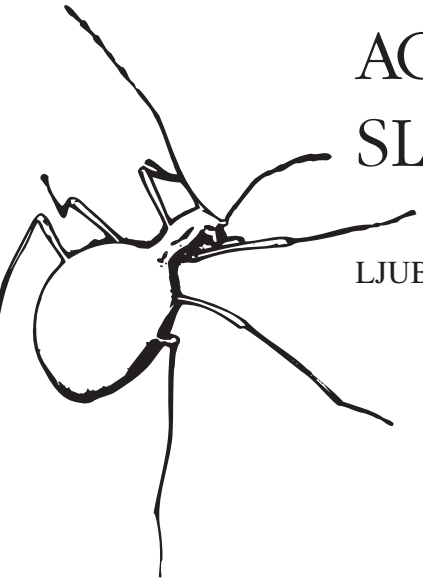

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ACTA ENTOMOLOGICA SLOVENICA

LJUBLJANA, JUNIJ 2020 Vol. 28, št. 1: 5–14

REVIDIRAN SEZNAM STEKLOKRILCEV (LEPIDOPTERA: SESIIDAE) SLOVENIJE

Željko PREDOVNIK

Ob železnici 82, 3313 Polzela, Slovenia, e-mail: predovnik1@gmail.com

Izvleček – Na osnovi lastnih večletnih raziskav favne steklorilcev v obdobju 1998 – 2019 ter podatkov iz muzejskih zbirk, sem pripravil nov revidiran seznam steklokrilcev Slovenije, kjer sem z najdbami zanesljivo potrdil skupno 44 vrst. Navajam komentarje k vrstam, ki jih, zaradi pomanjkljivih literaturnih navedb in odsotnosti dokaznega materiala, v nov seznam nisem vključil. Razpravljam tudi o vrstah, ki so prisotne v favnah sosednjih dežel in jih pri nas morda lahko pričakujemo. Revidiran seznam steklokrilcev Slovenije je usklajen z najnovejšimi taksonomskimi spremembami v Evropi.

KLJUČNE BESEDE: Lepidoptera, Sesiidae, Slovenija, seznam vrst, favna.

Abstract – REVISED CHECKLIST OF CLEARWING MOTHS (LEPIDOPTERA: SESIIDAE) OF SLOVENIA

Based on own research of the fauna of clearwing moths in the period 1998 – 2019, as well as data from museums collections, a new revised list of clearwing moths of Slovenia is presented, whereby a total of 44 species have been reliably confirmed. Comments are given on species that were not included in the new list due to insufficient references and lack of material evidence. I also discuss species that are present in the fauna of neighboring countries and may be expected in Slovenia. The revised list of clearwing moths of Slovenia is in line with recent changes in taxonomy in Europe.

KEY WORDS: Lepidoptera, Sesiidae, Slovenia, checklist, fauna.

Uvod

Kljub dolgi in razviti entomološki tradiciji je zgodovinskih najdb steklokrilcev, v primerjavi z ostalimi metulji v Sloveniji, malo. Že eden prvih priznanih razisko-

valcev J.A. Scopoli, je pri nas našel in opisal vrsto *Bembecia scopigera* (Scopoli, 1763), ki ostaja edina vrsta steklokrilca s tipsko lokaliteto v Sloveniji (Predovnik, 2003).

Prvi spisek slovenskih steklokrilcev smo dobili s Seznamom velikih metuljev Kranjske, ki ga je objavil Ivan Hafner v letih 1909-1912, kjer navaja 15 vrst. Naslednji pomemben spisek 23 vrst steklokrilcev je v novejšem času sestavil v svojem Rdečem seznamu makrolepidopterov Slovenije dr. Jan Carnelutti (1992a). V novejšem seznamu omenjene družine za evropsko favno (Laštůvka in Laštůvka, 2001) je zajetih 41 vrst za Slovenijo (Predovnik, 2003). Število pri nas na novo odkritih vrst je od tedaj še narastlo (Predovnik, 2001, 2002, 2005, 2012, 2017). V seznamu malih metuljčkov Slovenije Lesar in Govedič (2010) navajata 45 vrst steklokrilcev.

Najnovejši revidiran seznam steklokrilcev Slovenije temelji na preko 9000 najdbah steklokrilcev na ozemlju Slovenije v njenih sedanjih političnih mejah. Veliko večino teh podatkov sem zbral na terenskih raziskavah, zlasti s pomočjo novejših in učinkovitejših favnističnih metod, kot je uporaba feromonov in feromonskih pasti (Predovnik, 2012, 2014, 2017).

Pregledal sem ves maloštevilen razpoložljiv material steklokrilcev, shranjen v starih zbirkah, v Prirodoslovnem muzeju v Ljubljani (PMSL), v študijski zbirki v Ljubljani (Predovnik, 2003) in v Notranjskem muzeju v Postojni. Na tujem sem pregledal muzejske zbirke s steklokrilci v Hrvaškem prirodoslovnem muzeju v Zagrebu, v Mestnem muzeju Varaždin (Predovnik, 2010) in v Koprivnici (Hrvaška), ter zbirki steklokrilcev v muzeju Witt v Münchnu (Nemčija) in v Naravoslovnem muzeju na Dunaju (Avstrija). Pregledal sem material v zasebnih zbirkah: Jože Ahtik, Jože Broder, Stanislav Gomboc, Andrej Kapla, Mojmir Lasan in Jurij Rekelj.

Vsaka od naštetih vrst v seznamu je predstavljena z zanesljivim virom. Sestematika je povzeta po delu Laštůvke in Laštůvke (2001) The Sesiidae of Europe in seznamu steklokrilcev sveta (Pühringer in Kallies, 2004), nadgrajenega 28. 1. 2017.

Rezultati in diskusija

Pennisetiini Naumann, 1971
Pennisetia Dehne, 1850

1. *Pennisetia hylaeiformis* (Laspeyres, 1801)
   Predovnik, 2003
2. *Pennisetia bohemica* Králíček & Povolný, 1974
   Predovnik, 2002

Sesiini Boisduval, 1828
Sesia Fabricius, 1775

3. *Sesia apiformis* (Clerck, 1759)
   Predovnik, 2003
4. *Sesia bembeciformis* (Hübner, [1806])
   Slovenija, Karavanke, Hrušica, 650 m, 22.3.2003, ostanki kokona v *Salix* sp., leg. Predovnik.

Eusphecia Le Cerf, 1937

5. *Eusphecia melanocephala* (Dalman, 1816)
   Predovnik, 2001

Paranthrenini Niculescu, 1964
Paranthrene Hübner, [1819]

6. *Paranthrene tabaniformis* (Rottemburg, 1775)
   Predovnik, 2003
7. *Paranthrene insolita polonica* Schnaider, 1939
   Predovnik, 2001 (kot *Paranthrene insolita*, Le Cerf, 1914)

Synanthedonini Niculescu, 1964
Synanthedon Hübner, [1819]

8. *Synanthedon scoliaeformis* (Borkhausen, 1789)
   Predovnik, 2008
9. *Synanthedon mesiaeformis* (Herrich-Schäffer, 1846)
   Predovnik, 2012
10. *Synanthedon spheciformis* ([Denis & Schiffermüller], 1775)
    Predovnik, 2003
11. *Synanthedon stomoxiformis* (Hübner, 1790)
    Predovnik, 2003
12. *Synanthedon culiciformis* (Linnaeus, 1758)
    Predovnik, 2003
13. *Synanthedon formicaeformis* (Esper, 1783)
    Predovnik, 2003
14. *Synanthedon flaviventris* (Staudinger, 1883)
    Predovnik, 2002
15. *Synanthedon andrenaeformis* (Laspeyres, 1801)
    Štanta, 2000
16. *Synanthedon soffneri* Špatenka, 1983
    Predovnik, 2005
17. *Synanthedon melliniformis* (Laspeyres, 1801)
    Predovnik, 2001
18. *Synanthedon myopaeformis* (Borkhausen, 1789)
    Predovnik, 2003
19. *Synanthedon vespiformis* (Linnaeus, 1761)
    Predovnik, 2003
20. *Synanthedon theryi* Le Cerf, 1916
    Predovnik, 2017
21. *Synanthedon conopiformis* (Esper, 1782)
    Slovenija, Apaško polje, Spodnje Konjišče (gmajna ob reki Muri), 223 m, 1.11.2015, gosenice v lesu *Quercus* sp., leg. Predovnik.
22. *Synanthedon tipuliformis* (Clerck, 1759)
    Predovnik, 2003

23. *Synanthedon spuleri* (Fuchs, 1908)
Predovnik, 2001
24. *Synanthedon loranthi* (Králíček, 1966)
Predovnik, 2001
25. *Synanthedon cephiformis* (Ochsenheimer, 1808)
Slovenija, Kum, Stajica (dolina Sopote), 690 m, 27.11.2006, gosenice, stare izletne odprtine v lesu *Abies alba* L., leg. Predovnik.

Bembecia Hübner, [1819]
26. *Bembecia ichneumoniformis* ([Denis & Schiffermüller], 1775)
Predovnik, 2003
27. *Bembecia albanensis* (Rebel, 1918)
Predovnik, 2001
28. *Bembecia pavicevici* Toševski, 1989
Predovnik, 2001
29. *Bembecia scopigera* (Scopoli, 1763)
Predovnik, 2001
30. *Bembecia megillaeformis* (Hübner, [1813])
Predovnik, 2001
31. *Bembecia himmighoffeni* (Staudinger, 1866)
Predovnik, 2005
32. *Bembecia uroceriformis* (Treitschke, 1834)
Predovnik, 2001

Pyropteron Newman, 1832
33. *Pyropteron chrysidiformis* (Esper, 1782)
Slovenija, Koprsko primorje, Gažon, Baredi (Sv. Donat), 220 m, 19.6.2004, 8♂, feromonske vabe, leg. et coll. Predovnik.
34. *Pyropteron triannuliformis* (Freyer, 1843)
Predovnik, 2003
35. *Pyropteron affinis* (Staudinger, 1856)
Slovenija, Kraški rob, Zanigrad, 195 m, 9.6.2004, 2♂, feromonske vabe, leg. Predovnik.

Chamaesphecia Spuler, 1910
36. *Chamaesphecia schmidtiiformis* (Freyer, 1836)
Predovnik, 2002
37. *Chamaesphecia aerifrons* (Zeller, 1847)
Predovnik, 2002
38. *Chamaesphecia doleriformis colpiformis* (Staudinger, 1856)
Predovnik, 2005
39. *Chamaesphecia dumonti* Le Cerf, 1922
Predovnik, 2001

40. *Chamaesphecia nigrifrons* (Le Cerf, 1911)
    Predovnik, 2005
41. *Chamaesphecia euceraeformis* (Ochsenheimer, 1816)
    Slovenija, Kraški rob, Zanigrad, 195 m, 9.6.2004, 2♂, feromonske vabe, leg. et coll. Predovnik.
42. *Chamaesphecia hungarica* (Tomala, 1901)
    Predovnik, 2002
43. *Chamaesphecia empiformis* (Esper, 1783)
    Predovnik, 2003
44. *Chamaesphecia tenthrediniformis* ([Denis & Schiffermüller], 1775)
    Predovnik, 2001

Iz revidiranega seznama steklokrilcev sem izločil vrste, ki so znane za Slovenijo zgolj po dvomljivih literaturnih navedbah in brez konkretnih podatkov. Izločenih vrst nismo uspeli potrditi z nobeno konkretno najdbo na terenu, niti z dokaznim materialom v muzejskih ali zasebnih zbirkah. Zato lahko s precejšnjo gotovostjo domnevamo, da gre zgolj za domneve o njihovi navzočnosti na ozemlju Slovenije.

Microsphecia tineiformis (Esper, [1789])
Špatenka s sod., 1999; Laštůvka in Laštůvka, 2001; Pühringer, 2016 (na spletu).

Microsphecia brosiformis (Hübner, [1813])
Laštůvka in Laštůvka, 2001; Pühringer, 2016 (na spletu).

Pyropteron muscaeformis (Esper, 1783)
Hoffmann in Klos, 1914-1923; Carnelutti, 1971; Carnelutti, 1992a; Pühringer, 1997; Lesar in Habeler 2005; Lesar in Habeler 2007; Lesar in Govedič 2010.

Pyropteron leucomelaena (Zeller, 1847)
Hafner, 1909-1912; Forster in Wohlfahrt, 1960; Carnelutti, 1992a; Špatenka s sod., 1999; Laštůvka in Laštůvka, 2001; Lesar in Govedič, 2010; Pühringer, 2016 (na spletu).

Chamaesphecia chalciformis (Esper, [1804])
Stauder, 1929-1933; Carnelutti, 1971; Carnelutti, 1992a.

Chamaesphecia masariformis (Ochsenheimer, 1808)
Špatenka s sod., 1999; Laštůvka in Laštůvka, 2001; Pühringer, 2016 (na spletu).

Chamaesphecia bibioniformis (Esper, 1800)
Špatenka s sod., 1999; Laštůvka in Laštůvka, 2001; Pühringer, 2016 (na spletu).

Chamaesphecia astatiformis (Herrich-Schäffer, 1846)
Laštůvka in Laštůvka, 2001; Z. Laštůvka, 2012 (na spletu), Pühringer, 2016 (na spletu).

Iz seznama izločene vrste in vrste, ki jih literatura ne navaja, vendar so potencialno lahko prisotne v Sloveniji (*B. puella*, *Ch. annellata*, *Ch. leucopsiformis*), sem uvrstil v dve skupini. Prvo skupino sestavljajo vrste, ki so po avtorjevem mnenju pričakovane za Slovenijo in se pri nas verjetno nahajajo kot redke in izjemno lokalno razširjene. Zanje je značilno, da so razširjene v vseh ali v večini sosednjih držav in pri nas najdemo tudi potencialno primerne habitate s hranilnimi rastlinami gosenic in ustreznimi klimatskimi pogoji. Druga skupina je sestavljena iz vrst, ki jih v Sloveniji le težko pričakujemo, bodisi zaradi redkosti v sosednjih državah, morda neustreznih klimatskih razmer ali odsotnosti poznanih hranilnih rastlin gosenic pri nas.

Prva skupina:

Pyropteron muscaeformis (Esper, 1783)

Vrsto so našli v Italiji (Bella s sod., 2017), Avstriji (Pühringer, 1997), na Madžarskem (Fazekas, 2017) in Hrvaškem (Z. Laštůvka, 2012, na spletu). Pri nas jo lahko pričakujemo na kakšnem od rastišč potencialnih hranilnih rastlin gosenic, alpskega pečnika (*Armeria alpina* Willd.) na visokogorskih travnikih, pašnikih in meliščih Alp in Karavank.

Pyropteron leucomelaena (Zeller, 1847)

Vrsta je razširjena v Italiji (Bella s sod., 2017) in na Hrvaškem (Toševski, 1986). Najdemo jo predvsem na termofilnih, ruderalnih rastiščih hranilih rastlin gosenic - male strašnice (*Sanguisorba minor* Scop.) in krvavordeče krvomočnice (*Geranium sanguineum* L.). Pri nas bi jo lahko našli kot izjemno lokalno in redko v priobalnem delu Primorske ali na Krasu.

Chamaesphecia masariformis (Ochsenheimer, 1808)

Vrsto so našli v Italiji (Bella s sod., 2017), Avstriji (Pühringer, 1997), na Madžarskem (Fazekas, 2017) in na Hrvaškem (Predovnik, 2003). Je pričakovana vrsta predvsem na Krasu in v priobalnem delu Primorske. Potencialna nahajališča predstavljajo ruderalna, dobro osončena mesta s hranilnimi rastlinami gosenic, ki so lučniki (*Verbascum* spp.) in pasja črnobina (*Scrophularia canina* L.).

Chamaesphecia leucopsiformis (Esper, 1800)

Vrsta je zelo lokalno razširjena v Italiji (Bella s sod., 2017), Avstriji (Pühringer, 1997) in na Hrvaškem (Kranjčev 1995; Predovnik in Kranjčev, neobjavljeni podatki). Pogostejša je na Madžarskem (Fazekas, 2017). Hranilna rastlina gosenic je cipresasti mleček (*Euphorbia cyparissias* L.), ki je pri nas razširjen po celi državi. Vrsta lahko naseljuje zelo majhne površine in jo pričakujemo kot zelo lokalno razširjeno tudi v Sloveniji.

Druga skupina:

Microsphecia tineiformis (Esper, [1789])

Je izrazito toploljubna vrsta, ki naseljuje zelo različna življenjska okolja. Najdemo jo celo sredi kampov in naselij, povsod tam, kjer raste hranilna rastlina gosenic -

njivski slak (*Convolvulus arvensis* L.). Našli so jo v Italiji (Bella s sod., 2017) in na Hrvaškem (Laštůvka in Laštůvka, 2001). Samci radi priletijo na različne tipe feromonov in po podatkih avtorja tudi v feromonske pasti. Vzrok, da vrste nismo našli pri nas in tudi ne v hrvaški Istri, domnevno leži v neustreznih klimatskih razmerah severnega Jadrana.

Microsphecia brosiformis (Hübner, [1813])

Vzhodna vrsta, prisotna na Madžarskem (Fazekas, 2017) in na jugu Hrvaške (Laštůvka in Laštůvka, 2001). Nam najbližje sem jo našel šele v okolici Veszpréma (Predovnik, 2018). Hranilna rastlina gosenic je njivski slak (*C. arvensis*) (Laštůvka in Laštůvka, 2001).

