

## STUDIES OF DROSOPHILIDAE (DIPTERA) IN YUGOSLAVIA.

### XIII. COLLECTIONS FROM APATIN AT DANUBE COAST

V. KEKIĆ<sup>1</sup>, M. ANDJELKOVIĆ<sup>1,2</sup> AND G. BÄCHLI<sup>3</sup>

<sup>1</sup> Institute of Zoology, Faculty of Biology, University of Beograd,  
Studentski trg 16, YU-11000 Beograd

<sup>2</sup> Institute for Biological Researches "Siniša Stanković",  
29. novembra 142, YU-11000 Beograd

<sup>3</sup> Zoological Museum, Winterthurerstrasse 190,  
CH-8057 Zürich, Switzerland

A total of 26 Drosophilidae species has been recorded in two ecologically different habitats near Apatin: at the Danube coast - 26 species, and 17 species in a nearby settlement with vegetable gardens and orchards. Also, a list of Drosophilidae species of former Yugoslavia has been increased to 58 species by *Drosophila acuminata* and *Stegana similis*, collected at the Danube coast.

KEY WORDS: Diptera, Drosophilidae, Apatin, the river Danube.

## INTRODUCTION

This is the fourth paper in a series on Drosophilidae fauna researches along the Danube river in Yugoslavia (KEKIĆ *et al.*, 1995, 1996a, b). The main presumption of those researches was that rivers have always been natural migratory paths for various organisms, and that the Danube, the largest European river (2857 km long), has had an exceptional role in that.

Today, through Maine - Rhine system, the Danube connects the North and the Black Sea, and through its tributaries, Tisa and Morava, it connects the Pannonian plane and the southern parts of Balkan Peninsula, various biogeographic areas and different habitats - some of them remaining "wild", while others being dramatically altered by human activities.

We believe that Drosophilidae fauna researches along the Danube river and its tributaries will contribute to a better knowledge of migratory paths and ecology of these organisms, and of the ecological condition of habitats (localities) observed, as well.

## MATERIAL AND METHODS

Following the methodology applied in previous researches (KEKIĆ *et al.*, 1995, 1996a, b), flies were collected in two ecologically different habitats: close to the Danube river, in a green belt along the river, and a little further in a nearby settlement.

Apatin is a small town, 1404 km far from the mouth of the Danube to the Black Sea. A habitat near the river is a flat bank overgrown with herbaceous vegetation, willows and poplars, in places interrupted by sand. At this habitat flies have been collected on June 16 and 17, September 6 - 8, 1989, and July 12 - 14, 1994. Baits have been placed 10 to 50 m far from the river.

Flies have also been collected in a nearby settlement in July 12 - 14, 1994. The habitat is about 200 m far from the first one described, separated by the levee, with orchards and vegetable gardens.

Flies have been collected by baits (fermenting fruits), distributed all over the habitats studied. At the time of maximum flies' activity (in the morning and evening) those ones attracted by bait have been captured by an entomological net; for more detailed description of collecting methodology see KEKIĆ *et al.* (1996c).

## RESULTS AND DISCUSSION

The location of Apatin and other localities of the Drosophilidae fauna research along the Danube are presented on a sketch map (Fig. 1).

Flies are rather vagile organisms and they can, if they want to, travel few hundred meters per day in search for food, shelter, mate, site for oviposition, etc. (see e. g. TAYLOR *et al.*, 1984). Considering that, flies have always been collected immediately near Danube and in a nearby, but ecologically different habitat.

Table I presents results of determination of flies collected at the locality Apatin. A total of 26 species has been recorded, 24 at the Danube bank and 17 in a nearby settlement.

