

# Expansion of *Crocothemis erythraea* in Ukraine

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## Abstract

A noticeable expansion of some Mediterranean species takes place in Europe during last several decades and this data are related to climatic effects clearly. The present work is a review of literature and original data on distribution of *C. erythraea* in Ukraine. In the beginning and middle of XX century in Ukraine the Scarlet Dragonfly was observed in southern area at Dnieper valley, in outmost southwest at Danube delta at the west of Ukraine in Transcarpathian and Forecarpathian. Next, this species was registered at the foothills of Carpathian Mountains. During last three decades *C. erythraea* was also recorded at the north and east (central regions, eastern, northern and northeastern areas). Since 2000 new points have been registered in Odessa, Kherson, Vinnytsya, Cherkasy, Chernihiv, Kyiv administrative regions and in Crimea.

## Keywords

dragonflies, range expansion, *Crocothemis erythraea*, Ukraine, monitoring

## Introduction

*Crocothemis erythraea* is Palaearctic-Afrotropical-Oriental species, which distributed in Europe, Transcaucasus, Near East, Mid- and Central Asia, Northern and Tropical Africa, Madagascar and Northwestern India. In Western Palearctic the Scarlet Dragonfly occurs in the south and middle parts, reaching the Netherlands (Hermans and Gubbels 1997), Belgium (Knijf 2003), south of England (Jones 1996; Butler and Butler 1998; Parr 2001, 2002). The map of distribution *C. erythraea* in Western Palearctic region was made due to analysis of recent literature (fig. 1). In Europe it was found in Austria (Schweiger 1983; Chwala 1990; Raab et al. 1996; Ehmann 1998), Bulgaria



**Figure 1.** Distribution of *Crocothemis erythraea* in Western Palearctic.

(Beshovsky 1964a, 1964b, 1965, 1968; Scheffler 1973; Mauersberger 1985, 1990; Beutler 1987; Donath 1987; Beshovsky and Marinov 1993, 1998), Croatia (Trilar and Bedjanič 1999), Czech Republic (Mocek 1998; Waldhauser 2001), France (Rehfeldt 1991; Hazet 1992; Convey 1992; Papazian 1994, 1998; Wildermuth 2005), Germany (Müller 1987; Ott 1988, 1996, 2001; Stenberg 1989; Schorr 1990; Malkmus 1993, 1998; Bauhus 1996, 2001; Xyländer et al. 1998; Donath 2001, 2003; Lohr 2003; Horn 2004; Schlumprecht et al. 2004; Heidecke and Lindemann 2004; Mauersberger 2004), Hungary (Ambrus et al. 1996a,b,c,d,e), Italy (Letardi and d’Auria 1991; d’Antonio 1996, Terzani and Lo Cascio 1997), Moldova (Artobolevs’ky 1929; Andreev 1998), Poland (Czekaj 1994; Bernard 1999; Kalkman and Dijkstra 2000; Theuerkauf and Rouys 2001; Dolny 2003; Dolny et al. 2003), Slovakia (David 1990; 1998; Sibl 2001), Romania (Lehrer and Bulimar 1979), Spain (Aguero and Ferreras 1994; Cordero 1996; Pedrocchi and Ferreras 1996; Torralba and Ocharan 2003), Switzerland (Kiauta and Kiauta 1984; Weidmann 2001; Kunz and Hunger 2003; Gonseth and Monnerat 2003; Graf et al. 2004). *C. erythraea* also was registered in Asian part of Western Palearctic: Azerbaijan (Bartenev 1901), Jordan (Schneider 1985), Kazakhstan (Chaplina 2004), Tajikistan (Borisov 1987), Turkey (Hacet and Aktaş 1997; Kalkman et al. 2003; Van Pelt 2004), Saudi Arabia (Schneider 1995), Uzbekistan (Bartenev 1912) and northern Africa: Tunisia (Jodicke 2003).

A noticeable expansion of some Mediterranean Odonata species like *C. erythraea* occurred in Europe, beginning around 1980. Because the northward spread of these species is especially well documented, it seems worthwhile trying to correlate it with detailed climatic data now at hand (Ott 2001; Dijkstra, 2006). Scarlet Dragonfly colonizes the new biotopes mostly on initial stages of succession. Investigators registered the increasing of population sizes in higher altitudes as well. For example, in Germany *C. erythraea* have spread over several hundreds kilometers to the north and about 400 meters in altitude for last two decades (Ott 2001). Investigators consider this phenomenon as consequence of global climatic changed and propose *C. erythraea* as good indicator species.