Paranthrene diaphana Dalla Torre & Strand, 1925

Vrsta je lokalno razširjena na Hrvaškem (Z. Laštůvka, 2012, na spletu; Predovnik in Kranjčev, neobjavljeni podatki). Med hranilne rastline gosenic spadajo razne vrste vrb (*Salix* spp.) in topolov (*Populus* spp.), zlasti bela vrba (*Salix alba* L.) in beli topol (*Populus alba* L.) (Špatenka s sod., 1999). Pregledi potencialno primernih habitatov (Šturmovci, vrbovja ob reki Dravi pri Središču ob Dravi) pri nas zaenkrat niso bili uspešni.

Bembecia puella Z. Laštůvka, 1989

Vrsta je znana iz sosednje Madžarske (Fazekas, 2017). Pri nas bi lahko bila lokalno razširjena na rastiščih hranilne rastline gosenic - sladkega grahovca (*Astragalus glycyphyllos* L.), predvsem v vzhodnem delu Slovenije (Haloze, Kozjansko).

Chamaesphecia chalciformis (Esper, [1804])

To lepo vzhodnomediteransko vrsto so kot lokalno in redko našli na vzhodu Avstrije (Pühringer, 1997) in na Madžarskem (Fazekas, 2017). Navajajo jo tudi za jug Hrvaške (Laštůvka in Laštůvka, 2001). Navedbe za Italijo (Bertaccini in Fiumi, 2002) so dvomljive (Bella s sod., 2017), ravno tako za Hrvaško Istro (Predovnik, 2010). Zaradi velike podobnosti so možne zamenjave s sorodno vrsto *Ch. schmidtiiforms*, ki je pri nas razširjena na obali in na območju Kraškega roba. Morda bi vrsto kot lokalno in redko lahko našli na kakšnem od rastišč origana (*Origanum vulgare* L.) v vzhodni Sloveniji (Haloze, Kozjansko).

Chamaesphecia doleriformis doleriformis (Herrich-Schäffer, 1846)

Vrsta je razširjena v Grčiji, vzdolž Dalmatinske obale do Hrvaške Istre in v Italiji. Hranilne rastline gosenic so različne vrste kadulj (*Salvia* spp.), med njimi muškatna kadulja (*S. sclarea* L.) in *S. verbenaca* Wild. (Špatenka s sod., 1999). Pri nas je vrsta potencialno možna kot izjemno lokalna in redka v priobalnem delu Primorske ali na Krasu.

Chamaesphecia annellata (Zeller, 1847)

Vzhodna vrsta, ki so jo našli v Avstriji (Pühringer, 1997) in na Madžarskem (Fazekas, 2017). Najbližje Sloveniji sem jo našel v okolici Blatenskega Kostela (Keszt-

hely) na Blatnem jezeru (Predovnik, 2018) in pri Osijeku, kot pogosto na raznolikih, predvsem ruderalnih habitatih, kjer rastejo hranilne rastline gosenic - črne lahkotnice (*Ballota nigra* L.) (Predovnik in Kranjčev, neobjavljeni podatki). Kljub potencialno primernim habitatom (Lendavske Gorice, okolica Krškega, Kraški rob) vrste pri nas in na severozahodu Hrvaške še vedno nisem potrdil.

Chamaesphecia bibioniformis (Esper, 1800)

Nam najbližje sem vrsto našel v okolici Blatenskega Kostela (Keszthely) na Madžarskem (neobjavljeni podatki). Vrsto in hranilno rastlino gosenic so našli na južnem Tirolskem v Italiji in v Avstriji (Pühringer, 1997), znana je tudi za Hrvaško (Kučinić s sod., 1997; Laštůvka in Laštůvka, 2001). Gosenice se v srednjeevropskem prostoru in na Balkanu hranijo v koreninah mlečka vrste *Euphorbia seguieriana* Neck., ki v Sloveniji ne raste (Frajman in Jogan, 2007). Samci radi priletijo na različne feromone in po podatkih avtorja (Predovnik, 2018) tudi v feromonske pasti.

Chamaesphecia astatiformis (Herrich-Schäffer, 1846)

To stepsko vrsto so našli na vzhodu Avstrije (Pühringer, 1997) in na Madžarskem (Fazekas, 2017), na rastiščih rastline *Euphorbia esula* L., ki ponekod ni redka. Najbližje Sloveniji sem jo našel v okolici Veszpréma, na Blatnem jezeru (Balaton) (Predovnik, 2018). Pri nas je potencialno možna na vzhodu države, na mogočih zaplatah rastišč hranilne rastline.

Kot zanimivost naj omenim danes že zelo ogroženo vrsto steklokrilca *Chamaesphecia palustris* Kautz, 1927, ki je prisotna v vseh sosednjih deželah. Zanjo iz Slovenije ni zgodovinskih ali pisnih in materialnih dokazov. Glede na mogočo prisotnost močvirskega mlečka (*Euphorbia palustris* L.) v Sloveniji pa je mogoče, da je bila nekoč prisotna tudi pri nas. Močvirski mleček danes spada med izumrle vrste v Sloveniji (Frajman in Jogan, 2007). Kljub vsemu ostaja upanje, da v prihodnje, v kateri od starih, še nepreverjenih muzejskih zbirk v tujini, morda potrdimo kak primerek te lepe vrste steklokrilca.

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FOUR SPECIES OF HETEROPTERA NEW TO THE FAUNA OF SLOVENIA

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Abstract – Four species of Heteroptera were detected in Slovenia for the first time, all in the vicinity of Koper: *Camptotylus yersini* (Mulsant & Rey) (Miridae), *Callistodema fasciata* (Kolenati) (Reduviidae), *Metacanthus meridionalis* (A. Costa) (Berytidae) and *Chorosoma schillingii* (Schilling) (Rhopalidae). They were photographed in the field and in one case collected afterwards.

KEY WORDS: Hemiptera, Heteroptera, introduced species, fauna, Slovenia

Izvleček – ŠTIRI VRSTE STENIC (HETEROPTERA), NOVE V FAVNI SLOVENIJE

Štiri vrste podreda Heteroptera so bile prvič najdene v Sloveniji, vse v okolici Kopra: *Camptotylus yersini* (Mulsant & Rey) (Miridae), *Callistodema fasciata* (Kolenati) (Reduviidae), *Metacanthus meridionalis* (A. Costa) (Berytidae) in *Chorosoma schillingii* (Schilling) (Rhopalidae). Na terenu smo jih fotografirali in v enem primeru pozneje tudi ujeli.

KLJUČNE BESEDE: Hemiptera, Heteroptera, vnešene vrste, favna, Slovenija

Introduction

During the years 2018 and 2019, four species of Heteroptera not known from Slovenia before were photographed in the field. Two of them live on the *Tamarix* bushes and are introduced species like their plant host. The other two were long expected in Slovenia as they are present in neighbouring countries. Specimens of one of them were also collected and are preserved in the collection of the Slovenian museum of

Natural History in Ljubljana (PMSL). The indentifications of the other three species were possible from the photographs without doubt.

List of species

Miridae

Camptotylus yersini (Mulsant & Rey, 1856)

Koper, Škocjanski zatok, UTM: VL04, 23. 9. 2018 on *Tamarix*, photo Miroslav Kastelic

A characteristic colour pattern distinguishes this member of the Phylini tribe and enable identification from the photograph. *Camptotylus* species are recognizable mirids for having one dark rounded spot in the radial part of the corium; the hemelytra are green in color; Articles 3 and 4 of the rostrum are enlarged compared to the first and second. Four black rings on the second antennal segment differentiate *Camptotylus yersini* from other species in the same genus (Wagner 1973). It is a Mediterranean species, distributed in Southern Europe (France, Italy and Spain), Northern Africa, Middle East and Central Asia (Kerzhner & Josifov 1999). It lives on *Tamarix* species (Tamaricaceae) and was found and photographed on this plant also in Slovenia. Tamarisks are not native on the Slovenian coast, they are planted as ornamentals or expand further from such plants. Insects obligately dependent of them were thus also introduced, most probably together with the plant material, or they spread along the Mediterranean coast by themselves as tamarisks are present in many places. The record in Koper is the northernmost in the range of *Camptotylus yersini*. The nearest known locality is in Goro (Italy, Ferrara) on the opposite side of the Adriatic sea (Dioli 1995).

Fig. 1: *Camptotylus yersini* (Mulsant & Rey) on *Tamarix* in Škocjanski zatok near Koper, photo M. Kastelic

Reduviidae

Callistodema fasciata (Kolenati, 1857)

Koper, Škocjanski zatok, VL04, 8. 8. 2019 on *Tamarix*, 1 nymph, photo M. Kastelic, 29. 8. 2019, 1 nymph, photo M. Kastelic, 30. 8. 2019, 1 nymph, photo M. Kastelic, 2. 9. 2019, 1 nymph, photo M. Kastelic, 5. 9. 2019, 1 nymph, photo M. Kastelic, 10. 9. 2019 on *Tamarix*, 1♂, photo D. Vadnjal, 1♀, photo M. Kastelic, 11. 9. 2019, 1 freshly molted adult, photo D. Vadnjal, 13. 9. 2019, 1 nymph, photo D. Vadnjal, 15. 9. 2019, 1 nymph, photo D. Vadnjal, 21. 9. 2019, 1 freshly molted adult, photo M. Kastelic

Harpactorine assassin bug strictly bound to *Tamarix* bushes where it feeds on small Auchenorrhyncha and Heteroptera (Miridae like *Tuponia* and Lygaeidae – *Artheneis*) (Putshkov & Moulet 2009). The red and black colour pattern of adults reminds of *Lygaeus* and *Spilostethus* species (Lygaeidae). Nymphs that do not fly have a camouflage appearance among the leaves of the tamarisk (Fig. 2). Adults have instead aposematic colours like the poisonous Lygaeidae, e.g. *Lygaeus* and *Spilostethus*, to be safer from predators (Fig.3).

Callistodema fasciata is an East Mediterranean species, distributed from Greece to Turkey, Dagestan (Russia), Armenia, Georgia, Azerbaidjan and Iran (Putshkov P.V. & V.G. 1996, Putshkov & Moulet 2009). The locality on the Slovenian coast is far away from the known distribution but at the port of Koper, a possible spot of introduction. Warmer climate of recent years enable such southern species to survive far north to their native range.

Berytidae

Metacanthus meridionalis (A. Costa, 1843)

Koper, Škocjanski zatok, VL04, 3. 6. 2019 on *Epilobium hirsutum*, 1♀, photo Duša Vadnjal, 3. 8. 2019, 2♂1♀, Duša Vadnjal leg., PMSL

Fig. 2: *Callistodema fasciata* (Kolenati) nymph on *Tamarix* in Škocjanski zatok near Koper, photo M. Kastelic

Fig. 3: *Callistodema fasciata* (Kolenati) female on *Tamarix* in Škocjanski zatok near Koper, photo M. Kastelic

Fig. 4: *Metacanthus meridionalis* (A. Costa) female in Škocjanski zatok near Koper, photo D. Vadnjal

Fig. 5: *Chorosoma schillingii* (Schilling) female in Dekani near Koper, photo D. Vadnjal

North Mediterranean and Pontic species, living on *Epilobium* species (Onagraceae) (Péricart 1984). Its main foodplant is *Epilobium hirsutum,* confirmed also in Slovenia. Its presence was expected as it is distributed in neighbouring countries. It was found also in Gorizia, at the border between Italy and Slovenia (Péricart 1984).

Rhopalidae

Chorosoma schillingii (Schilling, 1829)

Koper, Dekani, VL04, 12. 8. 2018, 1♀, photo Duša Vadnjal, 20. 8. 2018, 1♂1♀, photo Miroslav Kastelic, 5. 9. 2018, 1♀, photo Duša Vadnjal

European species feeding predominantly on various Poaceae (Moulet 1995). It was expected in Slovenia as it is present in all neighbouring countries. Another species present in Europe, *Chorosoma gracile* Josifov 1968, is similar, but distributed only in the Pannonian part of Central Europe. It is unlikely to be present near the Adriatic coast. The identification is proved also by long pilosity of the hind tibiae, characteristic for *Ch. schillingii* and evident on the photographs.

Conclusions

All four species new to the country have been found in the Slovenian part of Istria, region with the warmest climate in Slovenia and where species which expand their distribution ranges due to climate change are expected to appear. Two species, *Metacanthus meridionalis* and *Chorosoma schillingii* may have been overlooked before as they are present in neighbouring countries. Two species which live exclusively on *Tamarix*, however, most probably colonized the Slovenian locality near Koper only in recent times. In the same locality other Heteroptera species were found on the *Tamarix* bushes before: *Tuponia hippophaes* (Fieber, 1861), *Tuponia mixticolor* (A. Costa, 1862) and *Megalodactylus macularubra* (Mulsant & Rey, 1852) (Gogala 2006). They were collected by the first author in the year 2000 during survey of the Škocjanski zatok, area provided for conservation. *Camptotylus yersini* and *Callistodema fasciata* were not detected then. The latter seems to be quite numerous now as it was photographed on many visits to the area, first as nymphs and in September finally as adults.

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CALIAESCHNA MICROSTIGMA (SCHNEIDER 1845) (RE)DISCOVERED IN SERBIA (ODONATA: AESHNIDAE)

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Abstract – The distribution of *Caliaeschna microstigma* (Schneider 1845) in Europe is restricted mostly to the Balkans. As its populations have been declining over the past years, the species is classified as Near Threatened (NT) in the European and Mediterranean Red Lists. In Serbia, this species was reported earlier, but the data is incomplete. Precise location and the description of the record is missing. During the field trip in July 2018 in Pčinja River Valley (Southern Serbia) two individuals of *C. microstigma* were recorded. Based on this study, further faunistic research should be carried out in southern parts of the country to map the present distribution of this rheophile species and to take the most effective management measures for its conservation.

Key words: Conservation, *Caliaeschna microstigma*, dragonflies, Pčinja River Valley, Serbia

Izvleček – PONOVNO ODKRITJE BLEDEGA VETRNJAKA *CALIAESCHNA MICROSTIGMA* (SCHNEIDER 1845) V SRBIJI (ODONATA: AESHNIDAE)

Bledi vetrnjak *Caliaeschna microstigma* (Schneider 1845) je v Evropi razširjen skoraj izključno na Balkanskem polotoku. Ker populacije te vrste upadajo, je vrsta uvrščena na evropski in sredozemski rdeči seznam, na oba s statusom potencialne ogroženosti ('Near Threatened', NT). Za Srbijo obstaja starejši podatek o prisotnosti bledega vetrnjaka, a je pomanjkljiv, kajti ni bilo sporočene natančne lokacije najdbe. Na terenski odpravi julija 2018 v dolino reke Pčinje (južna Srbija) smo zabeležili dva osebka bledega vetrnjaka. Za natančno poznavanje razširjenosti te reofilne vrste in pripravo načrta njenega ohranjanja so potrebne nadaljnje favnistične raziskave, predvsem v južnih predelih Srbije.

Ključne besede: varstvo, *Caliaeschna microstigma*, kačji pastirji, dolina reke Pčinje, Srbija

Introduction

In the last decade, great progress has been made in studying dragonflies in Serbia (e.g. Jović et al. 2010, Kulić et al. 2013, Rajkov et al. 2015, Vinko et al. 2016), but this group of insects is still insufficiently explored in the country. Although a certain number of papers on Serbian dragonfly fauna was published, the majority includes a smaller part of the country territory as well as a smaller part of the field season. For many species data is scarce and the records are sporadic (e.g. Jović et al. 2009). Therefore, the distribution of a large number of species in Serbia is poorly known and it can be assumed to be much wider than we know today.

In Serbia no national Red list exists (Boudot & Kalkman 2015), although seven dragonfly species are protected (Službeni glasnik Republike Srbije 5/2010). Jović (2013) listed 67 dragonfly species in the Serbian fauna, four of which require further research that will confirm the accuracy of the previous literature sources and were therefore not included in the Atlas of the European dragonflies and damselflies (Boudot & Kalkman 2015). One of these species is *Caliaeschna microstigma* (Schneider 1845). It develops in cold and fast flowing, well oxygenated running waters, which are at least partly shaded, with stony, pebble or gravel substrate. These are usually brooks, streams or small rivers (with width mostly 0.5–2 m), majority lacking aquatic vascular plants, where pools of calm water provide refuges for the larvae (Kovács & Murányi 2013, Kalkman & Jović 2015). Elevation of the habitats is from sea level up to 1,500 m a.s.l. (Shkëmbi et al. 2018). The larvae live among submerged moss, leaf litter, roots or under stones when other substrates are absent (Dijkstra & Lewington 2006). Larval development of this semivoltine species usually takes three years (Kovács & Murányi 2013). In Serbian language, the species is called '*primorski plemić'* (Jović 2013).

Without any political suggestion, in this paper we exclude Kosovo as a part of Serbia.

Landscape of outstanding features "Pčinja River Valley" is an area comprising 2,606 ha, located in the south of Serbia, on the border with the Republic of North Macedonia. It is a landscape with exceptional biogeographical characteristics (Avramović et al. 2005). Pčinja River Valley is located in the transitional area in the climatic and vegetational terms, which makes it prone to degradation and susceptible to anthropogenic influences (Mišić 1981). The climate of this area is a mixture of continental and Mediterranean and as such has influenced the development of specific heterogeneous vegetation. These two factors defined the unusual fauna structure in this area.

Caliaeschna microstigma was previously reported from Serbia (Karaman 1979), but without a precise description of the record. In this article we present the first detailed record of *C. microstigma* for the country.

