

## New data on the Horse Fly Fauna of Croatian Adriatic Islands (Diptera Tabanidae)

by Stjepan KRČMAR<sup>1</sup> & Paula DURBEŠIĆ<sup>2</sup>

<sup>1</sup> Department of Biology, Faculty of Education, J.J. Strossmayer University, L. Jägera 9, 31000 Osijek, Croatia (e-mail : stjegan@knjiga.pedos.hr).

<sup>2</sup> Department of Zoology, Faculty of Natural Science, University of Zagreb, Rooseveltov trg 6, 10000 Zagreb, Croatia.

### Abstract

810 horse flies were sampled and classified into 20 species in 25 stations on 12 islands of the Croatian Adriatic. The most abundant are the following species : *Tabanus bifarius*, *Tabanus exclusus*, *Tabanus shannonellus*, *Tabanus tergestinus*, *Haematopota pandazisi* and *Philipomyia graeca* that make up 90,37% of sampled specimens. The identified horse fly species on Croatian Adriatic islands cover 22 fields on the UTM grid of Croatia.

**Keywords :** Diptera, Tabanidae, biological diversity, Croatia

### Introduction

The Croatian coast of the Adriatic sea includes 1200 islands, cliffs and reefs, which makes it one of the most beautiful coasts in Europe and in the world (JELIĆ & KLARIĆ, 1995). Croatian Adriatic islands are characterized by preserved nature and attractive landscape. These are the principal reasons for the visits of numerous foreign scientists who collected insects on their expeditions in the late 19<sup>th</sup> and early 20<sup>th</sup> centuries. The first works dealing with the fauna of horse flies were those on the entomofauna of Dalmatia (DURBEŠIĆ, 1984; NONVEILLER, 1989). Through the review of literature it has been determined that the foreign researchers have sampled horse flies on only 8 stations on Croatian Adriatic islands. Scarce data on the fauna of horse flies on Croatian Adriatic islands gave us the incentive for this research that should improve the knowledge on biological diversity of one of the most indented coasts in Europe.

### Material and methods

The sampling of the horse flies (Tabanidae) was carried out on Croatian Adriatic islands in the course of 1994, 1996, 1997 and 1998. Horse flies were sampled on 9 Adriatic islands by means of a sampling net on cattle and some were caught by

hand in a car. Upon the review of the collection of J. MIKUSKA a further 16 specimens were determined, which were also sampled on Croatian Adriatic islands in 1987 and 1988. All sampled specimens were identified according to the key of CHVÁLA *et al.* (1972). The names of species were written according to the catalogue CHVÁLA (1988).

### Results

701 specimens of horse flies were sampled on 9 Croatian Adriatic islands during the 1994, 1996, 1997 and 1998. Sampled horse flies were classified into 16 species. A further 93 specimens were found upon the review of literature and an additional 16 specimens were determined in the collection J.MIKUSKA. All together there were 810 determined horse flies classified into 20 species (Table 1). The most abundantly represented genus is *Tabanus* with 14 identified species. It is followed by the genera : *Chrysops*, *Atylotus*, *Hybomitra*, *Haematopota*, *Dasyrhamphis* and *Philipomyia* which are all represented by one species each. The most abundantly represented species of horse flies on Croatian islands are : *Tabanus tergestinus*, *Haematopota pandazisi*, *Tabanus exclusus*, *Tabanus shannonellus*, *Philipomyia graeca* and *Tabanus bifarius* which include 90,37% of the sampled specimens (Table

1). In the collected sample, male horse flies were represented by 35 specimens classified into 7 species. Most of the 490 collected horse flies were sampled on the island of Krk, 155 on the island of Korčula, 66 on the island of Cres, 38 on the island of Hvar, 28 on the island of Brač and 17 on the island of Pag (Table 2). On the remaining 6

investigated islands of the Croatian Adriatic, only 18 specimens of horse flies were sampled (Table 2). All the identified horse flies on Croatian Adriatic islands came from 25 stations (Table 2) that cover 22 fields on the UTM grid of Croatia (Figure 1).

Table 1. Quantitative analysis of the determined species of horse flies.

