 brown. Setae predominantly yellow, only first tergite and last three segments with dark setae. **Length**: body 6.1–7.0 mm, wing 7.4–8.0 mm.

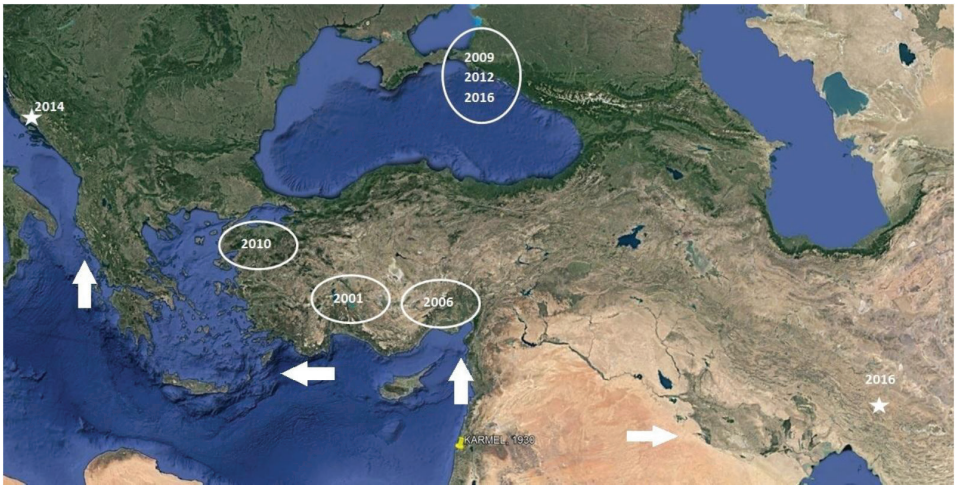

Fig. 4. First-year distribution records of *Empis* (*Euempis*) *pleurica* (Collin, 1960).

DISCUSSION

The new records of *Empis* (*Euempis*) *pleurica* may provide evidence of the expanding areas of thermophilous species probably due to climate change. This species was originally described from Israel (Collin, 1960); and consecutively recorded from Turkey (Çiftçi & Hasbenli, 2007, 2013), Russia (Krasnodarskiy Terr., Gladun, 2012) and Iran (present record). In the Caucasus it occurs up to 2500 m asl and in the Mediterranean up to ca 500 m asl probably spreading to north, northwest and east as illustrated on Fig. 4. A similar example was previously recorded in Empididae species from Croatia, *Rhamphomyia* (*Pararhamphomyia*) *intersita* Collin, 1960 (Barták & Kokan, 2017).

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