Material and methods

During the study we visited the Landscape of outstanding features "Pčinja River Valley" (Loc. 1) as well as the surrounding localities (Loc. 2–4) in order to clarify

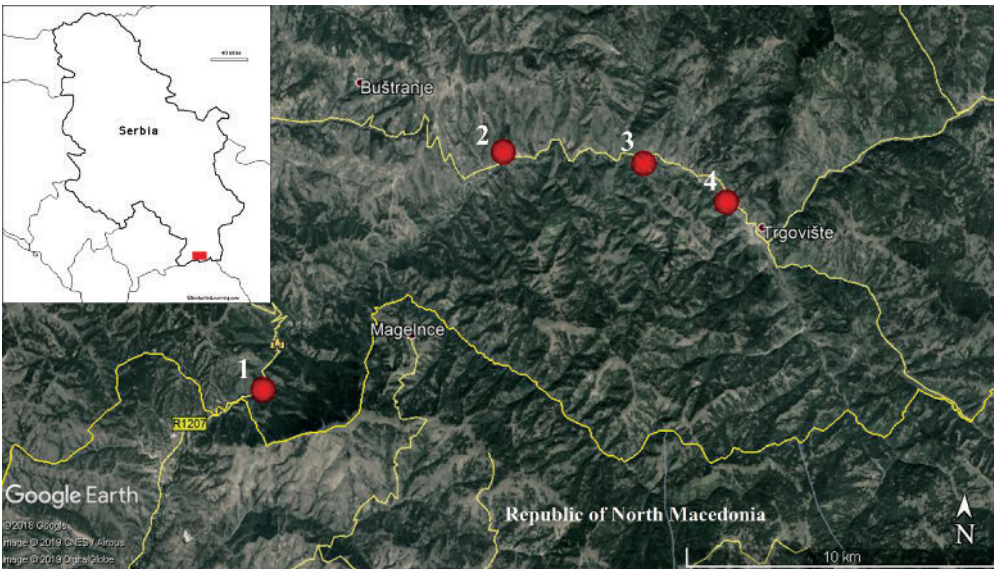

Fig. 1: Map of studied sites in the Pčinja region, south Serbia.

the status of *C. microstigma* in Serbia (Fig. 1). In the period from 20 to 22 July 2018 four sites were visited (Tab. 1) with only adult dragonflies identified. Three localities (Loc. 1, 3, 4) are different sites of Pčinja River, while one (Loc. 2) is a stream that is a tributary of the Pčinja River.

One male specimen of *C. microstigma* is stored in the entomological collection of the Natural History Museum in Belgrade.

Table 1: List of investigated sites from Fig. 1.

no. Loc.	Locality	Coordinates(lat./lon.)	alt. (m)	date	no. of dragonfly taxa
1	Prohor Pčinjski monastery (Pčinja River)	42°18'59.0"N 21°53'29.3"E	629	20.07.2018, 21.07.2018	1
2	Šaprance (stream)	42°23'11.67"N 21°58'55.71"E	561	21.07.2018, 22.07.2018	7
3	Šajince (Pčinja River)	42°23'02.9"N 22°02'02.8"E	572	21.07.2018	1
4	Trgovište (Pčinja River)	42°22'31.1"N 22°03'53.9"E	606	21.07.2018	3

Results

Altogether eight dragonfly taxa were identified (Tab. 2).

During the visit to Šaprance (Loc. 2), two adult males of *C. microstigma* were recorded (Fig. 2).

Table 2: List of recorded dragonfly species per locality from Tab. 1.

Species	Loc. 1	Loc. 2	Loc. 3	Loc. 4
Calopteryx virgo (Linnaeus 1758)	-	+	-	+
Platycnemis pennipes (Pallas 1771)	-	+	+	+
***Caliaeschna microstigma* (Schneider 1845)**	-	+	-	-
Cordulegaster bidentata Selys 1843	-	+	-	-
Cordulegaster sp.	+	-	-	-
Somatochlora meridionalis Nielsen 1935	-	+	-	-
Orthetrum coerulescens (Linnaeus 1758)	-	+	-	-
Orthetrum brunneum (Fonscolombe 1837)	-	+	-	+

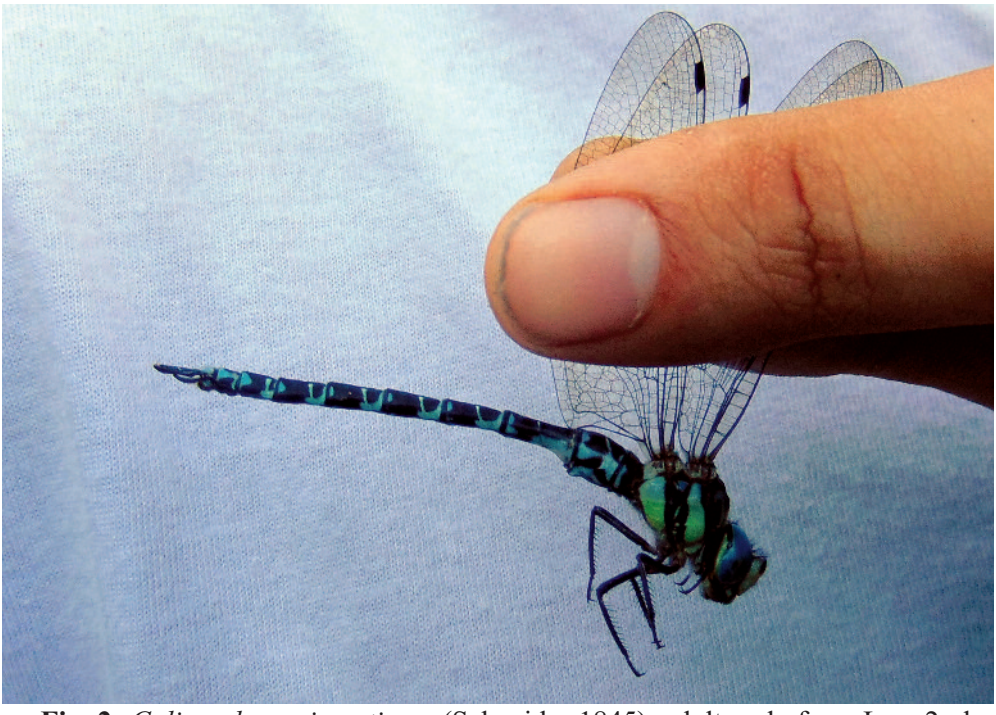

Fig. 2: *Caliaeschna microstigma* (Schneider 1845), adult male from Loc. 2, deposited in the entomological collection of the Natural History Museum in Belgrade (photo: Milan Đurić, 21-VII-2018).

Discussion

Two adult males of *Caliaeschna microstigma* were observed on 21 July 2018 in the late afternoon (18:00 PM), patrolling low above the water, matching the description of this crepuscular animal (Dijkstra & Lewington 2006). Recorded territorial behaviour as well as the appropriate habitat in form of a smaller slow flowing stream, in shade with dense surrounding vegetation indicates that reproduction is possible on the site. Further studies should be carried out in order to determine the reproduction status of this species. The site was also visited in the morning hours (10:00 AM) on 22 July 2018, when no individual of this species was recorded.

The species recorded in sympatry with *C. microstigma* were expected based on quotations (Kovács & Murányi 2013). *Caliaeschna microstigma* was often observed with *Cordulegaster* spp. and *Calopteryx* spp. (Kulijer et al. 2012, De Knijf et al. 2013), in our case with locally abundant *C. bidentata* and *C. virgo*.

The distribution of *C. microstigma* in Europe is restricted to the Balkans, Cyprus and the Aegean Islands (Kalkman & Jović 2015). This rheophile species is not uncommon in large parts of the eastern Mediterranean, but often occurs in low densities (Kalkman & Jović 2015). Individuals of *C. microstigma* are recorded in almost every country of the Balkan Peninsula (Adamović 1948, Bedjanič et al. 2008, Beschovski & Marinov 2007, Buczyński et al. 2013, Daraž 2009, De Knijf et al. 2013, Hostnik 2018, Kalkman 2000, Kovács & Murányi 2013, Kulijer et al. 2012, 2013, Lopau 2010, Puschnig 1926, Murányi 2007, Murányi & Kovács 2013, Shkëmbi et al. 2018, Vinko 2012, 2018, Vinko et al. 2017, 2018), while localities in Croatia (Belančić et al. 2008, Vilenica et al. 2014, Kotarac et al. 2016) represent north-westernmost border of the species areal (Kalkman & Jović 2015). This being considered, the presence of *C. microstigma* in the south of Serbia was expected.

Caliaeschna microstigma is classified as Near Threatened (NT) in the Mediterranean and the European Red Lists (Riservato et al. 2009, Kalkman et al. 2010). Kalkman et al. (2018) proposed *C. microstigma* to be included in the EU Habitat Directive (Council Directive 92/43/EEC) as its populations are declining and the species is likely to qualify as threatened in the European Red List in the future. Furthermore, decrease in quality of running waters throughout its area of distribution is present. As the range of *C. microstigma* is confined to cold streams and small rivers, the climate change will have a major impact on the species due to habitat degradation (Boudot et al. 2009). Therefore, the conservation of Pčinja River Valley is extremely important in order to protect the population of *C. microstigma* in Serbia. Further faunistic studies, focused also on dragonfly larvae and exuviae, should be carried out, especially in the southern parts of the country, to map the present distribution of this species and to take the most effective management measures for its conservation.

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NEW RECORDS OF HORSE-FLIES (DIPTERA: TABANIDAE) ALONG NERETVA RIVER VALLEY AND CETINA RIVER IN DALMATIA (SOUTHERN CROATIA)

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Abstract – Study of the horsefly fauna diversity in the area of the Cetina River during 2018 resulted in 23 species records of which *Chrysops viduatus* (Fabricius, 1794), *Atylotus rusticus* (Linnaeus, 1767), *Therioplectes tunicatus* Szilády, 1927, *Hybomitra bimaculata* (Macquart, 1826), *Tabanus lunatus* Fabricius, 1794 and *Philipomyia aprica* (Meigen, 1820) are new for the studied area. The total number of horsefly species currently known in the area increased to 35, while new locality records are provided for 17 species. During 2014 and 2015 in the Neretva River valley 15 species of horse-flies were recorded, of which new locality records are provided for 10 species. In the Neretva River valley a total of 37 species of horse-flies were recorded. Altogether, 46 species have been recorded in the study areas from 78 species recorded so far in the Croatian fauna. Considering biogeography, the majority of species recorded in both studied areas belong to the Mediterranean group of species.

KEY WORDS: Horse-flies, Tabanidae, Diptera, diversity, Southern Croatia, Europe

Izvleček – NOVE NAJDBE OBADOV (DIPTERA: TABANIDAE) V DOLINI NERETVE IN OB REKI CETINI V DALMACIJI (JUŽNA HRVAŠKA)

Raziskava raznovrstnosti favne obadov v območju reke Cetine leta 2018 je dala najdbe 23 vrst, od katerih so *Chrysops viduatus* (Fabricius, 1794), *Atylotus rusticus* (Linnaeus, 1767), *Therioplectes tunicatus* Szilády, 1927, *Hybomitra bimaculata* (Macquart, 1826), *Tabanus lunatus* Fabricius, 1794 in *Philipomyia aprica* (Meigen, 1820) nove za območje raziskave. Skupno število vrst obadov, trenutno znanih za območje, se je povečalo na 35, medtem ko je bilo 17 vrst najdenih na novih najdiščih. V letih 2014 in 2015 je bilo v dolini reke Neretve najdenih 15 vrst obadov, 10 izmed njih na

novih najdiščih. V dolini reke Neretve je bilo skupno najdenih 37 vrst obadov.V območjih raziskave je bilo skupno najdenih 46 vrst od 78 vrst, do zdaj najdenih v hrvaški favni. Biogeografsko večina najdenih vrst obeh raziskovanih območij pripada mediteranski skupini vrst.

KLJUČNE BESEDE: obadi, Tabanidae, Diptera, raznovrstnost, južna Hrvaška, Evropa

Introduction

Study of the insect fauna of Dalmatia was initiated relatively late in comparison to other areas in Europe (Nonveiller 1989). Although, the first data on the insects from Dalmatia are found in Forti's book entitled "Viaggio in Dalmatia" published in 1774 (Nonveiller 1989), data in this book on insects from Neretva River Delta are not results of scientific research and were mostly written on the basis of superficial observations (Nonveiller 1989). The first study of insect fauna in Dalmatia begins in the first half of the XIX century. Foreign entomologists were especially attracted by the fact that the insect world of Dalmatia was still uninvestigated (Durbešić 1984; Nonveiller 1989). Also, very important fact is that Dalmatia is the closest of all the Mediterranean countries to Central Europe (Nonveiller 1989). During the Austro-Hungarian Monarchy significant efforts have been made to investigate the natural resources of the Adriatic coast, including the insect fauna. Numerous entomologists, especially from the Vienna Natural History Museum, spent a lot of time in Dalmatia on islands, inland localities like Krka Falls, the source of Cetina River, the Dinara Mountains, Biokovo and neighbouring areas in these studies (Durbešić 1984, 2011; Nonveiller 1989). During these periods the horsefly fauna was researched primarily by foreign entomologists, with the first data being published at the end of 19th and the beginning of the 20th century (Brauer & Bergenstamm 1880; Strobl 1893, 1898, 1900, 1902; Zerny 1920). After World War II, the research activities of foreign and domestic entomologists in Dalmatia were continued and the number of recorded species from different groups of insects has gradually increased, especially from the family Tabanidae (Coe 1958, 1960; Moucha 1959, 1965; Leclercq 1960). In spite of the numerous entomological research, the knowledge on the majority of the insect groups of Dalmatia remains fragmentary. There are some areas along the Adriatic coast and inland of Dalmatia that haven't yet been sufficiently studied. These areas include rivers, river banks and wetlands. Data from these wet or flooded habitats for some insect groups, orders and families i.e. Ephemeroptera, Lepidoptera, Crambidae, Erebidae, Nymphalidae, from Diptera Empididae and Tabanidae, as well as Plecoptera were recently published during the end of the 20th century and the beginning of this century (Krčmar & Leclercq 1997; Krčmar 1999; Krčmar & Merdić 2007; Perković 2006; Popijač & Sivec 2010; Ivković & Horvat 2007; Ivković *et al.* 2007, 2013; Kučinić *et al.* 2014; Vilenica *et al.* 2016a, 2016b; Gumhalter *et al.* 2018). Flooded habitats (river banks and wetlands) are a significant source of biological diversity, considering the fact that one part of the life cycle of a large number of insects takes place in flooded habitats (Mitsch & Gosselink 2000). The aim of

this paper is to: a) show the diversity of horsefly fauna in the area of the Cetina River and the Neretva River valley, b) classify the horseflies according to their biogeographical groups, c) use of this data for further systematic entomological research in this area.

Material and methods

This study is based on unpublished data from the current study and unidentified specimens in S. Krčmar's collection, as well as data from literature. Samplings of horseflies in the Neretva River valley were carried out during June and July 2014 and 2015, while samplings of horseflies in the area of the Cetina River were carried out from mid May to second half of September during 2018. Horseflies were collected using Malaise traps, Nzi traps, canopy traps and plastic bottle traps, all were baited with 2 ml of 1-octen-3-ol. Also, some horseflies were collected by hand from grazing cattle or inside a car. All collected horseflies were preserved in 96% ethanol solution. Identification and nomenclature followed that of Chvála *et al.* (1972), Moucha (1976), Chvála (1988) and Krčmar *et al.* (2011) – see as well the Table 1 and lists of species at the end of this paper. Classification in major biogeographical groups i.e. Afro-Eurasian arid, Boreal-Eurasian, European and Mediterranean was performed according to Chvála *et al.* (1972) and Olsufjev (1977). The Mediterranean group includes South European species, Western and Eastern Mediterranean species. For every species from current study following data were listed: locality, UTM, date, number of specimens and sex. Additionally, the list of all recorded species, either from literature data or current study, was prepared to show complete faunal composition.

Study areas

Neretva River valley

The entire Neretva River valley is located in the Dubrovnik-Neretva County in Croatia. Even though only 22.3 km of the total 218 km of the Neretva River flows in the Republic of Croatia, exactly that final part of the river expands into a spacious delta of about 11.500 ha (Glamuzina & Glamuzina 2001). The most significant feature of this area is very diverse landscape (Figure 1) with different types of vegetation due to the constant presence of water and because a large part of this area is overgrown with common reed and high sedges (*Scirpo-Phragmitetum*).

Cetina River

Cetina River is located in the Split-Dalmatia County in Croatia. It is 105 kilometers long and the springs are located on the slopes of the Dinara Mountain at an altitude of 380 m a.s.l. Due to the petrographic structure of the Cetina valley, the Cetina River does not lose its flow and flows continuously from the spring to the mouth into the Adriatic Sea (Romac 2017). Many areas along Cetina River are overgrown by forest and bushy vegetation (Figure 2) where the edifiers are *Salix alba* (L.) and *Alnus glutinosa* (L.) Gaertn. (see Vukelić 2008).

Figure 1. Locality Modro Oko, Neretva River valley.

Figure 2. Cetina River landscape.

