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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)