Species	Specimens	%
<i>Chrysops italicus</i> MEIGEN, 1804	5	0,61
<i>Atylotus loewianus</i> (VILLENEUVE, 1920)	10	1,23
<i>Hybomitra ciureai</i> (SÉGUY, 1937)	1	0,12
<i>Tabanus bifarius</i> LOEW, 1858	49	6,04
<i>Tabanus bovinus</i> LINNAEUS, 1758	1	0,12
<i>Tabanus bromius</i> LINNAEUS, 1758	19	2,34
<i>Tabanus cordiger</i> MEIGEN, 1820	1	0,12
<i>Tabanus eggeri</i> SCHINER, 1868	3	0,37
<i>Tabanus exclusus</i> PANDELLÉ, 1883	90	11,11
<i>Tabanus lunatus</i> FABRICIUS, 1794	14	1,72
<i>Tabanus obsolescens</i> PANDELLÉ, 1883	2	0,24
<i>Tabanus quatuornotatus</i> MEIGEN, 1820	9	1,11
<i>Tabanus regularis</i> JAENNICKE, 1866	1	0,12
<i>Tabanus shannonellus</i> KRÖBER, 1936	80	9,87
<i>Tabanus spodopterus</i> MEIGEN, 1820	10	1,23
<i>Tabanus tergestinus</i> EGGER, 1859	241	29,75
<i>Tabanus tinctus</i> WALKER, 1850	1	0,12
<i>Haematopota pandazisi</i> KRÖBER, 1936	209	25,80
<i>Dasyrhamphus umbrinus</i> (MEIGEN, 1820)	1	0,12
<i>Philipomyia graeca</i> (FABRICIUS, 1794)	63	7,77
$\Sigma$ 20	810	100

List of the horse flies, including UTM fields, dates and numbers of sampled specimens.

1. *Chrysops italicus* MEIGEN, 1804 : Dinjiška (WK 11), 20.VII.1996 (1♀), 23.VII.1996 (4♀).
2. *Atylotus loewianus* (VILLENEUVE, 1920) : Dobrinj (VK 69), 29.VI.1997 (1♀), 20.VIII.1997 (1♀); Vrbnik (VK 79), 20.VIII.1997 (2♀); Krk - jezero (VK 68), 21.VIII.1997 (6♀).
3. *Hybomitra ciureai* (SÉGUY, 1937) : Dobrinj (VK 69), 29.VI.1997 (1♀).
4. *Tabanus bifarius* LOEW, 1858 : Cres (VK 57), 26.VI.1991 (1♀); Beli (VK 59), 26.VI.1997 (6♀); Dobrinj (VK 69), 29.VI.1997 (5♀); Biševo (WH 86), 14.VI.1998 (2♀). Data from literature : Korčula (XH 75), 22.V.1955 (33♀), (COE, 1958); Lumbarda (XH 75), 30.V.1924 (1♀), 15.V.1926 (1♀), (MOUCHA, 1959).
5. *Tabanus bovinus* LINNAEUS, 1758 : Zle Stijene (XH 93), 02.VI.1972 (1♀), (RUCNER, 1994).
6. *Tabanus bromius* LINNAEUS, 1758 : Dobrinj (VK 69), 29.VI.1997 (3♀), 20.VIII.1997 (3♀); Draga

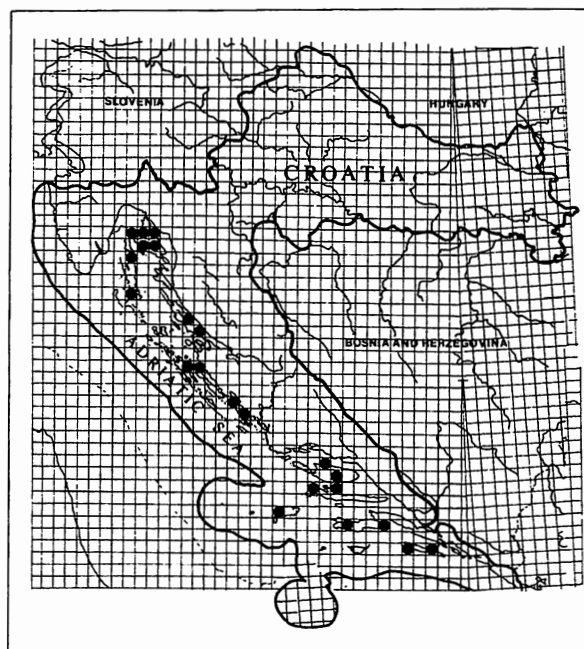


Fig. 1. Presentations of the localities on the UTM grid of Croatia on which horse flies were sampled.