Results

The total number of horseflies collected in this recent study in the Neretva River valley was 1321 specimens classified in 15 species. New locality records are provided for 10 species. The most numerous was the genus *Tabanus* with 9 species, while other genera were represented as follows: *Chrysops* and *Hybomitra* with 2 species each, as well as *Atylotus* and *Philipomyia* with 1 species each. *Tabanus bromius* was the most abundant with 62.30%, followed by *Tabanus eggeri* (16.04%), *Tabanus sudeticus* (5.90%), *Chrysops viduatus* (4.92%), *Philipomyia graeca* (4.84%) and *Tabanus tergestinus* (2.95%). These six species account for 96.95% of all collected specimens. Abundance was rated based on the number of horseflies collected. Abundance was considered sparse if the number of collected horseflies ranged from 1 to 10 specimens, low (11 – 20), moderate (21 – 50), high (51 – 100), and very high (> 100). Based on this division, 9 species were of sparse abundance, one species with moderate abundance, three species with high abundance and two species with very high abundance. Including current and earlier studies altogether, 37 species of horseflies were recorded in the Neretva River valley (Table 1). Twenty-three species belong to Mediterranean group of species, followed by Boreal – Eurasian biogeographical group with 11, Afro-Eurasian arid with 3, and European with one species (Table 1). During the study in 2018 in the area of the Cetina River 668 specimens of horseflies were collected, belonging to 21 species and seven genera. Based on these records and previously unpublished data (26 specimens classified to 12 species from S. Krčmar's collection), the new locality records are provided for 17 species. Six species, *Chrysops viduatus*, *Atylotus rusticus*, *Therioplectes tunicatus*, *Hybomitra bimaculata*, *Tabanus lunatus* and *Philipomyia aprica,* were recorded for the first time in the studied area along Cetina River. *Tabanus glaucopis* comprised 26.08% of the horseflies collected. It was followed by *Tabanus tergestinus* with 22.19%, *Tabanus bromius* with 13.68%, *Tabanus exclusus* with 8.21%, *Atylotus loewianus* with 6.62%, *Haematopota grandis* with 5.04%, *Philipomyia graeca* with 4.46% and *Tabanus spodopterus* s.str. (*T. spodopterus spodopterus*) with 3.17%. These eight species represent 89,45% of the horseflies collected, while the remaining 15 species are represented with 10.55%. *Tabanus* was found as the best represented genus with 11 species, followed by *Hybomitra* with 3 species, *Chrysops*, *Atylotus*, *Haematopota* and *Philipomyia* with 2 species each, and *Therioplectes* with one species. The majority of species (13) collected in the area of the Cetina River were of sparse abundance, followed by two species with low abundance, four species with moderate abundance, two with high abundance, and two species with very high abundance. Including current and earlier studies a total of 35 species of horseflies were recorded in the area of the Cetina River (Table 1). Considering biogeoraphy, most species belong to the Mediterranean group (21), followed by the Boreal– Eurasian group with 11 species, Afro-Eurasian arid with 2, and European with one species (Table 1). The following list of species includes new locality records and new records of horsefly species for the areas of the Neretva River valley and Cetina River obtained during this study as well as unpublished records.

List of recorded horsefly species in the Neretva river valley during 2014 and 2015

Chrysops flavipes Meigen, 1804. New locality records: Banja (XH 96), 16.07.2014, 1♀

Chrysops viduatus (Fabricius, 1794). Desne (YH 06), 30.06.2015, 37♀♀, 01.07.2015, 16♀♀, 02.07.2015, 6♀♀, 03.07.2015, 1♀; Badžula (YH 16), 02.07.2015, 5♀♀

Atylotus loewianus (Villeneuve, 1920). New locality records: Banja (XH 96), 16.07.2014, 2♀♀

Hybomitra acuminata (Loew, 1858). Desne (YH 06), 02.07.2015, 1♀

Hybomitra muehlfeldi (Brauer *in* Brauer & Bergenstamm, 1880). Desne (YH 06), 01.07.2015, 2♀♀, 02.07.2015 1♀; Badžula (YH 16), 02.07.2015, 1♂

Tabanus autumnalis Linnaeus, 1761. New locality records: Desne (YH 06), 01.07.2015, 2♀♀; Vriještica (YH 07), 18.07.2014, 1♀, 03.07.2015, 2♀♀, 1♂

Tabanus bromius Linnaeus, 1758. New locality records: Desne (YH 06), 17.07.2014, 3♀♀, 30.06.2015, 43♀♀, 01.07.2015, 61♀♀, 02.07.2015, 222♀♀, 03.07.2015, 288♀♀, 04.07.2015, 186♀♀; Vid (YH 16), 16.07.2014, 2♀♀; Vriještica (YH 07), 18.07.2014, 4♀♀, 03.07.2015, 6♀♀, 6♂♂; Badžula (YH 16), 02.07.2015, 2♀♀

Tabanus darimonti Leclerq, 1964. New locality records: Desne (YH 06), 30.06.2015, 1♀, 02.07.2015, 4♀♀, 03.07.2015, 4♀♀, 04.07.2015, 1♀

Tabanus eggeri Schiner, 1868. New locality records: Banja (XH 96), 16.07.2014, 1♀; Blace (YH 06), 17.07.2014, 1♀; Desne (YH 06), 30.06.2015, 19♀♀, 01.07.2015, 19♀♀, 02.07.2015, 74♀♀, 03.07.2015, 34♀♀, 04.07.2015, 59♀♀; Vriještica (YH 07), 03.07.2015, 5♀♀

Tabanus exclusus Pandellé, 1883. New locality records: Desne (YH 06), 02.07.2015, 1♀

Tabanus miki Brauer *in* Brauer & Bergenstamm, 1880. Desne (YH 06), 30.06.2015, 1♀, 01.07.2015, 2♀♀, 02.07.2015, 3♀♀, 03.07.2015, 2♀♀

Tabanus regularis Jaennicke, 1866. New locality records: Desne (YH 06), 05.06.2003, 1♀, 03.07.2015, 4♀♀; Vriještica (YH 07), 03.07.2015, 2♀♀

Tabanus sudeticus Zeller, 1842. Desne (YH 06), 17.07.2014, 1♀, 30.06.2015, 9♀♀, 01.07.2015, 5♀♀, 02.07.2015, 21♀♀, 1♂, 03.07.2015, 8♀♀, 04.07.2015, 12♀♀; Vriještica (YH 07), 18.07.2014, 2♀♀, 03.07.2015, 7♀♀, 5♂♂; Badžula (YH 16), 02.07.2015, 7♀♀

Tabanus tergestinus Egger, 1859. New locality records: Banja (XH 96), 16.07.2014, 4♀♀; Komin (XH 96), 16.07.2014, 1♀; Vid (YH 16), 16.07.2014, 1♀; Blace (YH 06), 17.07.2014, 1♀; Ploče (XH 96), 17.07.2014, 1♀; Desne (YH 06), 30.06.2015, 3♀♀, 01.07.2015, 3♀♀, 02.07.2015, 6♀♀, 03.07.2015, 4♀♀, 04.07.2015, 15♀♀

Philipomyia graeca (Fabricius, 1794). New locality records: Banja (XH 96), 16.07.2014, 1♀; Desne (YH 06), 17.07.2014, 2♀♀, 30.06.2015, 20♀♀, 01.07.2015, 7♀♀, 02.07.2015, 3♀♀, 03.07.2015, 15♀♀, 04.07.2015, 3♀♀; Ploče (XH 96), 17.07.2014, 1♀; Badžula (YH 16), 02.07.2015, 5♀♀; Vriještica (YH 07), 03.07.2015, 1♀♀, 6♂♂

List of recorded horsefly species in the area of the Cetina River during 2018 and unpublished data from S. Krčmar's collection

Chrysops caecutiens Linnaeus, 1758. New locality records: Cetina (XJ 16), 20.06.2018, 2♀♀; Koljane (XJ 16), 20.06.2018, 1♀

Chrysops viduatus (Fabricius, 1794). First record: Rumin (XJ 25), 10.06.2003, 1♀; Cetina (XJ 16), 20.06.2018, 2♀♀; Koljane (XJ 16), 20.06.2018, 1♀

Atylotus loewianus (Villeneuve, 1920). New locality records: Donje Maovice (XJ 16), 19.06.2018, 3♀♀, 20.06.2018, 2♀♀, 30.08.2018, 21♀♀, 10.09.2018, 4♀♀; Cetina (XJ 16), 20.06.2018, 2♀♀; Peruča (XJ 24), 05.07.2018, 1♀, 14.07.2018, 1♀; Ogorje (XJ 14), 28.07.2018, 3♀♀, 30.08.2018, 3♀♀, 10.09.2018, 1♀; Glavice (XJ 34), 30.07.2018, 2♀♀, 05.08.2018, 2♀♀; Gala (XJ 34), 31.08.2018, 1♀

Atylotus rusticus (Linnaeus, 1767). First record: Bitelić Gornji (XJ 25), 10.06.2003, 3♀♀; Koljane (XJ 16), 20.06.2018, 2♀♀

Therioplectes tunicatus Szilády, 1927. First record: Omiš (XJ 31), 08.06.2003, 1♀

Hybomitra bimaculata (Macquart, 1826). First record: Rumin (XJ 25), 10.06.2003, 1♀

Hybomitra ciureai (Séguy, 1937). New locality records: Donje Maovice (XJ 16), 20.06.2018, 1♀

Hybomitra muehlfeldi (Brauer *in* Brauer & Bergenstamm, 1880). New locality records: Bitelić Gornji (XJ 25), 10.06.2003, 1♀; Rumin (XJ 25), 10.06.2003, 1♀; Donje Maovice (XJ 16), 20.06.2018, 1♀

Tabanus bifarius Loew, 1858. New locality records: Bitelić Gornji (XJ 25), 10.06.2003, 6♀♀; Rumin (XJ 25), 10.06.2003, 1♀; Donje Maovice (XJ 16), 19.06.2018, 1♀, 20.06.2018, 1♀; Cetina (XJ 16), 20.06.2018, 3♀♀

Tabanus bromius Linnaeus, 1758. New locality records: Bitelić Gornji (XJ 25), 10.06.2003, 13♀♀; Rumin (XJ 25), 10.06.2003, 2♀♀; Donje Maovice (XJ 16), 19.06.2018, 4♀♀, 20.06.2018, 17♀♀, 30.08.2018, 1♀, 10.09.2018, 1♀; Cetina (XJ 16), 20.06.2018, 15♀♀; Koljane (XJ 16), 20.06.2018, 2♀♀; Trilj (XJ 33), 20.06.2018, 1♀; Peruča (XJ 24), 21.06.2018, 2♀♀, 05.07.2018, 14♀♀, 14.07.2018, 13♀♀; Tugare (XJ 31), 21.06.2018, 1♀; Gala (XJ 34), 22.06.2018, 1♀; Štikovo (XJ 06), 18.07.2018, 6♀♀; Ogorje (XJ 14), 18.07.2018, 1♀; 28.07.2018, 1♀

Tabanus cordiger Meigen, 1820. New locality records: Blato na Cetini (XJ 41), 6.07.2003, 1♀; Donje Maovice (XJ 16), 20.06.2018, 4♀♀, 30.08.2018, 1♀; Peruča (XJ 24), 21.06.2018, 1♀

Tabanus eggeri Schiner, 1868. New locality records: Donje Maovice (XJ 16), 20.06.2018, 2♀♀, 30.08.2018, 2♀♀; Gala (XJ 34), 22.06.2018, 1♀; Štikovo (XJ 06), 18.07.2018, 1♀

Tabanus exclusus Pandellé, 1883. New locality records: Blato na Cetini (XJ 41), 6.07.2003, 1♀; Donje Maovice (XJ 16), 19.06.2018, 1♀, 20.06.2018, 9♀♀, 30.08.2018, 7♀♀, 10.09.2018, 3♀♀; Cetina (XJ 16), 20.06.2018, 2♀♀; Koljane (XJ 16), 20.06.2018, 1♀; Naklice (XJ 31), 21.06.2018, 1♀; Tugare (XJ 31), 21.06.2018, 10♀♀; Peruča (XJ 24), 05.07.2018, 3♀♀, 14.07.2018, 2♀♀; Ogorje (XJ 14),

18.07.2018, 7♀♀, 28.07.2018, 5♀♀, 30.08.2018, 1♀; Štikovo (XJ 06), 18.07.2018, 3♀♀; Glavice (XJ 34), 30.07.2018, 1♀

Tabanus glaucopis Meigen, 1820. New locality records: Donje Maovice (XJ 16), 20.06.2018, 1♀, 30.08.2018, 103♀♀, 10.09.2018, 47♀♀; Ogorje (XJ 14), 28.07.2018, 2♀♀, 30.08.2018, 6♀♀, 10.09.2018 11♀♀; Tugare (XJ 31), 30.08.2018, 6♀♀; 11.09.2018, 4♀♀; Gala (XJ 34), 31.08.2018, 1♂

Tabanus lunatus Fabricus, 1794. First record: Tugare (XJ 31), 21.06.2018, 1♀

Tabanus quatuornotatus Meigen, 1820. New locality records: Bitelić Gornji (XJ 25), 10.06.2003, 4♀♀; Ogorje (XJ 14), 18.05.2018, 3♀♀; Donje Maovice (XJ 16), 20.06.2018, 1♀

Tabanus shannonellus Kröber, 1936. New locality records: Donje Maovice (XJ 16), 30.08.2018, 2♀♀

Tabanus spodopterus s. str. (*spodopterus spodopterus*)Meigen, 1820. New locality records: Vrlika (XJ 16), 20.06.2018, 8♀♀; Peruča (XJ 24), 05.07.2018, 5♀♀, 14.07.2018, 9♀♀

Tabanus tergestinus Egger, 1859. New locality records: Bitelić Gornji (XJ 25), 10.06.2003, 3♀♀; Donje Maovice (XJ 16), 19.06.2018, 11♀♀, 20.06.2018, 65♀♀; Ogorje (XJ 14), 19.06.2018, 1♂, 18.07.2018, 4♀♀, 28.07.2018, 1♀; Cetina (XJ 16), 20.06.2018, 5♀♀; Glavice (XJ 34), 20.06.2018, 1♂; Vrlika (XJ 16), 20.06.2018, 4♀♀; Naklice (XJ 31), 21.06.2018, 1♀; Peruča (XJ 24), 21.06.2018, 12♀♀, 3♂♂, 05.07.2018, 2♀♀, 14.07.2018, 2♀♀; Tugare (XJ 31), 21.06.2018, 1♀; Gala (XJ 34), 22.06.2018, 2♀♀; Štikovo (XJ 06), 18.07.2018, 36♀♀

Haematopota grandis Meigen, 1820. New locality records: Donje Maovice (XJ 16), 30.08.2018, 27♀♀, 10.09.2018, 5♀♀; Ogorje (XJ 14), 30.08.2018, 2♀♀; Tugare (XJ 31), 11.09.2018, 1♀

Haematopota pandazisi Kröber, 1936. New locality records: Donje Maovice (XJ 16), 30.08.2018, 12♀♀, 10.09.2018, 6♀♀

Philipomyia aprica (Meigen, 1820). First record: Peruča (XJ 24), 05.07.2018, 1♀

Philipomyia graeca (Fabricius, 1794). New locality records: Blato na Cetini (XJ 41), 8.06.2003, 3♀♀; Bitelić Gornji (XJ 25), 10.06.2003, 1♀; Donje Maovice (XJ 16), 19.06.2018, 6♀♀, 20.VI.2018, 21♀♀

Discussion

Published data for the studied areas were very scarce until the nineties of the last century. Only *Chrysops viduatus* has been recorded in the Neretva River valley by foreign entomologists. All other recorded species for this area were collected during studies performed at the end of 20th and the beginning of this century (Krčmar & Leclercq 1997; Krčmar 1999; Krčmar & Merdić 2007). In the same period in the area of Cetina River, 29 species of horseflies were recorded, which were the first data on Tabanidae family for this area (Krčmar 1999). During the study of 2018 and reviewing of horseflies in S. Krčmar collection, species *Chrysops viduatus*, *Atylotus rusticus*, *Therioplectes tunicatus*, *Hybomitra bimaculata*, *Tabanus lunatus* and *Philipomyia aprica* were recorded for the first time for the area of Cetina river. From six most

abundant species of horseflies in the Neretva River valley three belong to Boreal-Eurasian biogeographical group. This is in line with many freshwater lakes (Baćina, Desne, Kuti, Modro Oko), springs, channels and lagoons, which are suitable places for development of their larval stages. Small number of horsefly species in adult stage fly off far away from the place of their larval development (Chvála & Ježek 1997; Andreeva *et al.* 2009). From the eight most abundant species of horseflies along Cetina River six belong to Mediterranean group of species, while two belong to Boreal-Eurasian biogeographical group. Altogether 46 species of horseflies were recorded in study areas (Neretva River valley and Cetina River) from 78 species recorded so far in Croatian fauna, which amounts to 58.97% of the horsefly fauna of Croatia. The majority of species (29) recorded in both study areas belong to the Mediterranean group of species. In a similar study Krčmar *et al.* (2006) listed, on the basis of literature data, 6 species of horseflies from the Mediterranean group and 5 from South European group on Hungarian banks of the river Drava. This is in line with the fact that some Mediterranean species reach the borders of Central Europe (Chvála *et al.* 1972). In this study, from halophilous species of horseflies listed in Croatian fauna, only *Hybomitra acuminata* was recorded in the area of the Neretva River valley. In previous studies halophilous species of horseflies were recorded in localities at the mouths of Neretva and Cetina Rivers flowing into the Adriatic Sea. In some localities salinity range was between 1.300 mg/l (Cl^-) and 1.400 mg/l (Cl^-), (Glamuzina *et al.* 2002). However, salinity tolerance among different species of horseflies varies and some species inhabit habitats with salinities over 5.500 mg/l (Cl^-) (Van de Meutter 2016).

