

*Culex laticinctus* Edwards, a mosquito species new to the Croatian fauna

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**Abstract**

The Mediterranean species, *Culex laticinctus* Edwards, has been discovered in Croatia. It was found on the island of Vis in Dalmatia in September 2003. During the summer and autumn of 2005, the population of this species was monitored and found to appear in late summer and increase in abundance until autumn.

**Introduction**

The mosquito fauna of Croatia has been investigated several times. Relevant research results were published at different times during the past century (Karaman, 1925; Pavišić, 1951; Adamović & Paulus, 1983; Merdić, 1993; 1995), with the results of all previous investigations of the Croatian mosquito fauna presented in Merdić *et al.* (2004), who listed 48 mosquito species in the country. Since then, *Aedes albopictus* has also been recorded (Klobučar *et al.*, 2006), making *Culex (Culex) laticinctus* Edwards reported herein, the 50th mosquito species recorded in Croatia. Little is known about the biology of *Cx. laticinctus*. Larvae and adults appear mostly in the summer. It is supposed that only females hibernate. The species is widespread in Africa and the Mediterranean region from the Canary Islands to the Middle East (Gutsevich *et al.*, 1974; Becker *et al.*, 2003). In Europe it is found in the Mediterranean countries. It is recorded from Portugal, Spain, Italy, Malta, Greece, Romania and Turkey (Snow & Ramsdale, 1999). Larvae occur in permanent bodies of water of different dimensions, e.g. reservoirs, barrels, pools, etc, as well as wells, springs and irrigation canals. The water is mostly fresh, but may occasionally be mildly brackish. Females have not been found in settlements, but there are no records that people have been bitten, so the species has no medical significance.

**Methods**

Sampling of larvae and pupae was done using a net 25 cm in diameter. Each sample covered an area of 0.5 m<sup>2</sup>. Samples were collected twice a month during July, August and September 2005. The abundance of larvae per sample was estimated, with low, moderate and high densities recorded as +, ++ and +++, respectively (see Table 1 for the number of larvae denoted by each symbol). Adults were reared from pupae present in the samples.

Larvae were prepared for examination by dehydration in ethanol (50, 70, and 96%), cleared in xylol and mounted in Canada balsam. Adult mosquitoes were mounted on insect pins. The preparations are stored in the collections of the Institute for Public Health of Split-Dalmatia County and the Department of Biology of J.J. Strossmayer University in Osijek. Identification was performed using the keys of Gutsevich *et al.* (1974), Schaffner *et al.* (2001) and Becker *et al.* (2003).

**Results and discussion**

*Culex laticinctus* was first recorded in Croatia on 13 September 2003, in a collection made in a open concrete water tank (length 3.4m, width 1.4 m, height 0.82 m) located in a vineyard near the seashore on the island of Vis in central Dalmatia (Fig. 1). The depth of water in the tank during the sampling varied considerably, but was not found to run dry. Water temperature ranged between 21-26°C.

Species identification was carried out using fourth-stage of larvae and adult males and females that emerged from pupae. Key characters for the identification of the species are given by Samanidou-Vojadjoglou & Harbach (2001).

The main distinctive features of larvae are as follows: abdominal hair 6-VI single, comb scales on the abdominal segment VIII without a median apical spine and seta 1a-S inserted before the most distal pecten spine.

Diagnostic characters of adults include: 2 or more (usually 2-4) lower mesepimeral setae, wing with a short line of pale scales at base of costa, scales on forecoxa entirely pale, relatively wide basal pale bands on abdominal terga; prealar area with or without one or more scales.

The first samples of larvae and pupae were taken from the water tank in September 2003. Larvae of *Cx. laticinctus* were prevalent in the samples. To learn more, the tank was monitored for three months during 2005. The results are presented in Table 1. Samples collected in July 2005 also contained larvae of *Culiseta longiareolata* and *Cx. pipiens*, but in small numbers. Larvae of *Cx. laticinctus* first appeared in August and become the dominant species in the tank at the beginning of September.

Table 1. Relative abundance of mosquito larvae obtained during sampling in 2005.

	11.07.	23.07	08.08.	14.08.	03.09.	19.09.	01.10.
<i>Culiseta longiareolata</i>	+	+	++	++	++	+	+
<i>Culex pipiens</i>	+	+	+	+	-	-	-
<i>Culex laticinctus</i>	-	-	+	+	+++	+++	+

+++ > 50 larvae per sample  
 ++ 10 – 50 larvae / per sample  
 + 1 – 10 larvae / per sample  
 - no larvae

*Culex laticinctus* obviously has only one generation per year, never of great abundance, as it has never been recorded in the spring. Analysis of the data in Table 1 shows that there is a relationship between *Cx. pipiens* and *Cx. laticinctus*. It can be seen that *Cx. pipiens* is present until August, until the appearance of the first larvae of *Cx. laticinctus*, when their numbers decrease until they disappear, and the larvae of *Cx. laticinctus* become more numerous. There appears to be competition between the species, because it is known that larvae of *Cx. pipiens* can be found in breeding sites in the central Dalmatian islands until the end of November.

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Figure 1. Map of Croatia and the Island of Vis showing the study site.