According to our categorization of Drosophilidae habitats (KEKIĆ *et al.*, 1996c), both habitats studied are semidomestic, with the presence of peoples' frequent activities, i. e. humans' constant immediate or indirect influence. Nevertheless, there exists a considerable difference in Drosophilidae species com-

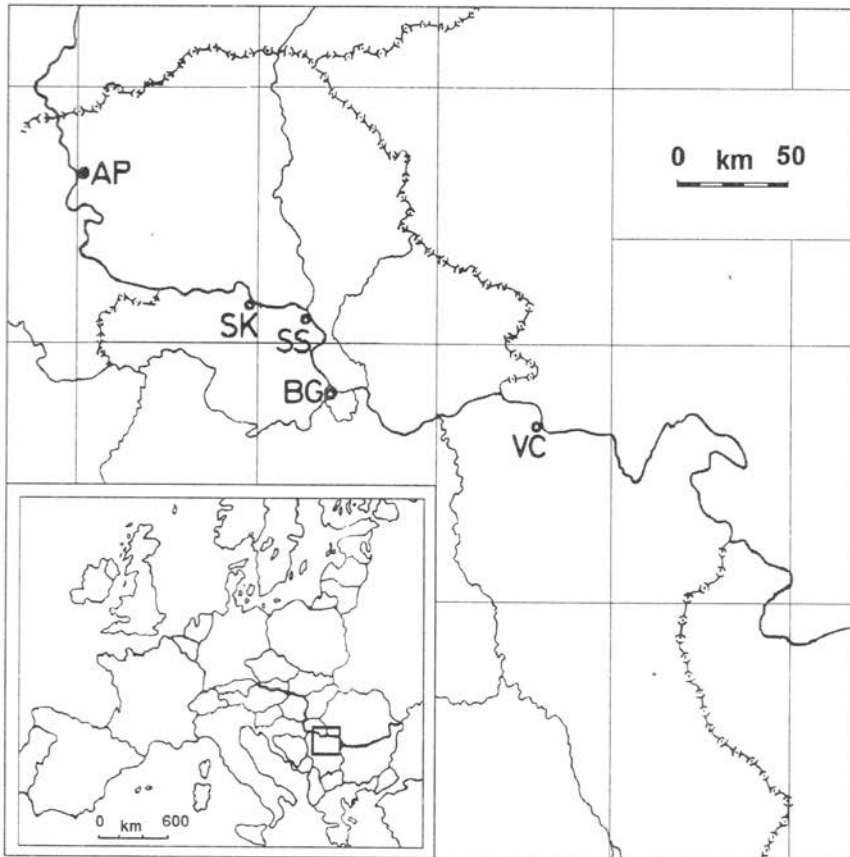


Fig. 1. Sites of the *Drosophilidae* fauna researches (AP - Apatin; SK - Sremska Kamenica; SS - Stari Slankamen; BG - Belgrade; VC - Vinci).

position between habitat near the river, and the other one, 200 m away, assigned as settlement.

The difference is clearly illustrated by the proportion of synanthropic or domestic *Drosophila* species (PATERSON & STONE, 1952; DOBZHANSKY, 1965; PARSONS & STANLEY, 1981) in each habitat. The proportion of those flies at the Danube bank has been 14%, and in a settlement over 44%. It is not surprising, for it is logically to expect a larger proportion of domestic species in a habitat with a larger influence of men.

On the other hand, it is well known that flies can differentiate habitats and microhabitats with the most suitable combination of ecological conditions at the time. In the field, in every real habitat, in the frame of potential area of daily

Table I  
Drosophilidae flies collected at the locality Apatin.