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Table 1. Systematical list of the horsefly (Tabanidae) fauna in the study areas

Genus	Species	Neretva River valley	Cetina River	Biogeographical group
Chrysops Meigen, 1803	*Chrysops caecutiens* Linnaeus, 1758	+	+	BE
	Chrysops flavipes Meigen, 1804	+	-	M
	Chrysops italicus Meigen, 1804	+	-	M
	Chrysops viduatus (Fabricius, 1794)	+	+	BE
Atylotus Osten – Sacken, 1876	*Atylotus loewianus* (Villeneuve, 1920)	+	+	M
	Atylotus rusticus (Linnaeus, 1767)	-	+	BE
Therioplectes Zeller, 1842	*Therioplectes gigas* (Herbst, 1787)	+	-	M
	Therioplectes tunicatus Szilády, 1927	+	+	M
Hybomitra Enderlein, 1922	*Hybomitra acuminata* (Loew, 1858)	+	+	AE
	Hybomitra bimaculata (Macquart, 1826)	-	+	BE
	Hybomitra ciureai (Séguy, 1937)	+	+	BE
	Hybomitra expollicata (Pandellé, 1883)	+	+	AE
	Hybomitra muehlfeldi (Brauer *in* Brauer & Bergenstamm, 1880)	+	+	BE
	Hybomitra pilosa (Loew, 1858)	+	+	E
	Hybomitra ukrainica (Olsufjev, 1952)	+	-	AE

Tabanus Linnaeus, 1758	*Tabanus autumnalis* Linnaeus, 1761	+	+	BE
	Tabanus bifarius Loew, 1858	+	+	M
	Tabanus bromius Linnaeus, 1758	+	+	BE
	Tabanus cordiger Meigen, 1820	+	+	BE
	Tabanus darimonti Leclercq, 1964	+	-	M
	Tabanus eggeri Schiner, 1868	+	+	M
	Tabanus exclusus Pandellé, 1883	+	+	M
	Tabanus glaucopis Meigen, 1820	-	+	BE
	Tabanus indrae Hauser, 1939	-	+	M
	Tabanus lunatus Fabricius, 1794	-	+	M
	Tabanus miki Brauer *in* Brauer &Bergenstamm, 1880	+	-	BE
	Tabanus obsolescens Pandellé, 1883	+	+	M
	Tabanus paradoxus Jaennicke, 1866	-	+	M
	Tabanus quatuornotatus Meigen, 1820	+	+	M
	Tabanus regularis Jaennicke, 1866	+	+	M
	Tabanus shannonellus Kröber, 1936	+	+	M
	Tabanus spectabilis Loew, 1858	+	-	M
	Tabanus spodopterus s.str. (*spodopterus spodopterus*) Meigen, 1820	+	+	M
	Tabanus sudeticus Zeller, 1842	+	-	BE
	Tabanus tergestinus Egger, 1859	+	+	M
	Tabanus tinctus Walker, 1850	-	+	M
Haematopota Meigen, 1803	*Haematopota bigoti* Gobert, 1881	+	-	M
	Haematopota grandis Meigen, 1820	+	+	M
	Haematopota italica Meigen, 1804	+	+	BE
	Haematopota pandazisi Kröber, 1936	+	+	M
	Haematopota pluvialis (Linnaeus, 1758)	+	-	BE
Dasyrhamphis Enderlein, 1922	*Dasyrhamphis anthracinus* (Meigen, 1820)	+	-	M
	Dasyrhamphis ater (Rossi, 1790)	+	+	M

	Dasyrhamphis umbrinus (Meigen, 1820)	-	+	M
Philipomyia Olsufjev, 1964	*Philipomyia aprica* (Meigen, 1820)	-	+	M
	Philipomyia graeca (Fabricius, 1794)	+	+	M
Σ 8	46	37	35	4

Biogeographical groups are abbreviated as follows: Afro-Eurasian arid (AE); Boreal-Eurasian (BE); European (E); Mediterranean (M)

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CONTRIBUTION TO THE KNOWLEDGE OF THE BUTTERFLY FAUNA (LEPIDOPTERA: PAPILIONOIDEA) OF GRAN CANARIA (CANARY ISLANDS, SPAIN)

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Abstract – Gran Canaria is a good example of an island where we can observe endemic species of butterflies as well as the colonisation of new ones. In this article previously unknown localities of some butterfly species observed in December 2019 are being reported. This includes new locations of newly arrived species (*Cacyreus marshalli* and *Leptotes pirithous*), as well as new locations of some native ones (*Vanessa cardui*, *Lycaena phlaeas* and *Pieris rapae*). Most importantly, new location of a rare butterfly *Azanus ubaldus* is also reported, being observed in the NW part of the island for the first time. According to my finds and previous observations newly introduced species are consolidating themselves fast across the entire island.

Key words: Lepidoptera, Gran Canaria, *Azanus ubaldus*, *Leptotes pirithous*, *Cacyreus marshalli*, new localities, introduced species

Izvleček – PRISPEVEK K POZNAVANJU FAVNE METULJEV (LEPIDOPTERA: PAPILIONOIDEA) OTOKA GRAN CANARIA (KANARSKI OTOKI, ŠPANIJA)

Gran Canaria je lep primer otoka na katerem lahko opazujemo endemne vrste metuljev, kot tudi razširjanje vrst, ki so otok poselile pred kratkim. V tem članku so podana prej neznana nahajališča nekaterih vrst metuljev z lokacij, ki so bile obiskane v decembru 2019. To vključuje nova nahajališča za nekaj na novo prispelih vrst (*Cacyreus marshalli* in *Leptotes pirithous*), kot tudi nova nahajališča za nekaj avtohtonih vrst (*Vanessa cardui*, *Lycaena phlaeas* in *Pieris rapae*). Predvsem pa je bila odkrita tudi nova lokacija redkega metulja vrste *Azanus ubaldus*, ki je bila prvič opažena na SZ delu otoka. Kot kažejo naše najdbe in prejšnja opazovanja, se novo naseljene vrste hitro razširjajo po otoku in utrjujejo svojo prisotnost.

Ključne besede: Lepidoptera, Gran Canaria, *Azanus ubaldus*, *Leptotes pirithous*, *Cacyreus marshalli*, nova nahajališča, tujerodne vrste

Introduction

Islands are often very interesting places for observing unique flora and fauna because of their isolation, which results in high percentage of endemism. Besides that, they are also very important for observation of colonisation of organisms by natural or anthropogenic pathways. The colonisation by new inhabitants can happen gradually over hundreds of years in the case of plants and slow moving organisms, or can be very fast and sudden in the case of more mobile ones. This is also the case of butterflies, which can spread rapidly over the new environments when the conditions are right (Juan et al. 2000; Emerson 2003).

A perfect example of that is the island of Gran Canaria, especially because of the favourable climate conditions, which persist all year round. Here we can observe the colonisation of some parts of the islands by butterfly species, which were absent prior to the 20th century. Some of those have been reported only in the last two decades, while others expanded rapidly over the last few. Some of the examples are the Monarch (*Danaus plexippus*), the Desert babul blue (*Azanus ubaldus*), the Common zebra blue (*Leptotes pirithous*) and the Geranium bronze (*Cacyreus marshalli*) (Olivier and Van der Poorten 1992; Wiemers 1995; Wiemers et al. 2013; Naranjo Morales et al. 2018).

In this article new locations of butterfly species, including some of the previously mentioned, are reported. It is known that most of the species found on the island can be seen all year round because of the warm climate, therefore it is worth mentioning, that the observations were made in mid-December. This is especially important since most of the prior studies focused on spring (because of the more favourable humid conditions) or summer months (Wiemers 1995; Wiemers et al. 2013; Naranjo Morales et al. 2018).

Geographical characteristics of the region

Gran Canaria is a roughly 16 million years old volcanic island, located approximately 200 km west of African continent in the Atlantic Ocean. With its 1530 km^2 it is the third largest island in the archipelago of Canary Islands. Its highest point reaches 1949 m with Pico de las Nieves (third highest in the archipelago), which combined with its landscape diversity and fragmentation gives rise to all kind of different environments (Wiemers 1995; Schmincke & Sumita 1998). This is consequently reflected in its high number of butterfly species (26), surpassing or equalling (La Palma and La Gomera (26)) all of the other islands in its group, except Tenerife (27) (Naranjo Morales et al. 2018; Naranjo Morales & Suárez Ramos 2019).

As mentioned before, Gran Canaria has a mild subtropical climate with warm temperatures that show little seasonal variation (monthly means are between 18 °C in January and 24°C in August) (Wiemers 1995). Its climate is strongly influenced by the humid trade winds from the northeast, which in combination with the altitude of the volcanoes and the drier northwest winds blowing at higher levels, produce an inversion zone and marked vegetation zones with clouds banks at around 1000 m on

the northeast slopes. Thus the northeast side of the island is relatively humid while the south and northwest sides are relatively dry. As a result, different vegetation zones are distinguished: Arid subtropical scrub (up to 250 m), semiarid to humid subtropical scrub and woods (from 250-600 m on the northeast side and from 250-1000 m on the south and northwest side), humid laurel forest in the cloud belt on the northeast side (600-1000 m) and humid to dry temperate pine forest (from 1000-2000 m) which is substituted with scrub where the conditions are not favourable (Juan et al. 2000; Emerson 2003). Besides the habitats in the four main vegetation zones, very important butterfly habitats on the island are also those of the anthropogenic origin. Especially important in this regard are different parks and gardens in the villages and cities, as well as fields and plantations with the exotic flora, which can be found throughout the island and are the primary habitats of the recently introduced butterfly species (Naranjo Morales et al. 2018).

The localities in this article cover almost all of the different environments found on the island – sand dunes, arid, semiarid and humid scrub, semiarid and humid pine forests, laurel forest, lakes and especially anthropogenic environments such as gardens, fields and city parks. In this respect the chances to observe all butterfly species that are flying in December on Gran Canaria were enhanced.

Results

List and description of localities

Exact locality and details regarding coordinates (WGS 84 Web Mercator projection; EPSG:3857), altitude, habitat and date of each observation are given. In the case of broader locality, coordinates are given for the most appropriate observation spot. The localities are given in the order of the observation dates.

1. Calle de la Calzada (Barranco de Guiniguada); coordinates: X: 28.065077, Y: -15.463480; 260-315 m; mostly anthropogenic: humid scrub with deciduous trees, parks, gardens; 9.12.2019
2. Puerto de las Nieves; coordinates: X: 28.101054, Y: -15.708923; 5-55 m; mostly anthropogenic: arid scrub, parks, gardens; 10.12.2019
3. El Risco (Parque Natural Tamadaba); coordinates: X: 28.046660; Y: -15.727383; 75-140 m; mixed anthropogenic and natural: arid scrub, gardens (some with acacia trees); 10.12.2019
4. La Aldea de San Nicolas de Tolentino; coordinates: X: 27.974804, Y: -15.778552; 70-100 m; mostly anthropogenic: arid scrub, gardens, banana plantations; 10.12.2019
5. Barranco de La Aldea de San Nicolas (Mirador del Molino); coordinates: X: 27.992790, Y: -15.693976; 70-700 m; mostly natural: arid to semiarid scrub, very few gardens; 10.12.2019
6. Cruz de Tejeda; coordinates: X: 28.005481, Y: -15.599639; 1520 m; mostly natural: humid pine forest with grasslands, very few gardens; 11.12.2019

7. Tejeda; coordinates: X: 27.994413, Y: -15.614928; 1030-1075 m; mostly anthropogenic: semiarid scrub with deciduous trees, gardens, parks; 11.12.2019
8. Roque Nublo; coordinates: X: 27.967494, Y: -15.604835; 1600-1640 m; natural: semiarid pine forest; 11.12.2019
9. Pico de las Nieves-Roque Redondo; coordinates: X: 27.957621, Y: -15.557664; 1870-1940 m; natural: semiarid pine forest; 11.12.2019
10. Las Palmas; coordinates: X: 28.150416, Y: -15.427583; 10-50 m; anthropogenic: gardens, parks; 12.12.2019
11. Agüimes; coordinates: X: 27.904122, Y: -15.447502; 265-285 m; anthropogenic: gardens, parks; 13.12.2019
12. Barranco de las Vacas; coordinates: X: 27.913614, Y: -15.474998; 500-555 m; natural: arid-semiarid scrub; 13.12.2019
13. Maspalomas; coordinates: X: 27.744037, Y: -15.599220; 5-35 m; mixed anthropogenic and natural: sand dunes with arid scrub and trees, gardens, parks; 14.12.2019
14. Moya; coordinates: X: 28.108636, Y: -15.582788; 480-490 m; mixed anthropogenic and natural: humid laurel forest with meadows, gardens, parks; 15.12.2019
15. Los Tiles/San Fernando; coordinates: X: 28.094066, Y: -15.583005; 640-700 m; mixed anthropogenic and natural: humid laurel forest with meadows, gardens; 15.12.2019
16. Reserva Natural Especial de los Tilos; coordinates: X: 28.083056, Y: -15.591848; 740-770 m; natural: humid laurel forest; 15.12.2019
17. Fontanales; coordinates: X: 28.057341, Y: -15.610145; 1020 m; mostly anthropogenic: humid pine forest, vegetable gardens, gardens, fields; 15.12.2019
18. Bandama (Caldera de Bandama); coordinates: X: 28.037437, Y: -15.457761; 575-445 m; mixed anthropogenic and natural: semiarid-humid scrub with trees, flower gardens; 15.12.2019
19. Las Crucitas (Barranco de Arguineguin); coordinates: X: 27.776810, Y: -15.666651; 35 m; mixed anthropogenic and natural: dry river bed with acacia trees and scrub; 16.12.2019
20. Barranco de Arguineguin (La Sao, Los Peñones, El Horno, Cercados de Espinos, Las Filipinas, Barranquillo Andrés, Soria); coordinates: X: 27.906031, Y: -15.669504; 140-660 m; mixed anthropogenic and natural: arid scrub, gardens, parks; 16.12.2019
21. Mogan; coordinates: X: 27.883955, Y: -15.723216; 253-260 m; mostly anthropogenic: semiarid scrub, gardens, parks; 17.12.2019
22. Pie de la Cuesta; coordinates: X: 27.900977, Y: -15.710002; 330-365 m; mixed anthropogenic and natural: arid scrub, gardens; 17.12.2019
23. Playa de Tasarte (Barranco de Tasarte); coordinates: X: 27.879702, Y: -15.794059; 70 m; anthropogenic: watermelon field; 17.12.2019
24. Presa del Mulato (lake above Soria); coordinates: X: 27.917387, Y: -15.693824; 760-845 m; natural: arid-semiarid pine forest; 17.12.2019
25. Sardina; coordinates: X: 27.847242, Y: -15.468448; 155-175 m; anthropogenic: gardens, parks; 18.12.2019

26. Arguineguin; coordinates: X: 27.760226, Y: -15.682618; 10-15 m; anthropogenic: gardens, parks; 18.12.2019
27. Santa Lucía de Tirajana; coordinates: X: 27.912729, Y: -15.541533; 695-700 m; anthropogenic: gardens, parks; 19.12.2019
28. Era del Cardón (Barranco de Balos); coordinates: X: 27.869984, Y: -15.492199; 325 m; mostly anthropogenic: arid scrub, gardens; 19.12.2019

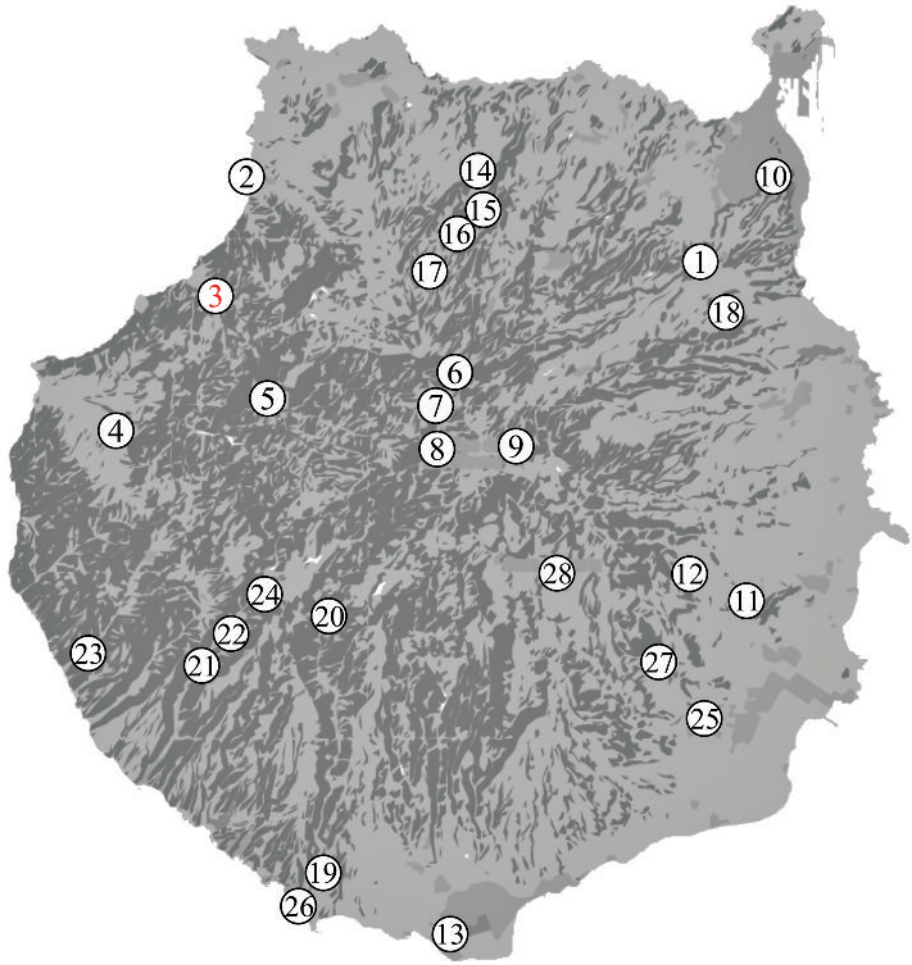

Figure 1: Map of localities of the December 2019 butterfly observations across the island of Gran Canaria. The new locality of *Azanus ubaldus* is marked with the red colour. Figure created with the Snazzy Maps (Snazzy Maps 2019).