- Bašćanska (VK 78), 24.VII.1997 (1♀); Vrbnik (VK 79), 20.VIII.1997 (10♀); Krk-jezero (VK 68), 21.VIII.1997 (1♀). Data from literature : Hvar (XH 18), 17.VI.1962 (1♂), (MOUCHA, 1965).
7. *Tabanus cordiger* MEIGEN, 1820 : Draga Bašćanska (VK 78), 24.VII.1997 (1♀).
8. *Tabanus eggeri* SCHINER, 1868 : Draga Bašćanska (VK 78), 24.VII.1997 (3♀).
9. *Tabanus exclusus* PANDELLÉ, 1883 : Cres (VK 57), 3.VII.1987 (4♀); Starigrad (XH 38), 03.VIII.1987 (1♀), 03.VIII.1988 (2♀); Vrbnik (VK 79), 26.VI.1994 (1♀), 20.VIII.1997 (3♀); Bol - Brač (XH 39), 21.VIII.1994 (1♀); 23.VIII.1994 (2♀); Preko (WJ 18), 22.VII.1996 (1♀), 23.VII.1996 (2♀, 2♂); Korčula (XH 75), 12.VIII.1996 (41♀, 1♂), 16.VIII.1996 (3♀, 1♂); Beli (VK 59), 26.VI.1997 (1♀); Draga Bašćanska (VK 78), 24.VII.1997 (23♀). Data from literature : Ugljan (WJ 08), 5.VII.1928 (1♀), (MOUCHA, 1959).
10. *Tabanus lunatus* FABRICIUS, 1794 : Hvar (XH 18)-, (1♀, 1♂), (STROBL, 1893, 1898, 1900); Korčula (XH 75), 22.V.1955 (12♀), (COE, 1958).
11. *Tabanus obsolescens* PANDELLÉ, 1883 : Cres (VK 57), 3.VII.1987 (1♀); Korčula (XH 75), 16.VIII.1996 (1♀).
12. *Tabanus quatuornotatus* MEIGEN, 1820 : Cres (VK 57), 3.VII.1987 (1♀); Vrbnik (VK 79), 26.VI.1994 (1♀); Beli (VK 59), 26.VI.1997 (4♀); Dobrinj (VK 69), 29.VI.1997 (1♀). Data from literature : Korčula (XH 75), 22.V.1955 (1♀), (COE, 1958); Hvar (XH 18), 14.VI.1962 (1♀), (MOUCHA, 1965).
13. *Tabanus regularis* JAENNICKÉ, 1866 : Pag (WK 02), 13.VI.1958 (1♀), (KRČMAR & LECLERCQ, 1997).
14. *Tabanus shannonellus* KRÖBER, 1936 : Starigrad (XH 38), 3.VIII.1988 (2♀, 1♂); Bol - Brač (XH 39), 21.VIII.1994 (9♂), 23.VIII.1994 (5♀, 5♂), 29.VIII.1994 (3♀); Korčula (XH 75), 12.VIII.1996 (1♀); 16.VIII.1996 (42♀); Hvar (XH 18), 17.VIII.1997 (8♀). Data from literature : Hvar (XH 18), 5.IX.1924 (1♀), (MOUCHA, 1959); Supetar (XJ 20), 14.VIII.1964 (3♀), (MOUCHA, 1965).
15. *Tabanus spodopterus* MEIGEN, 1820 : Dinjiška (WK 11), 23.VII.1996 (3♀). Data from literature : Pag (WK 02), 19.VII.1894 (7♀), (STROBL, 1898, 1900).
16. *Tabanus tergestinus* EGGER, 1859 : Cres (VK 57), 1.VII.1987 (1♀), 3.VII.1987 (2♀), 6.VII.1987 (1♀); Vrbnik (VK 79), 26.VI.1994 (2♀); Beli (VK 59), 26.VI.1997 (41♀, 1♂); Dobrinj (VK 69), 29.VI.1997 (166♀, 1♂); Punat (VK 78), 29.VI.1997 (2♀); Draga Bašćanska (VK 78), 24.VII.1997 (24♀).
17. *Tabanus tinctus* WALKER, 1850 : Pag (WK 02), 19.VII.1894 (1♀), (MOUCHA, 1965).
18. *Haematopota panadzisi* KRÖBER, 1936 : Korčula (XH 75), 16.VIII.1996 (1♀); Preko (WJ 18), 23.VII.1996 (1♀); Dobrinj (VK 69), 20.VIII.1997