## Material and methods

The present work is a review of literature data on distribution of *C. erythraea* in Ukraine. Author use the data of own collection and observation during 1999–2009 and data of collection of colleagues entomologists which were kindly lent for author as well.

## Results and discussion

In the beginning and middle of XX century in Ukraine the Scarlet Dragonfly was observed in southern area at Dnieper valley (Artobolevs'ky 1929; Brauner 1902), at Danube delta (Brauner 1903; Bezvali 1932) and in Western Ukraine in Transcarpathian and Forecarpathian (St. Quentin 1933; Grabar 1933) and Crimea (Artobolevsky 1929b; Pliginsky 1913). Pavlyuk (1990) collected this species in 1968 and 1973 at the foothills of Carpathian Mountains. During last two decades *C. erythraea* was recorded in Ukraine in outermost southwest at Danube delta (Gorb and Ermolrenko 1996; Dyatlova 2005, 2006), in Crimea peninsula (Kiseleva and Vershitsky 1998; Prokopov 2003), in the west (Vizslán and Huber, 2001) and towards to north and east, namely central regions (Barsov 1987), eastern (Martynov and Martynov 2003), northern (Tytar 2003; Matushkina 2006) and northeastern regions (Khrokalo 2000). In 2000–2007 new points were registered in Vinnytsya, Chernihiv, Kyiv administrative regions and in Crimea. Detailed data of all records are presented in regional order in the table 1. These points are mapped on the fig. 2 as well with numbers according to table 1 and years of records in parentheses.

Thus, *C. erythraea* is abundant in south areas, in other territories it occurs rarer. It expansion in Ukraine toward the north and east has been observed obviously. The flight period in Ukraine was registered from the end of May to end of September. Larvae were collected in different type of waters, such as lakes, ponds, rivers, brooks and pools, brackish waters. One of aspects which define this species is its ability to colonise the waterbodies on initial stages of succession. *C. erythraea* is characterized by R-strategy of population development, preference for higher temperature of environment, good flyers in adults, exophytic oviposition and other features of “winners” spe-

**Table 1.** Records of *Crocothemis erythraea* in Ukraine

№	Location	Date of records	References	Number of specimens, notes
Northern and Northeastern Ukraine				
1.	Sumy region, Yampil' distr., Nature Park "Prudysche"	17.07.1999	Khrokalo 2000	1 female - in Ulichka river valley at the derivation canal
2.	Chernihiv region, Borzna distr., env. vill. Yaduty	10.06.2002	Sheshurak P unpublished data	1 male
3.	Kyiv region, Vyshhorod distr., env. vill. Osischyna	27.06.2004, 6.08.2004, 2.07.2005	Matushkina 2006	2 males, 6 female, 1 exuviae were found at the lotic waterbodies. Tandems and oviposition were observed.
4.	Kyiv, Dnieper River, Trukhaniv Island		Tytar 2003	
5.	Env. of Kyiv, lake Ped'kine	4.07.2004	Khrokalo 2005	1 male
6.	Kyiv, lake Malynivka	23.06.2005	Khrokalo L unpublished data	2 males
7.	Kyiv, Golosiivsky Park, pond	25.07.2006	Khrokalo L unpublished data	1 male
8.	Kyiv region, Boryspil distr., env. of vill. Devichki, Dnieper river	12.07.2005	Matushkina 2006	1 female
9.	Kyiv region, Obukhiv distr., env. Kozyn, Kozynka river.	14.09.2003	Khrokalo L unpublished data	larva 1 female
Western Ukraine				
10.	Zakarpats'ka region, env. of Uzhhorod		Grabar 1933	
11.	Zakarpats'ka region, env. of Khust, lake in Tissa River valley	14.06.1968	Pavlyuk 1990	1 male
12.	Zakarpats'ka region, Mukacheve town, pond	26.09.1973	Pavlyuk 1990	1 male
13.	Zakarpats'ka region, Latorytsya river, env. of Mukacheve	28.07.1997	Vizslán and Huber 2001	1 male, floodplain of the Latorytsya river, <i>Reunoutria japonica</i> in some places.
14.	Zakarpats'ka region, env. of Velykaya Dobron', canals	25-30.07.1997	Vizslán and Huber 2001	7 males, slowly flowing almost stagnant water, silty bed and macrovegetation, on banks <i>Salix</i> .
15.	Chernivtsi region, Storozhynets' distr., vill. Jadova	13-20.07.1931	St. Quentin 1933	Common species.
16.	Vinnysya region, Shargorod distr., vill. Klekotyne	24.06.2004	Stolbchaty V unpublished data	1 male