Slika 1: Zemljevid nahajališč metuljev opazovanih decembra 2019 na otoku Gran Canaria. Nova lokaliteta metulja *Azanus ubaldus* je označena z rdečo barvo. Slika je izdelana s pomočjo programa Snazzy Maps (Snazzy Maps 2019).

List of species

The nomenclature and taxonomy are in accordance with Wiemers et al. (2018).

Table 1: Distribution of butterflies on Gran Canaria. The localities are indicated by numbers from 1 to 28 as in the list and description of localities.
Tabela 1: Razširjenost dnevnih metuljev na otoku Gran Canaria. Lokalitete so označene s številkami od 1 do 28, enako kot v seznamu nahajališč in njihovih opisov.

Family/*species*	Locality	Number of locations
Pieridae		
1. *Pieris rapae*	1, 3, 4, 7, 10, 11, 12, 14, 15, 16, 17, 18, 20, 23, 25, 26, 27, 28	18
Lycaenidae		
2. *Azanus ubaldus*	3, 19	2
3. *Cacyreus marshalli*	4, 21, 26, 27	4
4. *Leptotes pirithous*	23	1
5. *Lycaena phlaeas*	3, 17, 24	3
6. *Zizeria knysna*	1, 3, 10, 13, 23, 27	6
Nymphalidae		
7. *Danaus plexippus*	1, 10, 13, 21, 25, 27	6
8. *Vanessa atalanta*	10, 16	2
9. *Vanessa cardui*	1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28	26
10. *Vanessa vulcania*	1, 18	2

Discussion

In December 2019 visit to Gran Canaria the primary focus was on discovering most of the endemic species on the island and confirming their localities, or more im-

portantly, discovering some new ones. Unfortunately only 10 species out of 26 were observed at 28 visited locations scattered all over the island, with only one being endemic (*V. vulcania*). Despite the fact, that some species are very rare migrants on Gran Canaria (*Danaus chrysippus*, *Catopsilia florella*, etc.) or could not be observed during certain months (including December) because of their life cycles (*Thymelicus christi*, *Hipparchia tamadabae*, etc.) (Wiemers 1995), the number of the observed species is unexpectedly low. One of the possible reasons could be the massive fires that engulfed a large part of the island in August 2019 or more importantly the severe drought that caused them (Copernicus 2019).

After visiting roughly half of the localities, my primary focus shifted from endemic species to the recently introduced ones, since some of them were not even expected to be found in December (*A. ubaldus*), let alone be discovered on new locations. Despite some other species also being found on the previously unknown localities (*V. cardui*, *L. phlaeas*, *P. rapae*), the most intriguing finds were the species that were only recently discovered on the island (*C. marshalli*, *L. pirithous*) or were thought to be very rare and known only from few locations (*A. ubaldus*) (Wiemers 1995; Naranjo Morales et al. 2018). The rest of the discussion will therefore focus mainly on the species of blues (Lycaenidae) that recently invaded Gran Canaria.

Cacyreus marshalli (Butler, 1898)

C. marshalli is a small butterfly mostly found in southern Africa, but has recently colonized its northern part, as well as southern parts of Europe, most Mediterranean and some Atlantic islands (Wiemers et al. 2013). On the island of Gran Canaria it was first observed in July 2005 in the city of Teror (Acosta-Fernández 2005), but has since spread to most of the humid northern parts of the island, mostly to towns and villages, where *Geranium* and especially *Pelargonium* (its larval food plants) abound. Despite being widespread in the humid northern part, the butterfly was thought to be absent from the more arid western and southern part of the island, the only recently discovered locality being Maspalomas (Wiemers et al. 2013; Naranjo Morales et al. 2018). However, the species was recently found in the south also in villages and towns such as Mogan and Santa Lucía de Tirajana according to observations reported on Observation.org (2019).

Surprisingly, the only localities, in which the butterfly was observed during this December visit, also lie in the arid southern and western parts of the island. The species was found on four locations, namely Mogan, Santa Lucía de Tirajana, Arguineguin and La Aldea de San Nicolas de Tolentino. Those observations suggests that the butterfly successfully colonized the remaining - more arid - parts of the island and is now distributed throughout the island, at least in the villages and towns where its larval food plants are available. So far the butterfly was restricted only to the anthropogenic environments and *Pelargonium* plants, but the fear remains that it could also spread to the places with wild *Geranium* species, competing with the

native *Aricia cramera* butterfly. The findings in December also confirm the thesis that the butterfly is on the wing all year round (Wiemers 2013).

Leptotes pirithous (Linnaeus, 1767)

Another recent inhabitant of Gran Canaria is *L. pirithous*, a widespread Pan-African species found throughout the Mediterranean basin. In the Canary Islands it was first recorded on Fuerteventura in 1994 (Kistner & Beck 2000) and it later colonised most of the archipelago. On Gran Canaria it was first observed in Maspalomas in 2011, but has since spread across the island. It mostly inhabits the anthropogenic environments and could thus be found in gardens, parks and fields throughout villages and towns (Wiemers et al. 2013; Naranjo Morales et al 2018).

It flies in continuous broods throughout the year and so far it was reported from northern, eastern and southern part of the island, mostly near the coast (Naranjo Morales et al. 2018). Recently it was also seen further inland in Mogan (Observation.org 2019), which is also the westernmost location reported until now. In this article the first sighting from the west coast, as well as the westernmost location so far, is reported, since the butterfly was observed and photographed in the watermelon field in Playa de Tasarte. It seems that the species is spreading really fast and has already colonized the entire island, which means that the sightings like this in December will not be rare any more.

Azanus ubaldus (Stoll, 1782)

A. ubaldus is a very small butterfly, common in arid environments from northern Africa to India, and is also found in some parts of the Mediterranean region (Gascoigne-Pees 2016). It is one of the rarest butterflies on Gran Canaria, until 2018 known only from three localities – Maspalomas, El Berriel and Barranco de Arguineguin (Naranjo Morales et al. 2018). It was first discovered in 1982 in Maspalomas (Playa de Inglés), but that was not recognised until 1992, when it was correctly identified (Olivier & Van der Poorten 1992). The species was not seen again until 2007, when it was rediscovered on the same locality (Schurian 2008). In 2016 the second locality was discovered (El Berriel), and in 2018 last of its three localities was found (Barranco de Arguineguin). All three known localities lie on the southern part of the island relatively close together, and even though it was speculated that the butterfly will colonize other arid parts of the island, where its food plants are found (especially *Acacia farnesiana* and *Prosopis juliflora*), it was not observed anywhere else (Gascoigne-Pees 2016; Naranjo Morales et al. 2018).

Surprisingly, this December the butterfly was not only observed again in Las Crucitas (Barranco de Arguineguin), thus confirming previous findings, it was also found in a village of El Risco, which lies in the north-western part of the island in

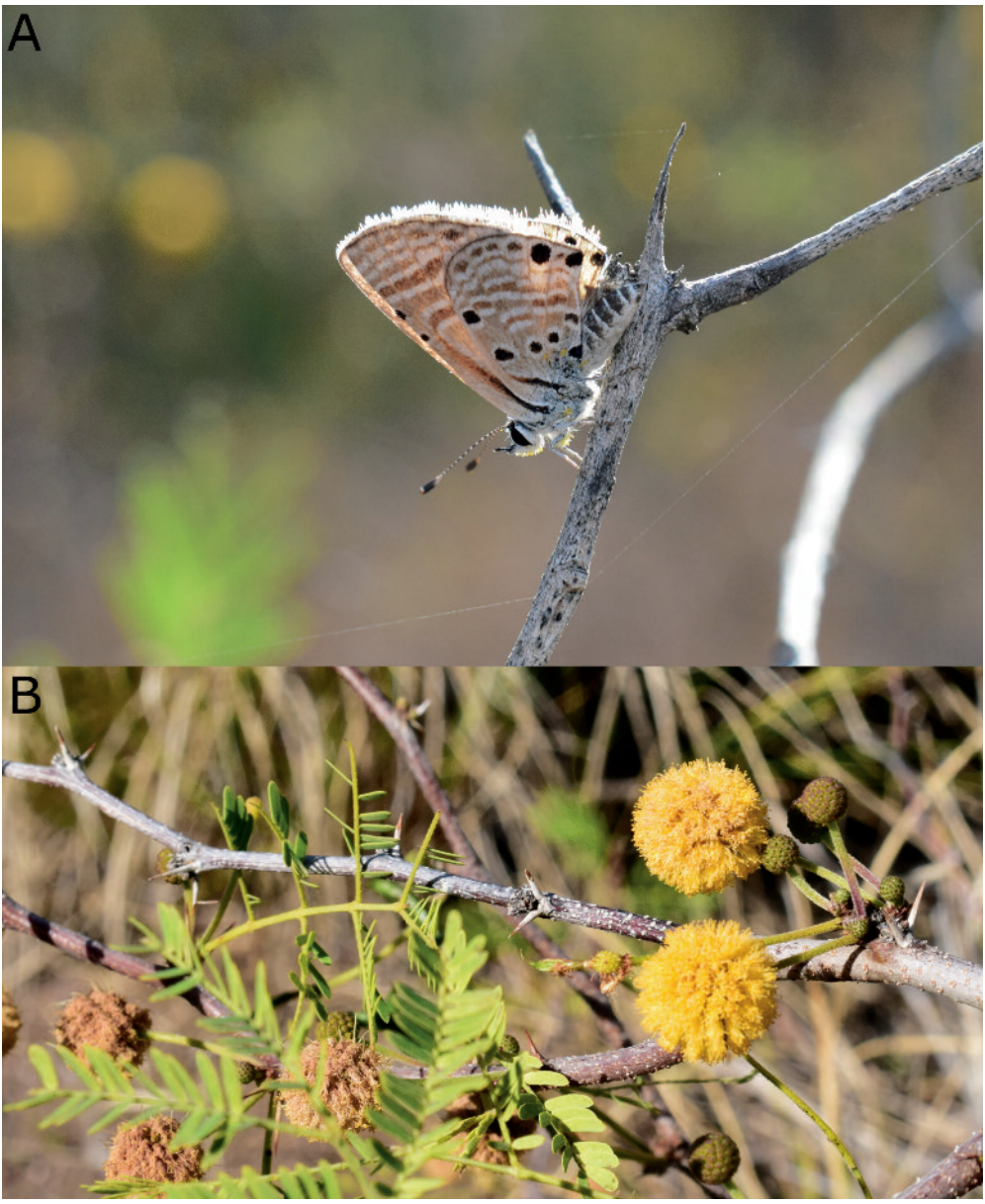

Figure 2: A) *Azanus ubaldus* (Las Crucitas; Barranco de Arguineguin); 16.12.2019. B) *Acacia farnesiana* found on the locality of El Risco, where *A. ubaldus* was observed; 10.12.2019

Slika 2: A) *Azanus ubaldus* (Las Crucitas; Barranco de Arguineguin); 16.12.2019. B) *Acacia farnesiana* najdena na lokaciji El Risco, kjer je bil opažen *A. ubaldus*; 10.12.2019

Tamadaba Natural Park, almost on the opposite side of Gran Canaria. At the locality, a single imago was observed flying near a concrete fence, settling briefly on the leaf of a nearby palm, just enough for photographing and identification. At first, the finding came as a total surprise, but later quite a few of its food plants (*A. farnesiana*) were observed in the vicinity. The *A. farnesiana* trees were discovered also at the nearby parking lot, suggesting, that a larger area could be considered as a suitable habitat for the species. It looks like that the butterfly somehow bridged the mountainous gap in between and colonized the new locality. The finding also suggests that there are likely additional colonies present elsewhere on the island since the whole western edge of the island is arid and thus appropriate for its host plants.

As reported by previous authors, the species seems to be active all year round also on the island, and is possibly spreading due to its host plants gaining ground as well (Gascoigne-Pees 2016; Naranjo Morales et al. 2018). It can be thus expected that new localities of this species will be discovered soon on Gran Canaria.

Conclusions

In December 2019 visit of Gran Canaria ten butterfly species were found out of 26 recorded so far (Naranjo Morales et al. 2018; Naranjo Morales & Suárez Ramos 2019), at 28 localities. From the gathered data it can be concluded, that the invading species are becoming more widespread across the island. The most important discovery is a new locality for *A. ubaldus*, a rare inhabitant of the island, which was so far not observed flying in December. The new locality is especially significant, since it was found far away from the previous localities on the opposite side of the island. This also indicates, that new colonies of the butterfly are likely to be found somewhere in between these localities. Those findings confirm that some of the recently introduced species are consolidating on the island and are becoming its permanent residents, mostly due to human influence.

Acknowledgments

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ZANIMIVE NAJDBE VRSTE *LILIOCERIS TIBIALIS* VILLA & VILLA, 1838 V SLOVENIJI (COLEOPTERA: CHRYSOMELIDAE: CRIOCERINAE)

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Izvleček – Vrsta *Lilioceris tibialis* je bila najdena v Sloveniji. Najdišči se nahajata nad Črnim jezerom in na južnem pobočju gore Tosc, obe v Julijskih Alpah.

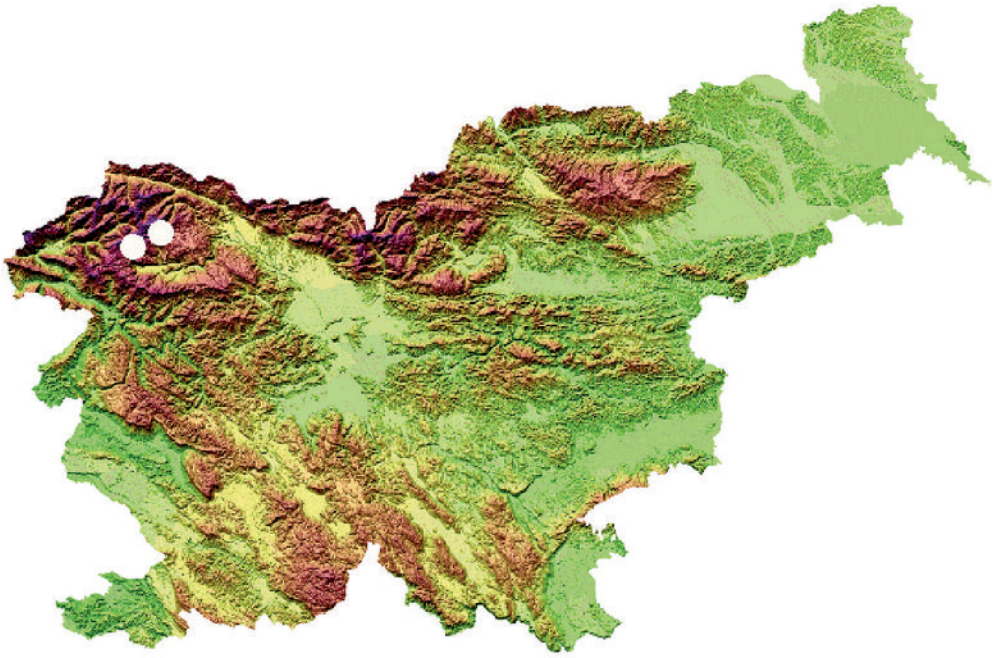
KLJUČNE BESEDE: Coleoptera, Chrysomelidae, Criocerinae, *Lilioceris*, favna, Slovenija

Abstract – INTERESTING FINDINGS OF THE SPECIES *LILIOCERIS TIBIALIS* IN SLOVENIA (COLEOPTERA: CHRYSOMELIDAE: CRIOCERINAE)

Lilioceris tibialis was found in two locations in Slovenia. First finding place lies near the lake Črno jezero and the second on the south slopes of the Mountain Tosc, both in the Julian Alps.

KEY WORDS: Coleoptera, Chrysomelidae, Criocerinae, *Lilioceris*, fauna, Slovenia

Dne 10. 7. 2017 je bilo v Julijskih Alpah na 2275 m visokem Toscu (slika 1) ulovljenih pet primerkov lepencev iz rodu *Lilioceris.* Najdišče se nahaja na južnem, travnatem pobočju gore, na nadmorski višini 1900 m. Podrobna raziskava morfoloških značilnosti in genitalij je dala zanimive rezultate. Ujeti primerki so pripadali dvema vrstama: *Lilioceris tibialis* in *Lilioceris schneideri.* Dve leti kasneje (natančneje 4. 9. 2019) je avtor na istem najdišču, tokrat na nadmorski višini 1850 m, našel na eni sami rastlini še 8 novih osebkov. Vsi so pripadali vrsti *Lilioceris tibialis.* Glede na razpoložljive podatke v literaturi naj bi bilo to prvo znano najdišče vrste v Sloveniji. Ob dodatnem pregledu Osrednje zbirke hroščev Slovenije v Prirodoslovnem muzeju Slovenije pa so bili najdeni še trije primerki z najdišča Črno jezero v Julijskih Alpah.