SPECIES	Danube coast		Settlement	Total
	June/July	September	July	
<i>Amiota</i>				
<i>A. semivirgo</i>	2	1	1	4
<i>Chymomyza</i>				
<i>C. amoena</i>	—	2	1	3
<i>Drosophila</i>				
<i>D. acuminata</i>	—	1	—	1
<i>D. ambigua</i>	1	—	3	4
<i>D. bifasciata</i>	10	2	—	12
<i>D. busckii</i>	—	4	—	4
<i>D. confusa</i>	—	2	—	2
<i>D. fenestrarum</i>	—	1	—	1
<i>D. helvetica</i>	5	—	1	6
<i>D. hydei</i>	—	—	1	1
<i>D. immigrans</i>	—	236	3	239
<i>D. kuntzei</i>	2	365	—	367
<i>D. limbata</i>	—	17	—	17
<i>D. littoralis</i>	2	5	1	8
<b><i>D. melanogaster</i></b>	17	184	370	571
<i>D. obscura</i>	135	52	53	240
<i>D. phalerata</i>	29	221	23	273
<i>D. rufifrons</i>	—	—	5	5
<i>D. simulans</i>	—	3	—	3
<i>D. subobscura</i>	995	853	320	2 168
<i>D. testacea</i>	—	5	7	12
<i>D. transversa</i>	—	5	12	17
<i>D. tristis</i>	2	10	42	54
<i>Leucophenga</i>				
<i>L. maculata</i>	1	—	1	2
<i>Scaptomyza</i>				
<i>S. pallida</i>	5	2	1	8
<i>Stegana</i>				
<i>S. similis</i>	1	—	—	1
TOTAL	1 207	1 971	845	4 023

The names of the domestic *Drosophila* species are emphasized by bold letters.

activity and motion of *Drosophila*, ecologically different microhabitats can be found, sometimes only at a few meters' distance. Different *Drosophila* species composition presents an indirect evidence that flies can recognize between them (KEKIĆ & MARINKOVIĆ, 1979), while direct confirmation would be that even genetically different individuals of the same species prefer different microhabitats with different probability (for bibliography on the subject see TAYLOR & POWELL, 1983; TAYLOR, 1987).

Table II

Drosophilidae species collected at five localities along the Danube coast.

SPECIES	Apatin	Sremska Kamenica	Stari Slankamen	Belgrade	Vinci	No. of local.
<i>Amiota</i>						
1. <i>A. semivirgo</i>	+		+	+		3
2. <i>A. variegata</i>			+			1
<i>Chymomyza</i>						
3. <i>C. amoena</i>	+					1
<i>Drosophila</i>						
4. <i>D. acuminata</i>	+					1
5. <i>D. ambigua</i>	+	+	+	+	+	5
6. <i>D. andalusiaca</i>					+	1
7. <i>D. bifasciata</i>	+	+	+	+	+	5
8. <i>D. busckii</i>	+	+				2
9. <i>D. cameraria</i>					+	1
10. <i>D. confusa</i>	+			+	+	3
11. <i>D. deflexa</i>		+				1
12. <i>D. fenestrarum</i>	+			+		2
13. <i>D. funebris</i>		+	+	+	+	4
14. <i>D. helvetica</i>	+	+		+	+	4
15. <i>D. hydei</i>		+	+	+	+	4
16. <i>D. immigrans</i>	+	+	+	+	+	5
17. <i>D. kuntzei</i>	+	+	+	+	+	5
18. <i>D. limbata</i>	+			+	+	3
19. <i>D. littoralis</i>	+		+			2
20. <i>D. melanogaster</i>	+	+	+	+	+	5
21. <i>D. obscura</i>	+	+	+	+		4
22. <i>D. phalerata</i>	+	+	+	+	+	5
23. <i>D. repleta</i>			+			1
24. <i>D. rufifrons</i>			+	+		2
25. <i>D. simulans</i>	+					1
26. <i>D. subobscura</i>	+	+	+	+	+	5
27. <i>D. testacea</i>	+	+	+	+	+	5
28. <i>D. transversa</i>	+	+	+	+	+	5
29. <i>D. tristis</i>	+	+	+	+		4
<i>Leucophenga</i>						
30. <i>L. maculata</i>	+					1
<i>Scaptomyza</i>						
31. <i>S. graminum</i>		+			+	2
32. <i>S. pallida</i>	+	+	+	+	+	5
<i>Stegana</i>						
33. <i>S. similis</i>	+					1
No. of SPECIES	24	18	19	20	18	

The names of the domestic *Drosophila* species are emphasized by bold letters.

Considering the facts mentioned above and the ecology of different Drosophilidae, it is possible to adequately characterize ecological condition of a

given habitat in a certain time, based on a proportion of synanthropic species in a collection, and to determine a degree of a habitat "contamination" by humans.

