Acta entomologica serbica, 2010, 15(1): 1-6 UDC 595.733(560)

AN ANOMALOUS CONNECTION IN THE GENUS *AESHNA* FABRICIUS, 1775 (ODONATA: AESHNIDAE) WITH AN ADDITIONAL RECORD OF *AESHNA CYANEA* (MÜLLER, 1764) FROM TURKISH THRACE

NURTEN HACET

Trakya University, Faculty of Arts and Sciences, Department of Biology, TR-22030 Edirne, Turkey
E-mail: nhacet@hotmail.com

Abstract

A heterospecific tandem between a male *Aeshna affinis* Vander Linden, 1820 and a female *Aeshna cyanea* (Müller, 1764) is reported from İğneada (Longos Forest) in Kırklareli province in the Turkish Thrace Region. The locality, where the tandem was observed, is the second recording locality for *A. cyanea* from the region.

KEY WORDS: Odonata, dragonfly, heterospecific tandem, Aeshnidae, *Aeshna*, Turkish Thrace, Turkey

Introduction

Recent studies have indicated that heterospecific tandems within Odonata are not unusual (BICK & BICK, 1981; UTZERI & BELFIORE, 1990; CORBET, 1999). However, the difficulty in detection of females in heterospecific pairs for some genera restricts the number of records of such pairs (BICK & BICK, 1981; CORBET, 1999). Thus, it is probable that there are unreported or unpublished records of heterospecific pairs among dragonflies, and it is possible that the total number of all records is greater than the amount of available data.

Heterosexual heterospecific tandems were recorded and observed more often in Anisoptera than Zygoptera, and most of the known records showed that heterospecific pairs consist of individuals of the same genus (CORBET, 1999). Aeshnidae from Anisoptera is one of the families for which heterospecific pairings were recorded, and *Sympetrum* and *Gomphus* are Anisopteran genera including the highest record numbers of mixed pairings (BICK & BICK, 1981; CORBET, 1999).

Future accurate records or observations, in addition to the current ones, on heterospecific tandems and matings among dragonflies will provide important data that will contribute to understanding the effects of reproductive isolating barriers in dragonflies.

Aeshna cyanea, the species of the female member of the heterospecific pair reported in this paper, has a distributional range in northern Turkey (KALKMAN, 2006; KALKMAN & VAN PELT, 2006a) and has so far been reported from one locality in Turkish Thrace (HACET & AKTAÇ, 1997).

The objective of this paper is to report an anomalous tandem between the different species of dragonflies, and give an additional record to the distributional knowledge of *A. cyanea* from Turkish Thrace.

Material and Methods

An anomalous tandem of an *Aeshna affinis* male and an *A. cyanea* female was recorded in Longos Forest (41°49'N, 27°57'E; 16 m a.s.l.) of İğneada (Kırklareli province) in Turkish Thrace on 29-VII-2009. Another female specimen, *A. cyanea,* was observed at the same place on 09-VIII-2009. The locality (Longos Forest) representing the second record for *A. cyanea* in Turkish Thrace and where the heterospecific tandem was recorded is shown in Fig. 1.

Longos forest is situated to the north of Istranca Mountains in Turkish Thrace. The northern part of the Istranca Mountains is covered with humid forest with a rich undergrowth dominated by *Rhododendron* spp. (DÖNMEZ, 1990). Longos forest is characterized by ash, oak and alder trees. There are *Alnus glutinosa* (L.) Gaertn. subsp. *glutinosa* and *Fraxinus angustifolia* Vahl. subsp. *oxycarpa* (Bieb. ex Willd.) Franco et Alfonso in its marshy areas, and in particular *Quercus robur* L. and various oak species in its relatively more droughty areas (GÜLER, 2007).

Results & Discussion

A tandem between a male *Aeshna affinis* and a female *A. cyanea* was seen in a woody area near a roadside in Longos Forest. At first, a few *A. affinis* pairs and a few single *A. affinis* males were observed in the observation area. This species is quite common in İğneada and its surroundings. Then, a mixed pair of *A. affinis* and *A. cyanea* was noticed while they were flying in a tandem position in the same area. It was obvious that *A. affinis* had difficulty in carrying the *A. cyanea* female because the female was bigger in size. They settled in tandem position on a branch of a shrub for a short time and flew off, keeping their tandem positions when they were observed at a closer distance. The pair was then caught, and *A. affinis* male left *A. cyanea* female in a few seconds.