Sl. 1: Najdišči vrste *Lilioceris tibialis* v Sloveniji

Preiskani material:

Slovenija, Julijske Alpe, nad Črnim jezerom, > 1400 m: 12. 6. 1997, 3 ex, leg. D. Tome, det. in coll. S. Brelih (Osrednja zbirka hroščev Slovenije, Prirodoslovni muzej Slovenije, Ljubljana)

Slovenija, Julijske Alpe, Tosc, 1900 m: 10. 7. 2017, 1♀, leg., det., coll. B. Kofler (Zbirka CBKS, Škofja Loka)

Slovenija, Julijske Alpe, Tosc, 1850 m: 4. 9. 2019, 5 ♂, 3 ♀, leg., det., coll. B. Kofler (Zbirka CBKS, Škofja Loka)

Lilioceris tibialis (slika 2) je redka visokogorska vrsta in je endemit Alp. Bila je ujeta v Avstriji, Nemčiji, Švici, Franciji (Bezdek & Mlejnek, 2016) in v Italiji (Fauna Europaea, 2019). Za Slovenijo do sedaj o najdbah ni bilo objavljenih podatkov (Fauna Europaea, 2019).

Vrsta ima eno generacijo na leto. Odrasli osebki po zaključenem prezimovanju že zgodaj spomladi odlagajo jajca na spodnjo stran listov hranilnih rastlin. Izlegle ličinke se hranijo na različnih vrstah divjih lilij, zlasti na *Lilium martagon.* Odraščajoče ličinke so zaščitene z debelim fekalnim ovojem. Ko odrastejo, se zabubijo v zemlji. Novi imagi se pojavijo pozno poleti in se takoj pričnejo hraniti. Po nekaj tednih odidejo na prezimovanje (Bezdek & Mlejnek, 2016).

Sl. 2: *Lilioceris tibialis,* naravna velikost: 7,7 mm (foto: Miroslava Kofler)

Ulov nad Črnim jezerom in ulova na Toscu potrjujejo stalno prisotnost vrste na slovenskem ozemlju. V prihodnosti torej lahko pričakujemo nove najdbe z novih lokacij v Julijskih Alpah.

Zahvala

Avtor se zahvaljuje dr. Tomiju Trilarju, ki mu je omogočil preiskavo primerkov iz Osrednje zbirke hroščev Prirodoslovnega muzeja Slovenije.

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Prejeto / Received: 20. 1. 2020

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THE FIRST RECORD OF *PANORPA RUFOSTIGMA* WESTWOOD, 1846 FROM NORTH MACEDONIA (MECOPTERA: PANORPIDAE)

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Abstract – The scorpionfly species *Panorpa rufostigma* Westwood, 1846 has been recorded for the first time in North Macedonia. This finding shifts the range border of the species by ca. 145 km northwards. A photograph detailing the male genitalia of *P. rufostigma* is presented for the first time.

KEY WORDS: faunistics, *Panorpa rufostigma*, scorpion fly, North Macedonia.

Izvleček – PRVA NAJDBA ŠKORPIJONKE *PANORPA RUFOSTIGMA* WESTWOOD, 1846 V SEVERNI MAKEDONIJI (MECOPTERA: PANORPIDAE)

Prvič je za Severno Makedonijo zabeleženo pojavljanje vrste škorpijonke *Panorpa rufostigma* Westwood, 1846. Z najdbo se je severna meja njenega poznanega areala premaknila za pribl. 145 km severneje. Na fotografiji so prvič predstavljene genitalije samčka vrste *P. rufostigma*.

KLJUČNE BESEDE: favna, *Panorpa rufostigma*, škorpijonka, Severna Makedonija.

Panorpa rufostigma is a relatively rare scorpion fly species strictly restricted to the southernmost parts of the Balkan Peninsula. Published records with exact localities are known from southern Albania (Bartoš, 1965) and several records from southern Greece: Attiki, Pindos Mts, Kerkira (Korfu) island, Peloponnisos, and Evvia (Euboa) island (Lauterbach, 1972; Willmann, 1977; Pollmann et al., 2008; Dvořák, 2018).

Fig. 1. Right fore wing of *Panorpa rufostigma* with unmistakenable red pterostigma. Photo: D. Devetak.

Panorpa rufostigma Westwood, 1846 (Figs 1–2)

North Macedonia: Vardar Region, Demir Kapija, east of Besvica village, gorge of Besvički dol river, 255 m a. s. l., 41°22'58"N, 22°11'45"E, 28. 10. 2018, light traps, 1♂, leg. A. Nahirnić & S. Beshkov, det. D. Devetak, revid. et coll. L. Dvořák.

Details of the habitat: pseudomaquis with *Fraxinus ornus* L., *Juniperus excelsa* M. Bieb., *Juniperus oxycedrus* L., *Paliuris spina-christi* Mill., *Pistacia terebinthus* L., *Phillyrea latifolia* L., *Quercus pubescens* Willd. (Fig. 3).

Details of the trap design: Collecting methodology involved 2-3 portable light traps with an 8 Watt actinic (368 nm) and 8 Watt "Blacklight" luminescent tubes, both powered by 12 Volt batteries, as well as a Finnish "tent trap" with a 160 Watt MV bulb at the top of the pole and a 20 Watt (368 nm) black light lamp over the catching pot below. An additional 20 Watt (368 nm) lamp was also positioned about 70 m from the tent trap. All traps ran throughout the night.

This record from North Macedonia represents the northernmost known locality of *P. rufostigma* (Fig. 4). This finding shifts the range border of the species by ca. 145 km northwards. As recently published data on *Panorpa* spp. records from the southern Balkans show (Dvořák, 2014, 2016a, 2016b; Dvořák & Georgiev, 2017), more interesting records should be expected.

Fig. 2. Male genitalia of *Panorpa rufostigma*. Photo: D. Devetak.

Acknowledgements

We are grateful to Stoyan Beshkov (Sofia, Bulgaria) for assistance in the field. This contribution was partly supported by the Slovenian Research Agency and the Research Programme Computationally Intensive Complex Systems (P1-0403).

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Fig. 3. The locality of *Panorpa rufostigma* in North Macedonia. Photo: A. Nahirnić.

Fig. 4. The presently known distribution of *Panorpa rufostigma*. Orig. D. Devetak.

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CRIORHINA FLOCCOSA (MEIGEN, 1822), A NEW HOVERFLY (DIPTERA: SYRPHIDAE) IN THE FAUNA OF CROATIA

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Abstract – *Criorhina floccosa* is a large, bumblebee-mimic and saproxylic hoverfly which mainly inhabits deciduous forest habitats and its larvae develop in rot-holes, wet decaying roots, but also in live trunks. The range of this species includes almost all of Europe, but it had not been recorded in Croatia so far. *C. floccosa* was registered on the territory of Croatia for the first time in the Macelj Mt., on March 17, 2020. The specimen was caught on *Salix caprea* catkins, at the edge of a mixed deciduous forest of *Fagus* sp., *Quercus* sp. and *Castanea sativa*.

KEY WORDS: Eristalinae, faunistics, forest habitats, saproxylic insects

Izvleček – *CRIORHINA FLOCCOSA* (MEIGEN, 1822), NOVA MUHA TREPETAVKA (DIPTERA: SYRPHIDAE) V FAVNI HRVAŠKE

Criorhina floccosa je velika, čmrlju podobna, saproksilna muha trepetavka, ki v glavnem naseljuje listavske gozdne habitate, njene ličinke pa se razvijajo v gnilobah, vlažnih propadajočih koreninah, pa tudi v živih deblih. Razpon razširjenosti vrste zajema skoraj vso Evropo, vendar na Hrvaškem doslej ni bila zabeležena. *C. floccosa* je bila 17. marca 2020 na ozemlju Hrvaške prvič registrirana na planini Macelj. Osebek je bil ujet na cvetovih *Salix caprea*, na robu mešanega listopadnega gozda bukve (*Fagus* sp.), hrasta (*Quercus* sp.) in kostanja (*Castanea sativa*).

KLJUČNE BESEDE: Eristalinae, favnistika, gozdni habitati, saproksilne žuželke

Hoverflies are a large family of flies (Diptera: Syrphidae), with over 6000 described species worldwide (Thompson, 2013). European hoverfly fauna numbers more than 920 species and in Croatia about 200 species were registered (Radenković, 2008;

Nedeljković, 2011; Speight, 2018). Hoverfly fauna of Croatia is generally poorly researched, and additional species are expected to be recorded in the country in the future. Some neighbouring countries have a better researched hoverfly fauna, such as Serbia (with over 412 species registered) and Slovenia (with over 310 species registered) and in both countries, new species are registered each year (De Groot & Govedič, 2008; De Groot *et al.*, 2010; Van Steenis *et al.*, 2013; Janević & De Groot, 2018; Miličić *et al.*, 2018; Vujić *et al.*, 2018; Šebić *et al.*, 2019; Van Steenis *et al.*, 2019; Vujić, 2020).

Criorhina Meigen, 1822 is a genus of large bee or bumblebee mimics and from other genera that are bee or bumblebee mimics (*Arctophila*, *Brachypalpus*, *Mallota*, *Pocota* etc.) can be separated by the typical form of antennae. In *Criorhina*, the third segment is much shorter than it is wide and the first segment is thinner and forms a stalk. Also, in contrast to *Pocota* or *Brachypalpus*, *Criorhina*'s face projects downwards and facial knob is present (van Veen, 2004). In Europe, 6 species of the genus *Criorhina* have been recorded so far: *C. asilica* (Fallen, 1816), *C. berberina* (Fabricius, 1805), *C. brevipila* Loew, 1871, *C. floccosa* (Meigen, 1822), *C. pachymera* (Egger, 1858) and *C. ranunculi* (Panzer, 1804). *C. berberina*, *C. floccosa* and *C. ranunculi* are bumblebee mimics, while *C. asilica*, *C. brevipila* and *C. pachymera* are bee mimics (Van Veen, 2004; Speight, 2018). In Croatia, 3 species of this genus were registered so far, *C. asilica*, *C. berberina* and *C. ranunculi* (Langhoeffer, 1919; Marcuzzi, 1941; Coe, 1956; Vujić & Milankov, 1990; Radenković, 2008).

Criorhina floccosa is a large bumblebee-mimic and saproxylic hoverfly. Its larvae develop in rot-hole of *Ulmus*, wet, decaying roots of *Fagus* stumps, within the mass of wet tree humus, but were also found in large, live trunks of *Acer pseudoplatanus*, 1.5m from the ground (Speight, 2018). Adults occur in deciduous forests, where they mainly visit flowers of trees or shrubs (*Cornus sanguinea*, *Crataegus*, *Photinia*, *Prunus spinosa*, *Ribes alpina*, *Rubus ideaus*, *Sorbus* spp.), but also visit white umbellifers (van Veen, 2004; Speight, 2018). This species can be separated from other *Criorhina* species by combination of morphological characters: barette (hypopleural ridge) bare, first and second basal cells of wings with extensive areas bare of microtrichia, femur 3 marginally thickened and not curved, tibia 1 and 2 with pale, short, adpressed hairs at the back, tergites from 2 to 4 without grey or yellowish dusted bands, tergite 2 with distinct side tufts of long yellow hairs, tergites 3 and 4 with short, dense reddish hairs (Van Veen, 2004; Speight, 2017).

During a survey of insects on the Macelj Mt. (northern Croatia), one female specimen was caught by a standard sweeping net method. The species was feeding on *Salix caprea* catkins together with bees and bumblebees, in deciduous forest of beech (*Fagus* sp.), oaks (*Quercus* spp.) and sweet chestnut (*Castanea sativa*). Identification was based on the morphological characters and performed by using keys in Van Veen, 2004 and Speight, 2017. The record was entered into the database of Croatian insects – Biologer.hr (http://www.biologer.hr/).

Fig. 1: *Criorhina floccosa*, female habitus (photo: T. Koren).

Criorhina floccosa (Meigen, 1822) (Fig. 1)

Material examined: CROATIA, Mt. Macelj, lat: 46.260041, long: 15.882631, 17.3.2020, 468m a.s.l., 1 ♀, leg. T. Koren.

Notes: New for the fauna of Croatia. One female specimen was caught next to the road in a deciduous forest, near to Macelj village in northern Croatia (Fig. 2).

The range of *C. floccosa* includes southern Sweden and Denmark south to the Pyrenees, from Ireland eastwards through central Europe, northern Italy, some parts of the former Yugoslavia, European parts of Russia as far as the Caucasus (Speight, 2018). In the former Yugoslavia, this species was registered in Bosnia and Herzegovina, Montenegro, North Macedonia, Serbia and Slovenia (Strobl, 1898; Glumac, 1968; Vujić & Milankov, 1990; Vujić & Milankov, 1999; De Groot & Govedič, 2008; Radenković, 2008).

Speight, 2018 quotes that *C. floccosa* adults fly from the beginning of April to the beginning of July. Our specimen was registered on March 17th, and this early occurrence can be explained due to the unusually mild winter and the warm beginning of spring.

Further surveys of hoverflies of the country should yield new and interesting records. An important tool for this could be different citizen science platforms on

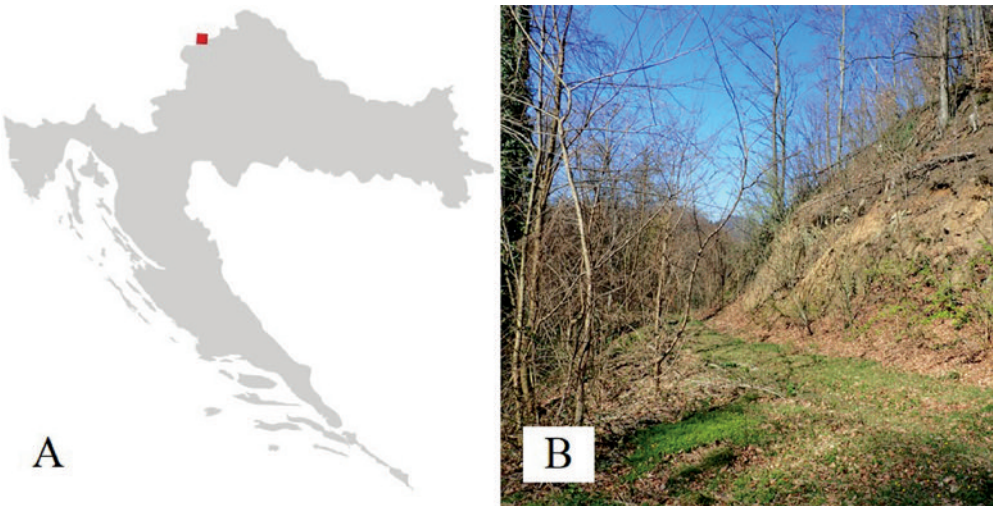

Fig. 2: The location where *C. floccosa* was collected in Croatia (A) and photo of the habitat (B); (photo: T. Koren).

which citizens can input their observations which can then be verified by local experts. We invite all experts and amateur entomologists visiting Croatia to import their data directly in the platform Biologer.hr (http://www.biologer.hr/) in order to expand the knowledge about Syrphidae of the country and region.

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MALLOTA FUCIFORMIS (FABRICIUS, 1794) (DIPTERA: SYRPHIDAE), A NEW HOVERFLY SPECIES IN SLOVENIA

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Abstract – The hoverfly species *Mallota fuciformis* (Fabricius, 1794) was recorded in Slovenia for the first time. It was found in Ponikva pri Žalcu, Grče on the 13th of April 2020. One specimen was found on a flowering cherry laurel (*Prunus laurocerasus*) in the vicinity of a forest stand with deciduous and coniferous trees. This is the first record of the genus *Mallota* in Slovenia.

Key words: Diptera, Syrphidae, fauna, Slovenia, first record

Izvleček – *MALLOTA FUCIFORMIS* (FABRICIUS, 1794) (DIPTERA: SYRPHIDAE), NOVA VRSTA MUHE TREPETAVKE V SLOVENIJI

Nova vrsta muhe trepetavke je bila zabeležena v Sloveniji: *Mallota fuciformis* (Fabricius, 1794). Vrsta je bila najdena na Ponikvi pri Žalcu, Grče, dne 13. 4. 2020, na cvetočem lovorikovcu (*Prunus laurocerasus*) v bližini mešanega gozda. Gre za prvo najdbo muhe trepetavke iz rodu *Mallota* v Sloveniji.

Ključne besede: dvokrilci, muhe trepetavke, živalstvo, Slovenija, prva najdba

In the last few years several new species of hoverflies (Diptera, Syrphidae) have been recorded for Slovenia (Janević and de Groot, 2018; Šebić, et al., 2019). This group of flies has become more and more popular as they are very conspicuous – they look like bees or wasps, and are important pollinators. They fulfill also other functions in the ecosystems, for example by feeding on aphids and plants, and they are also indicators for the status of dead wood in forests (Speight, 1989; Reemer, 2005; Rotheray and Gilbert, 2011).