- (37♀); Vrbnik (VK 79), 20.VIII.1997 (11♀); Krk - jezero (VK 68), 20.VIII.1997 (76♀), 21.VIII.1997 (80♀); Jurandvor (VK 78), 21.VIII.1997 (3♀).
19. *Dasyrhamphus umbrinus* (MEIGEN, 1820) : Murter (WJ 45), 14.VI.1931 (1♂), (MOUCHA, 1959); Hvar (XH 18) -, (STROBL, 1893, 1898, 1900; MOUCHA, 1959).
20. *Philipomyia graeca* (FABRICIUS, 1794) : Cres (VK 57), 26.VI.1991 (1♀); Korčula (XH 75), 12.VIII.1996 (1♀), 16.VIII.1996 (1♀); Beli (VK 59), 26.VI.1997 (1♀); Dobrinj (VK 69), 29.VI.1997 (21♀); Mali Lošinj (VK 53), 18.VI.1998 (1♀); Sobra (YH 13), 6.VIII.1998 (3♀). Data from literature : Korčula (XH 75), 22.V.1955 (7♀, 1♂), (COE, 1958); Hvar (XH 18), 10.VI.1924 (2♀); 23.V.1926 (1♀); 11.VI.1962 (1♀, 1♂); 18.VI.1962 (1♀, 7♂); Kaprija otok (WJ 54), 23.VI.1929 (1♀); Lumbarda (XH 75), 15.VI.1926 (3♀, 2♂); Vela Luka (XH 45), 18.VI.1931 (1♀), (MOUCHA, 1959); Hvar (XH 18) -, (6♀), (STROBL, 1902).

Table 2. List of localities with sampled horse flies on Croatian Adriatic islands.

Localities with UTM fields	Specimens	%
Dobrinj (VK 69)	240	29,62
Krk - jezero (VK 68)	163	20,12
Korčula (XH 75)	147	18,14
Beli (VK 59)	54	6,66
Draga Bašćanska (VK 78)	52	6,41
Hvar (XH 18)	32	3,95
Vrbnik (VK 79)	30	3,69
Bol - Brač (XH 39)	25	3,08
Cres (VK 57)	12	1,48
Pag (WK 02)	9	1,11
Dinjiška (WK 11)	8	0,98
Lumbarda (XH 75)	7	0,86
Starigrad (XH 38)	6	0,74
Preko (WJ 18)	6	0,74
Supetar (XJ 20)	3	0,37
Sobra (YH 13)	3	0,37
Jurandvor (VK 78)	3	0,37
Biševo (WH 86)	2	0,24
Punat (VK 78)	2	0,24
Kaprija otok (WJ 54)	1	0,12
Mali Lošinj (VK 53)	1	0,12
Murter (WJ 45)	1	0,12
Vela Luka (XH 45)	1	0,12
Ugljan (WJ 08)	1	0,12
Zle Stijene (XH 93)	1	0,12
Σ 25	810	100