№	Location	Date of records	References	Number of specimens, notes
Central Ukraine				
17.	Cherkasy region, Kanivs'ky reserve, Dnieper River, Zmiyni Islands	11-12.06.2004	Matushkina 2006	2 male, 2 female
18-20.	Central Ukraine, Dnipropetrovs'k region, valleys of Dnieper, Samara, Mokra Sura, Vovcha rivers.		Barsov 1987	
East Ukraine				
21.	Donets'k region, Artemovsk distr., env. vill. Dronovka, valley of Sivers'ky Donets' River	27.07.2002	Martynov and Martynov 2003	1 female was found at the bogged bank of lake
South Ukraine				
22.	S Ukraine, Mykolayiv region, bank of Ingul river	June 1914	Artobolevs'ky 1929a	1 female
23.	S Ukraine, Zaporizhzhya region. Between Zaporizhzhya and vill. Bilen'ke	23-24.07.1927	Artobolevs'ky 1929a	2 males
24.	Kherson region, env. of Kherson		Brauner 1902	Numerous records. Emergence took place from end of May with duration about month. Copulation started from end of June.
25.	Kherson region, Gola Prystan town, Dnieper delta, Konka river	4.08.2004	Dyatlova 2006	Abundant
26.	Kherson region, Gola prystan distr., Stara Zburiivka vill	2.08.2004	Dyatlova 2006	2 females
Southwestern Ukraine				
27.	Odessa region, env. of Izmayil	26.06.1902	Brauner 1903	1 male, 1 female
28.	Odessa region, env. of Izmayil		Bezvali 1932	
29.	Odessa region, Kiliya distr., vill. Prymors'ke	15-28.06.1995	Gorb and Ermolenko 1996	9 males, 1 female
30.	Odessa region, Kiliya distr., Vilcove town	14-19.09.1995	Gorb and Ermolenko 1996	1 male, 2 females
31.	Odessa region, Kiliya distr., west bank of Sasyk Lake	12.09.1995	Gorb and Ermolenko 1996	1 female
32.	Odessa region, Kiliya distr., Vilcove town	25.05.1996, 7,10.07.1997	Dyatlova 2005, 2006	2 males, 3 female3

<b>№</b>	<b>Location</b>	<b>Date of records</b>	<b>References</b>	<b>Number of specimens, notes</b>
33.	Odessa region, Kiliya town, Danube delta	24.05.2003, 24.05.2005	Dyatlova 2005	larva 1 male; in May 2005 author observed mass emergence
34.	Odessa region, Kiliya distr., env vill. Kyslytsya, Danube flood-lands	21.08.1999	Dyatlova 2005	1 male, 1 female
35.	Odessa region, Reni distr., env. vill. Novosil'ske, lakes	9.07.2004	Dyatlova 2005	1 male, 1 female
36.	Odessa region, Bolgrad distr., vill. Vynogradivka, Yalpus lake	21.06.1999 13.07.2003	Dyatlova 2005	2 females
37.	Odessa region, Izmayil distr., Danube delta "Izmayil Islands", Tataru Island	6.07.2005	Dyatlova 2005	1 male, 1 female
38.	Odessa region, Izmayil distr., Danube delta, Tataru Island	1-10.07. 2003	Matushkina 2006	7 males, 19 females
39.	Odessa region, Stambul's'ky Island	7.07.1997	Dyatlova 2005	2 females
40.	Odessa region, Izmayil distr., Kugurly lake	17.08.1996	Dyatlova 2005	1 male
41.	Odessa region, Bilyaivka vill, branch of Bystry Turunchuk river	26.06.2005, 28.07.2005	Dyatlova 2006	2 males
42.	Odessa region, Bilyaivka distr, Mayaki vill.	19.06.2003, 12.06.2004, 26.06.2005, 30.06.2005	Dyatlova 2006	4 males, 3 females
43.	Odessa region, Ovidiopol distr., env.of Prilimanskoye vill., Sukhoy liman	3,15.06.2003, 15.05.2004, 5.06.2004, 4, 18.07.2004, 17.08.2004	Dyatlova 2006	9 males, 6 females
44.	Odessa region, Ovidiopol distr., Dnistrovsky firch, Nadlymanske vill.	5.06.2005	Dyatlova 2006	1 male, 1 female
45.	Odessa city	17.07,8.08. 2004, 18.08. 2005	Dyatlova 2006	2 males, 3 females
46.	Odessa region, Berezivka town, Tyligulsky firch	8.06.2005	Dyatlova 2006	1 male
<b>Crimea</b>				
47.	Steppe part of Crimea peninsula		Kiseleva and Vershytsky 1998	Larvae in waterbodies of different types
48.	South coast of Crimea, env. Sevastopol' city	09.07.1906	Artobolevsky 1929b, Prokopov 2003	1 male Larvae in different lentic and lotic water, springs