Two species new for the fauna of Yugoslavia have been captured at the locality Apatin: *Drosophila acuminata* Collin, 1952, and *Stegana similis* Lastovka et Maca, 1982 (a specimen of the latter one has been captured in August, 1980, at the Jastrebac Mt., Ravnište locality, determined as *D. similis* by Dr. J. MACA - unpublished record).

The list of Drosophilidae species recorded at the territory of former Yugoslavia, with those two species, counts 58 at the moment (KEKIĆ *et al.*, 1996c).

Table II presents the main faunistic results of all our previous researches of Drosophilidae along the Danube.

A total of 33 species has been detected in semidomestic habitats, making 57% of all species recorded on the territory of former Yugoslavia. The number of species found differs in different localities. Some of the species are obviously rare and can be found only locally or occasionally, while others are very common, and can be found everywhere: *D. ambigua*, *D. bifasciata*, *D. immigrans*, *D. kuntzei*, *D. melanogaster*, *D. phalerata*, *D. subobscura*, *D. testacea*, *D. transversa* and *Scaptomyza pallida*. Regarding the presence of a large number of wild habitats along the Danube river (let us mention the exceptionally various landscapes in Iron Gate gorge in the National Park "Djerdap", or Kovilje Marsh or famous oak trees along the Danube) we believe that the number of species exceeds 33 to a large extent.

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## ИСТРАЖИВАЊА DROSOPHILIDAE (DIPTERA) ЈУГОСЛАВИЈЕ.

### XIII. КОЛЕКЦИЈЕ ИЗ АПАТИНА НА ОБАЛИ ДУНАВА

В. КЕКИЋ, М. АНЂЕЛКОВИЋ И Г. БАХЛИ

#### И з в о д

Почињући истраживања фауне *Drosophilidae* у стаништима на обали Дунава, пошли смо од чињенице да су реке одувек биле природни путеви миграције различитих врста организама и да је Дунав (дугачак 2857 км) у европским миграцијама имао и има веома важну улогу.

Данас, преко система Рајна - Мајна - Дунав, повезано је Северно и Црно Море, а преко притока Дунава у Југославији, Тисе и Мораве, повезана је Панонска низија на северу са јужним делом Балканског полуострва - повезане су веома различите биогеографске области и еколошки различита станишта, од којих су нека већ драматично измењена и деградирана, а нека још увек релативно дивља и очувана.

Верујемо да истраживања фауне *Drosophilidae* мушица дуж тока Дунава могу да помогну бољем разумевању, како путева миграције ових организама и њихове екологије, тако и процене еколошког стања различитих станишта.

У овом, као и у свим нашим досадашњим радовима, мушице су ловљене уз помоћ супстрата за примамљивање (воћа у процесу врења) и ентомолошке мрежице (види КЕКИЋ *et al.*, 1996с).

На Табели I су приказани резултати ловљења мушица у близини Апатина у два блиска, али еколошки различита станишта: непосредно уз Дунав, у зеленом појасу који прати реку и у повртарско-воћарском делу оближњег викенд насеља. Према нашој грубој класификацији станишта Drosophilidae, оба припадају групи полудоместичних (KEKIĆ *et al.*, 1996c). Укупно је уловљено 26 врста: на обали Дунава 24, а у насељу 17.

На обали Дунава код Апатина су уловљене и две врсте које су нове у фауни Југославије: *Drosophila acuminata* Collin, 1952 и *Stegana similis* Maca et Lastovka, 1982, тако да је листа врста Drosophilidae пронађених на местима претходне Југославије овим налазом повећана на 58.

У досадашњим истраживањима фауне Drosophilidae на обали Дунава (Fig. 1 и Tab. II) откривено је укупно 33 врсте, а с обзиром да многа "дивља" и веома специфична еколошка станишта још нису истраживана (на пример, велики комплекси храстових шума у горњем току Дунава, ритови и мочваре код Петроварадина и Ковиља, или делови Дунава у оквиру Националног парка "Бердап"), верујемо да ће број врста бити изненађујуће велики.

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