Slovenia is a diverse country in many ways. This is mainly due to its unique location, namely at the meeting point of the Alpine-, Submediteranean-, Subpanonian-

Fig. 1: Adult male of *Mallota fuciformis* found in Ponikva pri Žalcu, Slovenia

and Dinaric regions (Ciglič and Perko, 2012). From the ecological point of view, Slovenia boasts numerous highly diverse habitats. In total, 315 hoverfly species have been recorded for Slovenia (De Groot and Govedič, 2008; De Groot, et al., 2010; Van Steenis, et al., 2013; Janević and de Groot, 2018; Šebić, et al., 2019). One of the genera that have not yet been found in Slovenia is *Mallota* (Meigen 1822). There are five species of *Mallota* hoverflies in Europe. *M. cimbiciformis* and *M. fuciformis* can be found throughout Europe, *M. megilliformis* is found in the Central- to Northern Europe, *M. tricolor* in the Central Europe and *M. dusmeti* only on the Iberian Peninsula. Other *Mallota* species can be found in other parts of the world (Reemer, et al., 2009). Adult *Mallota* hoverflies have a very short flying period and often fly high in the canopy. Their larvae are rat tailed maggots and live in moisty rot holes in trees (Reemer, et al., 2009). In this paper, we present a new species for Slovenia: *Mallota fuciformis,* which is also the first record of the genus in Slovenia.

The field work took place in Ponikva pri Žalcu, Grče in Central Slovenia. The specimen was only photographed. The species was identified with Bot and van de Meutter (2019).

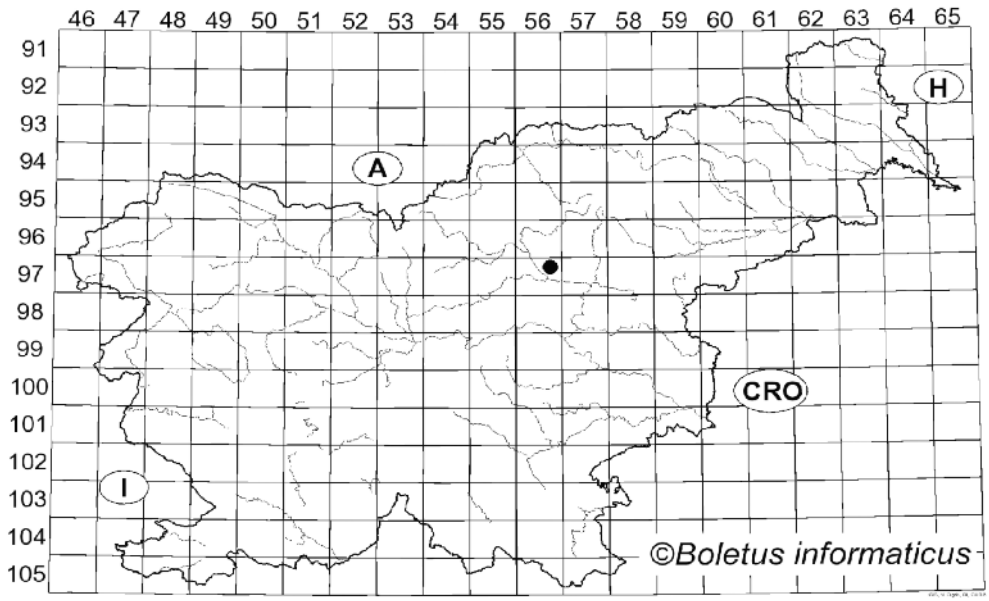

Fig. 2: Distribution of *Mallota fuciformis* in Slovenia (de Groot M. 2020. Karta razširjenosti za *Mallota fuciformis*. Podatkovna zbirka gliv Slovenije *Boletus informaticus.*, Ogris N. (ur.) (16.04.2020))

Mallota fuciformis (Fabricius, 1794)

Material examined (Fig 1). Slovenia, Ponikva pri Žalcu, Grče (GKX: 510346, GKY: 127739, Fig 2), 13.04.2020, altitude: 450 m asl., 1♂, photo D. Janević.

The specimen was found resting on a leaf of the cherry laurel (*Prunus laurocerasus*) (Figure 1) that was in full bloom. *M. fuciformis* is often found on flowering trees and bushes in other parts of Europe (Reemer, et al., 2009; Bot and van de Meutter, 2019; Speight, 2020). The specimen was found in a forested area with deciduous and coniferous trees. In other parts of Europe it is found mainly in deciduous forests and parks with old trees (Reemer, et al., 2009; Bot and van de Meutter, 2019). The larvae are found in rot holes of old trees (Bot and van de Meutter, 2019). Forests in Slovenia are relatively old, and many rot holes can be found which are potential breeding sites for this species.

This is the first species of the genus *Mallota* in Slovenia. According to Fauna Europaea, *M. cimbiciformis* was found in Austria, Italy and Hungary. So, it would not be surprising to find this species in the coming years in Slovenia.

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BRACHYOPA BIMACULOSA DOCZKAL & DZIOCK 2004 AND *CALLICERA FAGESII* GUÉRIN-MÉNEVILLE, 1844, TWO NEW HOVERFLIES (DIPTERA: SYRPHIDAE) IN THE FAUNA OF SERBIA

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Abstract – During a survey conducted in March and April 2020 on the Avala Mt., near to the capital city of Serbia, Belgrade, two new hoverfly species for the fauna of Serbia were collected – *Brachyopa bimaculosa* and *Callicera fagesii*. Both species were caught on mud on the forest road in a mixed deciduous forest. These species are saproxylic and their presence on the Avala Mt. indicates well-preserved forest habitats. Both species are registered in Serbia for the first time.

Key words: Eristalinae, saproxylic insects, forest habitats, faunistics

Izvleček – *BRACHYOPA BIMACULOSA* DOCZKAL & DZIOCK 2004 IN *CALLICERA FAGESII* GUÉRIN-MÉNEVILLE, 1844, DVE NOVI MUHI TREPETAVKI (DIPTERA: SYRPHIDAE) V FAVNI SRBIJE

Med raziskavo, izvedeno marca in aprila 2020, sta bili na gori Avali blizu glavnega mesta Srbije, Beograda, zbrani dve novi vrsti muh trepetavk za favno Srbije – *Brachyopa bimaculosa* in *Callicera fagesii*. Obe vrsti sta bili ujeti na blatu, na gozdni cesti v mešanem listnatem gozdu. Ti vrsti sta saproksilni in njuna prisotnost na Avali pomeni, da so gozdni habitati dobro ohranjeni. Obe vrsti sta v Srbiji prvič registrirani.

Ključne besede: Eristalinae, saproksilne žuželke, gozdni habitati, favnistika

Hoverflies (Syrphidae) are one of the most species-rich families of Diptera, with over 6000 described species in the world belonging to 188 genera (Thompson, 2013). European hoverfly fauna numbers more than 950 species and more than 412 are registered in Serbia (Vujić *et al.*, 2018; Van Steenis *et al.*, 2019; Speight, 2020; Vujić, 2020).

Brachyopa Meigen, 1822 are medium size, poorly haired hoverflies, with a yellow head, abdomen and usually thorax as well (Vujić, 1991). This genus doesn't show any clear sign of mimicry, and appears more like Muscidae or Scathophagidae. Adults usually can be found on bark or flowers of white umbellifers or *Crataegus* (Van Veen, 2004). In Europe 22 species occur and 11 of them were registered in Serbia: *B. bicolor* (Fallen, 1817), *B. dorsata* Zetterstedt, 1837, *B. grunewaldensis* Kassebeer, 2000, *B. insensilis* Collin, 1939, *B. maculipennis* Thompson, 1980, *B. panzeri* Goffe, 1945, *B. pilosa* Collin, 1939, *B. plena* Collin, 1939, *B. silviae* Doczkal & Dziock, 2004, *B. testacea* (Fallen, 1817) and *B. vittata* Zetterstedt, 1843 (Vujić *et al.*, 2018; Van Steenis *et al.*, 2019; Speight, 2020).

Callicera Panzer, 1809 are large, bee-mimic hoverflies, with long antennae and a black or metallic shiny body (Van Veen, 2004). Almost all species are orange-red or golden haired, and the metallic shine is more common in females. The genus *Callicera* can be distinguished from other hoverfly genera by a following combination of characters: antennae long (normally longer than the head, at least as long as the head), antennae with terminal style, entire body is black, without any yellow marks (usually with metallic shine), haired eyes, scutellum with a ventral hair fringe and cross-vein r-m is in basal half of cell dm (Smit, 2014). In Palaearctic region 9 species of the genus *Callicera* are present, while in Europe 6 species were registered (Smit, 2014; Speight, 2020). In Serbia, three species of this genus were recorded so far, *Callicera aenea* (Fabricius, 1777), *C. aurata* (Rossi, 1790) and *C. spinolae* Rondani, 1844 (Nedeljković *et al.*, 2009; Nedeljković *et al.*, 2015; Vujić *et al.*, 2018). The larvae of *Callicera* are saproxylic and can be found in rotten hardwood and rot-holes of different species of trees (van Veen, 2004; Speight, 2020).

The survey was conducted in 2020, and specimens were collected by a standard sweeping net method. The new species for the fauna of Serbia were registered at Čarapićev Brest, on Avala Mt., in the mixed deciduous forest of *Fagus*, *Quercus*, *Fraxinus*, *Acer, Robinia pseudoacacia, Prunus, Tilia* and some planted coniferous trees, such as *Abies alba* and *Pinus nigra*. Individuals of *Brachyopa bimaculosa* and *Callicera fagesii* were caught on mud on the forest road. The specimens were prepared by a standard procedure and identification was performed by using a key in Speight, 2017. All the data were entered into the database of Serbian insects – Alciphron (http://alciphron.habiprot.org.rs/). The maps were prepared in Alciphron database and QGIS 2.18.2. The collected specimens were deposited in private collection of Mihailo Vujić.

Two new species were registered for the first time on the territory of Serbia. Both species were collected in the mixed deciduous forest on Čarapićev Brest, on the Avala Mt., on March 21 and April 6, 2020. The locality where the specimens were collected is marked on the maps in Figures 1D and 1C.

Brachyopa bimaculosa Doczkal & Dziock 2004 (Fig. 1A)

Material examined: Serbia, Belgrade, Avala Mt., Čarapićev Brest, (Decimal Degrees: latitude: 44.694966 longitude: 20.524984), 6. IV 2020., 2♀, leg. M. Vujić.

Notes: New for the fauna of Serbia. Two female specimens were caught on mud, on a road in the mixed deciduous forest, mainly of *Fagus*, with sporadic trees of *Quercus*, *Acer*, *Fraxinus*, *Carpinus*, *Tilia*, *Robinia pseudoacacia* and planted coniferous trees of *Abies alba* and *Pinus nigra*. Photo of the habitat where *B. bimaculosa* was caught is presented in Figure 1C.

Callicera fagesii Guérin-Méneville, 1844 (Fig. 1B)

Material examined: Serbia, Belgrade, Avala Mt., Čarapićev Brest, (Decimal Degrees: latitude: 44.694966 longitude: 20.524984), 21. III 2020., 1♀, leg. M. Vujić; 6. IV 2020., 2♀, leg. M. Vujić.

Notes: New for the fauna of Serbia. on the Avala Mt., three female specimens were caught in total, on mud, on a road in the mixed deciduous forest, mainly of *Fagus*, with sporadic trees of *Quercus*, *Acer*, *Fraxinus*, *Carpinus*, *Tilia*, *Robinia pseudoacacia*, but also planted evergreen trees, such as *Abies alba* and *Pinus nigra*. Photo of the habitat where *C. fagesii* was caught is presented on Figure 1C.

Brachyopa bimaculosa is a rare species which was registered only in three European countries so far: Germany, Greece and Slovenia (Speight, 2020). From other European species of the genus *Brachyopa*, *B. bimaculosa* can be separated by characters from the keys in Speight, 2017: arista with hairs no longer than a maximum diameter of arista, mesoscutal disc bluish grey to black, wings without dark marks, abdomen brownish orange or yellow, antennal segment 3 without sensory pit, proepimeron with long, pale, scattered hairs, each inner extremity of the transverse suture with a more or less shining patches, hind femur slender (more than 5 times as long as its maximum depth), mesoscutum without shining, black, undusted marks on each sides, posterior to the humeral callus and anteror to the transverse suture, haltere entirely yellow, all sternites entirely dusted and mid coxa bare posteriorly.

Callicera fagesii is a rare species which occurs in a deciduous forest, with ancient *Fagus* and *Quercus* trees. Their range includes a large part of Europe and some countries in Asia, it can be found in the Netherlands, Belgium, France (south to the Mediterranean, including Pyrenees), Germany, Portugal, Spain, Italy (including Sardinia), Greece, Turkey, some parts of the former Yugoslavia and Turkmenistan (Zimina, 1986, Speight, 2020). From other European species of the genus *Callicera*, this species can be separated by characters from the keys in Speight, 2017: antennal segment 2 no more than half as long as antennal segment 1, antennal segment 3 twice as long as antennal segments 1 + 2 together, hind femora angled ventrally, femora mostly black and tarsomeres 3-5 of all legs are also black, all hairs on scutellar disc are longer than antennal segment 1, hairs on general body surface are yellow-brown to grey brown, tergite 4 often black-haired, tibiae may be orange, but at least hind tibia often brownish or partly black. The most similar species to *C. fagesii* is *C. macquarti*, and adults of it fly in autumn (September and October), while *C. fagesii* adults fly in spring and summer (from the beginning of April to the end of June) (Speight, 2020). The first specimen caught on Avala Mt. was caught on March 21st and that

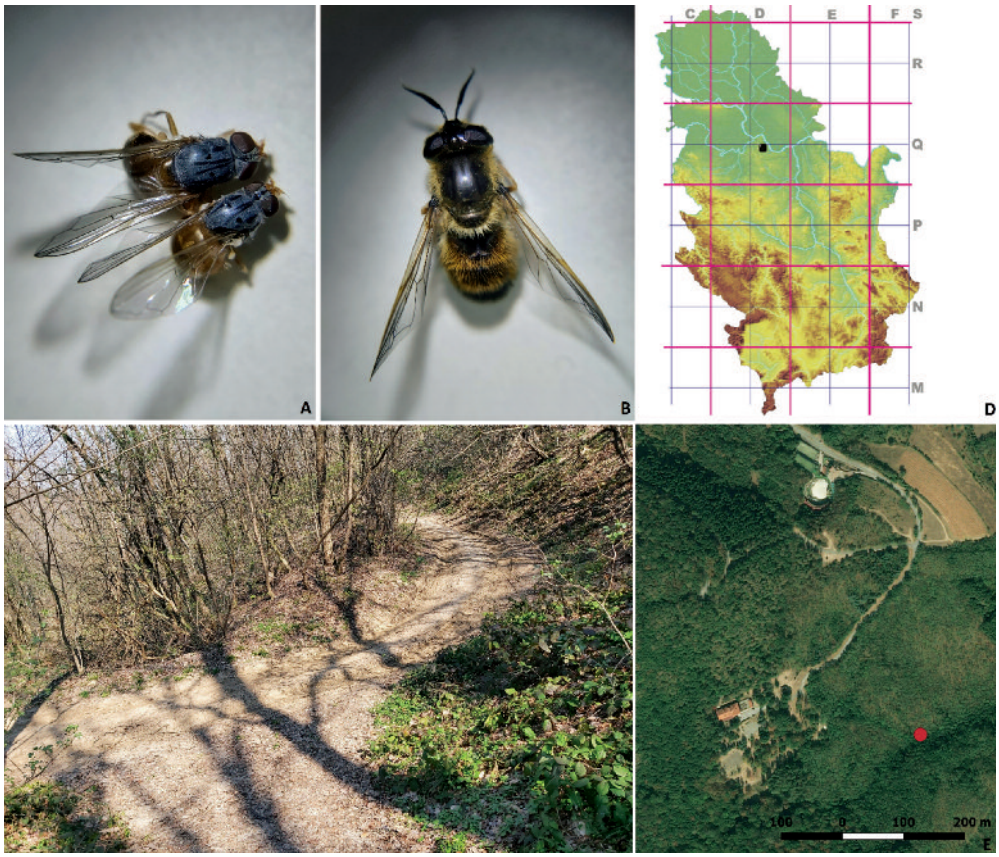

Fig. 1. A) *Brachyopa bimaculosa*, habitus of females; B) *Callicera fagesii*, habitus of a female; C) Photo of habitat of *B. bimaculosa* and *C. fagesii*; D) Locality where *B. bimaculosa* and *C. fagesii* were collected in Serbia; E) Locality where *B. bimaculosa* and *C. fagesii* were collected on Čarapićev Brest, Avala Mt.

can be explained due to the unusually mild winter and warm beginning of spring in Serbia. A few days after the first specimen was caught, there was a sudden rush of cold weather with snow and sub-zero temperatures lasting for several days, but specimens were also collected and observed after that.

Although most of the forests on the Avala Mt. are often logged and at these places usually young forests exist, on some parts, such as Čarapićev Brest, forests are well-preserved with many ancient trees of *Fagus*, *Quercus*, *Acer*, *Carpinus* and *Fraxinus*. The specimens in this paper were collected on a road in one of the well-preserved parts, where planted coniferous forest of *Abies alba* and *Pinus nigra*, as well as *Robinia pseudoacacia* were also present. The presence of the two saproxylic hoverflies presented in this paper, but also the presence of other saproxylic hoverflies and

beetles registered there, clearly indicates the importance of conservation of forest habitats of the Avala Mt.

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