The records of heterosexual heterospecific tandems within dragonflies are not rare (CORBET, 1999). As pointed out by TENESSEN (1982), it appears, taking into consideration the available data, that the premating reproductive isolating barriers are possibly not exactly preventive for heterospecific connections and matings among dragonflies. These isolating barriers (i.e. ethological and mechanical isolations) show also different effect mechanisms in various groups. When libellulids and calopterygids are compared with lestids one can see that heterospecific connections within libellulids and calopterygids occur more often than lestids because anal appendages of libellulids and calopterygids are simpler than those of lestids (UTZERI & BELFIORE, 1990). This, in turn, renders it hard to make the discrimination of a heterospecific mate by appendages in libellulids

and calopterygids. It is thought that visual isolation in libellulids and calopterygids is more effective in discrimination of individuals but more studies on this type of isolating barrier are needed (TENESSEN, 1982). In addition, although examples of putative reproductive isolating barriers based on courtship and different colour models are present in some genera, i.e. *Calopteryx* and *Libellula*, the relevant literature shows that heterospecific tandems can occur within these genera (CORBET, 1999).

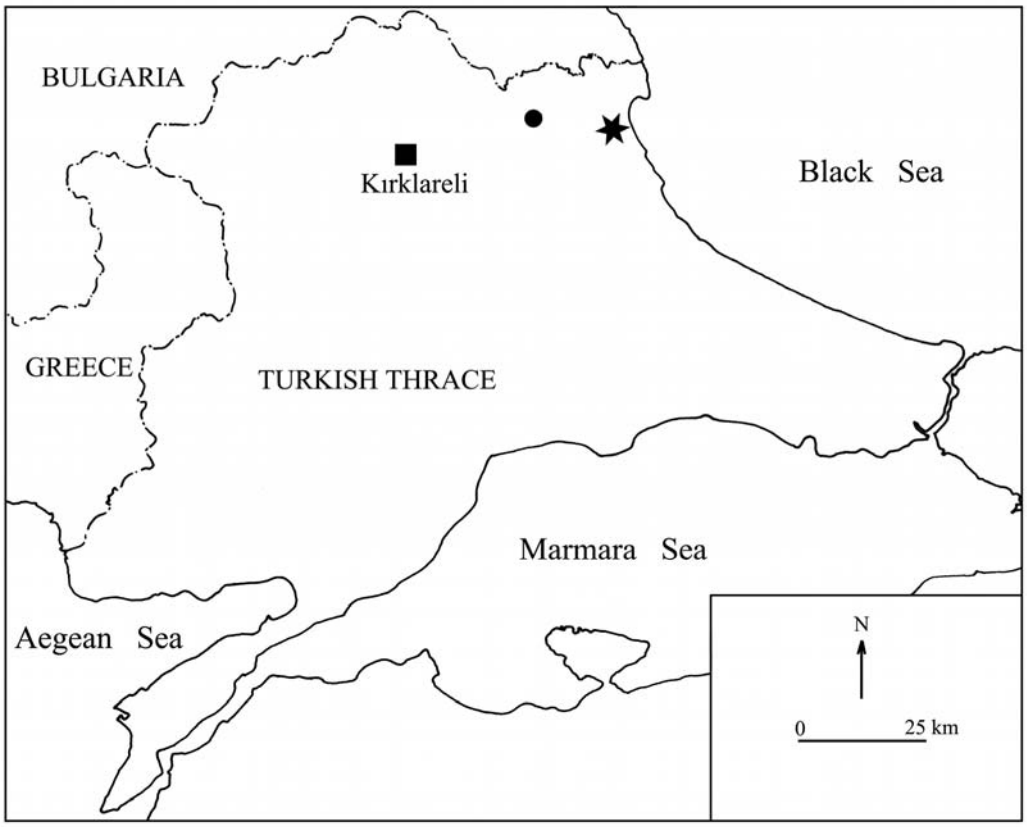

Figure 1. Map of the Turkish Thrace. Asterisk shows the locality where the heterospecific tandem was recorded. This is also the second locality record for *Aeshna cyanea* in the region. A circle denotes the former known locality for the species.

According to FINCKE (1994), heterospecific tandems decrease mating efficiency, and also would cause considerable waste of time when sterile eggs were laid. FINCKE (1994) defined mating efficiency for a mated female as "*the inverse of the number of times she mates per clutch laid".*

UTZERI & BELFIORE (1990) and SCHULTZ & SWITZER (2001) considered that mistaken reactions in mate choosing were probably adaptive behaviours. SCHULTZ & SWITZER (2001) reported an observation in their study that a male of the Eastern amberwing dragonfly, *Perithemis tenera* Say (Anisoptera: Libellulidae),

pursued not only its conspecific females and males in their territory but also a horse fly and a butterfly species resembling themselves in terms of body size, colour and flight height. The authors concluded that the male pursued the heterospecific targets as a result of misidentification.