№	Location	Date of records	References	Number of specimens, notes
49.	South coast of Crimea, env. Inkerman town	30.06-09.07.1912	Pliginsky 1913 Prokopov 2003	Adults Larvae in different lentic and lotic water, springs
50.	West coast, Bakhchisaray dist, env. vill. Beregove, Bulganak river	23.08.2001	Khrokalo and Prokopov 2009	larva 1 ♀
51.	Bakhchisaray dist, env. vill. Plodove, pond on river Al'ma	08.08.2008	Khrokalo and Prokopov 2009	1 male
52.	Saky dist. lake Donuzlav	25.08.2008	Khrokalo and Prokopov 2009	2 females
53.	env. of Bilogirsk, Rusanovsky pond	26.07.2007	Khrokalo and Prokopov 2009	2 males
54.	Simferopol'	1898 30.06-09.07.1912	Artobolevsky 1929b, Pliginsky 1913	1 male Adults
55.	Simferopol' dist., vill. Poznanske, pond on river Bukganak	06.08.2008	Khrokalo and Prokopov 2009	2 males
56.	South coast, Alushta distr., env. Rybache, Kanaks'ka gully	6.05.2005	Khrokalo and Prokopov 2009	larvae 2 juv. were found in small pool near road
57.	Yalta, pond in Mys Mart'yan reservation	08-10.07.2008	Khrokalo and Prokopov 2009	2 males

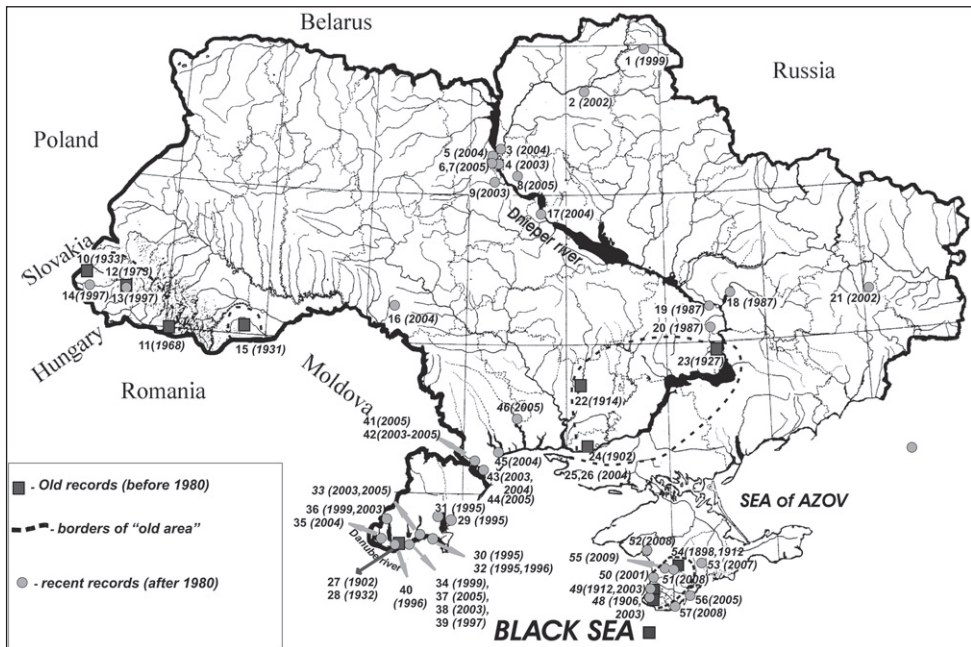


Figure 2. Records of *C. erythraea* in Ukraine.

cies (in competition). Most northern point of it breeding in Ukraine was registered in the north in Kyiv region (№ 3 in tab. 2). As climatic changes taking place, in Ukraine the average temperatures increases on 0,2–0,3°C during last two decades (Bilyavs'ky et al, 2004)), so more intensive expansion of Mediterranean species could be expected in future.

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