## Discussion

Samplings of horse flies were carried out on the largest islands of the Croatian Adriatic with different landscape and relief. There are 20 species of horse flies identified from Croatian Adriatic islands, which is 26,31% of the fauna of horse flies in Croatia. This is a rather small number of species having in mind that there are 62 species of horse flies that were identified in the Croatian coastal region (KRČMAR, 1999). Finds of the species *Tabanus obsolescens* and *Tabanus shannonellus* which have, so far, been recorded only in a few stations on the territory of Europe, hint at specific faunistic characteristics of Croatian Adriatic islands. Specimens of the species *Tabanus shannonellus* were sampled in August in Dalmatia and at the stations on the southern Dalmatian islands. Except in Croatia, specimens of the species *Tabanus shannonellus* were sampled only in Greece and in Bulgaria (CHVÁLA, 1988). Finds of the species *Tabanus obsolescens* on the stations of the northern and southern Croatian maritime region are also interesting because, in addition to Croatia this species was only found in Greece according to CHVÁLA (1988). These finds of the species *Tabanus obsolescens* and *Tabanus shannonellus* indicate the spreading of the areal distribution towards the west, which is made possible by the Adriatic Sea as the part of the Mediterranean that most deeply penetrates towards the center of Europe. Zoogeographic analysis shows that the species present on Croatian Adriatic islands are predominantly mediterranean species, with the exception of the species *Hybomitra ciureai*, *Tabanus bovinus*, *Tabanus bromius*, *Tabanus cordiger* and *Tabanus quatuornotatus* which belong to widely spread species of the palearctic region (CHVÁLA *et al.*, 1972). Of the 20 identified species of horse flies on the islands of the Croatian Adriatic; the species *Tabanus regularis* was recently recorded for the first time in the fauna of Croatia (KRČMAR & LECLERCQ, 1997). These 20 species are certainly not the final number of species on Croatian Adriatic islands, since only during our latest research we have identified 8 species of horse flies that were not recorded during previous studies. We presume that some other species of horse flies are present in the region as well, because horse flies can fly to the islands from the Croatian coastal region where a significantly larger number of species of horse flies was found. This assumption suggests the necessity to continue with systematic entomological research work because sporadic samplings are certainly one of the reasons why only such a

small number of species of horse flies were previously recorded on Croatian Adriatic islands.

## References

- CHVÁLA M., 1988. - Family Tabanidae. In : SOÓS A. (eds) *Catalogue of Palearctic Diptera, Athericidae - Asilidae*. Vol. 5. Budapest - Amsterdam, Akadémiai kiadó and Elsevier publication : 97-171.
- CHVÁLA M., LYNEBORG L. & MOUCHA J., 1972. - *The Horse Flies of Europe (Diptera, Tabanidae)* Entomological Society of Copenhagen. Copenhagen, 499 pp.
- COE R.L., 1958. - Diptera taken in Jugoslavia from May to July, 1955 with localities and notes - *Bulletin du Museum Historique Naturelle de Belgrade. Ser B*, (12) : 181-206.
- DURBEŠIĆ P., 1984. - Počeci entomoloških istraživanja u Hrvatskoj s bibliografijom. *Acta Entomologica Jugoslavica*, 20, supplementum : 7-56.
- JELIĆ T. & KLARIĆ Z., 1995. - *Zemljopis* 4. Školska knjiga - Zagreb, 202 pp.
- KRČMAR S. & LECLERCQ M., 1997. - Horse Flies (Diptera : Tabanidae) on the Lower Part of the Neretva River in Southern Croatia. *Bulletin & Annales de la Société royale belge d'Entomologie*, 133 (2) : 267-274.
- KRČMAR S., 1999. - Horse flies in the Mediterranean part of Croatia (Diptera : Tabanidae). *Folia Entomologica Hungarica*, 60 (1) : 325-344.
- MOUCHA J., 1959. - Zur Kenntnis der Tabanidenfauna Jugoslawiens (Diptera, Tabanidae). *Acta Faunistica Entomologica Musei Nationalis Pragae*, 5 (39) : 17-28.
- MOUCHA J., 1965. - Zur Kenntnis der Tabaniden - Fauna Jugoslawiens - 2, (Diptera, Tabanidae). *Acta Faunistica Entomologica Musei Nationalis Pragae*, 11 (99) : 71-78.
- NONVELLER G., 1989. - *Pioniri proučavanja insekata Dalmacije*, Societas Entomologica Jugoslavica. Zagreb, 390 pp.
- RUCNER Z., 1994. - Beitrag zur Entomofauna einiger Waldassoziationen Kroatiens. *Natura Croatica*, 3 (1) : 1-22.
- STROBL P.G., 1893. - Beiträge zur Dipterenfauna des österreichischen Littorale. *Wiener Entomologische Zeitung*, 12 : 29-31.
- STROBL P.G., 1898. - Fauna Diptera Bosne, Hercegovine i Dalmacije. *Glasnik Zemaljskog Muzeja Bosne i Hercegovine*, 10 : 387-393.
- STROBL P.G., 1900. - Dipterenfauna von Bosnien, Hercegovina und Dalmatien. *Wissenschaftlichen Mittheilungen aus Bosnien und Herzegovine*, 7 555-557.
- STROBL P.G., 1902. - Novi prilozi fauni diptera balkanskog poluostrva. *Glasnik Zemaljskog Muzeja Bosne i Hercegovine*, 14 : 461-518.