It has been documented that the reaction of a male to a female changes through his life, and even through a day (see MILLER & FINCKE, 1999). It was considered that daily mating success of males increased through a few days with increasing mate recognition. MILLER & FINCKE (1999) found that sexually dimorphic colouration of the abdomen and thorax of females gives important cues for sexual recognition by males. For instance, males of coenagrionid damselflies, which have females exhibiting colour polymorphism, learn to recognize andromorphic females resembling themselves as potential mates.

The females of *Aeshna affinis*, the species whose male was reported in a heterospecific pair within this study, have a body colouration composed of greenish and brown. The colour patterns in these females are similar to those of *Aeshna cyanea* females, which is the other member of the heterospecific pair reported here. Thus, it might first be thought that the anomalous tandem between *A. affinis* male and *A. cyanea* female occurred because of the similar body colours of heterospecific and conspecific females, as in the case of misidentification of different species as indicated above. UTZERI & BELFIORE (1990) argued that misrecognition might arise from high sexual incentive in the males. They also adopted such misrecognition behaviours as adaptive behaviours. According to this adaptive approach, the time and energy expended to pursue or seize a heterospecific target is less costly than the gain from capturing a conspecific female. Since the entrance time of females to a mating area is generally an unpredictable condition from the point of view of males, and females rarely intrude in mating areas, it may be more useful for a male to approach or respond to each female resembling its conspecifics in its territory rather than waste time looking for identification of its conspecific females (UTZERI & BELFIORE, 1990; CORBET, 1999; SCHULTZ & SWITZER, 2001). Probably it is beneficial for the male to pursue or seize each heterospecific female similar to its conspecifics because the cost of capturing the rare conspecific females for mating will be higher than the cost in time and energy expended for a misidentificated female. Consequently it is believed that heterospecific mating behaviours will be advantageous for dragonflies (CORBET, 1999; SCHULTZ & SWITZER, 2001).

The present data on dragonflies show that few hybrids are reported (CORBET, 1999; BICK & BICK, 1981), confirming the fact that reproductive isolating barriers (premating and postmating) in dragonflies work effectively together to prevent the hybridization between different species (BICK & BICK, 1981).

Aeshna cyanea, the female member of the heterospecific pair reported in this paper, has been known from Turkish Thrace from only one locality so far (HACET & AKTAÇ, 1997). Longos forest, where the heterospecific tandem were recorded, is also the second sampling site of this species from the region. *A. cyanea* is a common species in central Europe, but is rather scarce when one goes to southern parts of the continent (DIJKSTRA & LEWINGTON, 2006). The distributional range of the species in Turkey lies along the northern parts of the country and localities where it was recorded from Anatolia are mainly in mountains inside this northern part (KALKMAN, 2006; KALKMAN & VAN PELT, 2006a). The present record and observation of this species and also the locality where the species was first recorded are located in the Istranca Mountains in the north of Turkish Thrace. Although *A. cyanea* was found mostly in pools and lakes with a well vegetation mostly above 750 m a.s.l. in the Anatolian part of Turkey (KALKMAN, 2006), it was also recorded at 250 m a.s.l. in Sakarya and at 200 m a.s.l. in Bolu provinces (KALKMAN & VAN PELT, 2006b). In Turkish Thrace, the first record of *A. cyanea* was from a brook in a forest at ca. 450 m a.s.l. where only male individuals had been caught (HACET & AKTAÇ, 1997). The species was found within this present study in a woodland area around the sea level to the north side of the Istranca Mountains. Therefore, considering the elevations where the species was recorded in Turkey, the latter record around sea level gives new data for the species. *A. cyanea* breeds in the

large sized waterbodies, preferring those that are stagnant, shaded and small (DIJKSTRA & LEWINGTON, 2006). There exist wide lakes inside Longos forest where two females were recorded, providing suitable habitats for the species to reproduce. The presence of such suitable breeding areas and the female records inside the region make it most likely that the species breeds here.

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ИНТЕРСПЕЦИЈСКА КОПУЛА У ОКВИРУ РОДА *AESHNA* FABRICIUS, 1775 (ODONATA: AESHNIDAE) И ДРУГИ НАЛАЗ ВРСТЕ *AESHNA CYANEA* (MÜLLER, 1764) У ТУРСКОЈ ТРАКИЈИ

НУРТЕН ХАЦЕТ

Извод

Интерспециски тандем који су чинили мужјак врсте *Aeshna affinis* Vander Linden, 1820 и женка врсте *Aeshna cyanea* (Müller, 1764) је забележен на локалитету Игнеада (шума Лонгос) у провинцији Киркларели у турском делу Тракије. Овај налаз јер истовремено други налаз врсте *A. cyanea* у овом региону.

Received December 16th, 2009
Accepted May 25th, 2010