

First well documented records of *Orthetrum trinacria* for Greece and Turkey (Odonata: Libellulidae)

Vincent J. Kalkman¹, Roy M.J.C. Kleukers¹ and João Tiago Tavares²

¹ EIS-Nederland/NCB Naturalis, P.O. Box 9517, NL-2300 RA Leiden,
<vincent.kalkman@ncbnaturalis.nl>, <roy.kleukers@ncbnaturalis.nl>

² Rua Alferes Barrilero Ruas, 48, 2º dto., P-1800-008 Lisboa, <omnicogni@gmail.com>

Abstract

Two records of *Orthetrum trinacria*, one taken in Turkey and the other in Greece, are documented by photographs. Former records of *O. trinacria* from Greece and Turkey are considered as doubtful, making these observations the first well documented for this species in both countries. Range expansion of dragonflies in the eastern Mediterranean is discussed and it is suggested that the present records of *O. trinacria* in Greece and Turkey might be a first indication that this species will become established along the coastal regions of the eastern Mediterranean.

Zusammenfassung

Erste glaubhaft dokumentierte Nachweise von *Orthetrum trinacria* in Griechenland und der Türkei (Odonata: Libellulidae) – Zwei Nachweise von *O. trinacria*, einer aus Griechenland und einer aus der Türkei, werden anhand von Fotos belegt. Da bisherige Meldungen dieser Art aus den beiden Ländern als zweifelhaft angesehen werden, handelt es sich um die ersten sicheren Nachweise der Art in Griechenland und der Türkei. Eine Arealerweiterung von *O. trinacria* im östlichen Mittelmeerraum wird diskutiert. Es wird angenommen, dass die neuen Nachweise einen ersten Hinweis darauf darstellen, dass die Art sich demnächst entlang der Küsten der östlichen Mittelmeerrais etablieren wird.

Introduction

Orthetrum trinacria (Selys, 1841) is a widespread and common African species, occurring throughout the continent except in areas covered with tropical forests. The species is found in a wide range of habitats, ranging from temporary stand-

ing waters to slow flowing sections of streams and rivers (SUHLING & MARTENS 2007; SAMWAYS 2008). It is moderately common in North Africa. The name *trinacria* is a poetic name for the island of Sicily, from which the holotype originated (FLIEDNER 1997). Although it was described from Europe, *O. trinacria* has a limited distribution on this continent. After its description in 1841, it took more than a century before it was discovered elsewhere in Europe, with the first record from Sardinia in 1972 (BUCCIARELLI 1977) and subsequent findings in Spain in 1983 (BELLE 1984), Malta in 2003 (EBEJER et al. 2008) and Fuerteventura in 2003 (M. Crewe in BOUDOT et al. 2009). After its first record from mainland Spain, the species started to expand its range, reaching Portugal in 1991 (JAHN 1996) and the northeast of Spain at the mid-height of the Castellón province (BAIXERAS et al. 2006). The species is scarce in most parts of its Iberian range, although it is regionally common, for instance in the Extremadura (SÁNCHEZ et al. 2009), and is currently still expanding as was recently shown for the Algarve (SANTOS LOUREIRO 2012). Despite its increase in the European parts of the western Mediterranean, it remains remarkably scarce in the northern parts of the eastern Mediterranean (Fig. 3). In the southernmost eastern Mediterranean countries, it is common in the Jordan Valley (DUMONT 1977, 1991) and was found only recently to be not uncommon in Syria (MOUSATAT et al. 2010; Johan van't Bosch pers. comm.).

The only record from Greece is from Rhodes and is based on a fresh specimen without abdomen (BENTIVOGLIO 1929). As this author is often known to have been unreliable and the specimen could not be checked, this record was considered doubtful by LOPAU (2010). For Turkey, records have been published by DUMONT (1977), DEMIRSOY (1982), and KAZANCI (2008). The record published by DUMONT (1977) is based on a male specimen labeled 'Klein-Asien' that was collected by the German zoologist Hans Kumerloeve. DUMONT (1977) suggested that this specimen originated from the Amik Göl area in Antakya province, close to the Syrian border and formerly pertaining to Syria. It is, however, not certain that this specimen was collected at this locality or at any other locality included in present-day Turkey. The records published by DEMIRSOY (1982) were considered doubtful by BOUDOT et al. (2009), although they were mapped. The reason for this doubt is that DEMIRSOY (1982) gave ten locations from different parts of the country, but no subsequently certified records could be provided despite a strong increase in the number of observers and observations. The key of *Orthetrum* species given in DEMIRSOY (1982) was poor and might easily have led to incorrect identification. The record published by KAZANCI (2008) is from central Turkey, where the occurrence of the species is unlikely, and is part of a paper that contains several other unlikely records.

In 2010 and 2011, pictures of *O. trinacria* were taken in Turkey and Greece, respectively, constituting the first documented records of this species for these countries.

Records

Greece:

1 mature male (documented by a photograph, figure 1), western Greece, Akheloos delta; 38.347°N, 21.128°E; field with varied vegetation of grasses, herbs and reed; 06-ix-2011 (RMJCK).

Turkey:

1 mature male (sighting only), Şanlıurfa, Birecik, gravel pits west of the Euphrates; gravel pits with reeds; 37.0048°N, 37.973°E; 10-v-2010 (J. Renoult pers. comm.).

1 mature male (documented by a photograph, figure 2), Şanlıurfa, Birecik, reed beds and gravel pits along the Euphrates; 37.051°N, 37.974°E; 11-x-2010 (JTT).

Figure 1: *Orthetrum trinacria*, mature male, Greece, Akheloos delta (06-ix-2011). – Abbildung 1: *Orthetrum trinacria*, reifes Männchen, Griechenland, Akheloos-Delta (06.09.2011). Photo: RMJCK



Figure 2: *Orthetrum trinacria*, mature male, Turkey, Şanlıurfa, Birecik (11-x-2010). – Abbildung 2: *Orthetrum trinacria*, reifes Männchen, Türkei, Şanlıurfa, Birecik (11.10.2010). Photo: JTT



The record in Greece was taken by RMJCK during work on grasshoppers and no search was conducted at water bodies to see if more adults were present. The record in Turkey from October 2010 was taken by JTT during a bird and dragonfly watching trip. The following species were recorded at the same location: *Ischnura elegans*, *Brachythemis impartita*, *Crocothemis servilia*, *Sympetrum fonscolombii* and *Trithemis annulata*, while nearby *Aeshna mixta*, *Anax imperator*, *A. parthenope*, *Orthetrum sabina* and *Sympetrum striolatum* were found. No additional individual of *O. trinacria* was seen and the species was at least uncommon. Potential suitable habitats in this area are gravel pits and ditches in adjacent agricultural fields.

Discussion

The material on which BENTIVOGLIO (1929) based the only previous Greek record of *Orthetrum trinacria* has not been checked since its publication and this record is considered doubtful (LOPAU 2010). The record presented here is therefore the

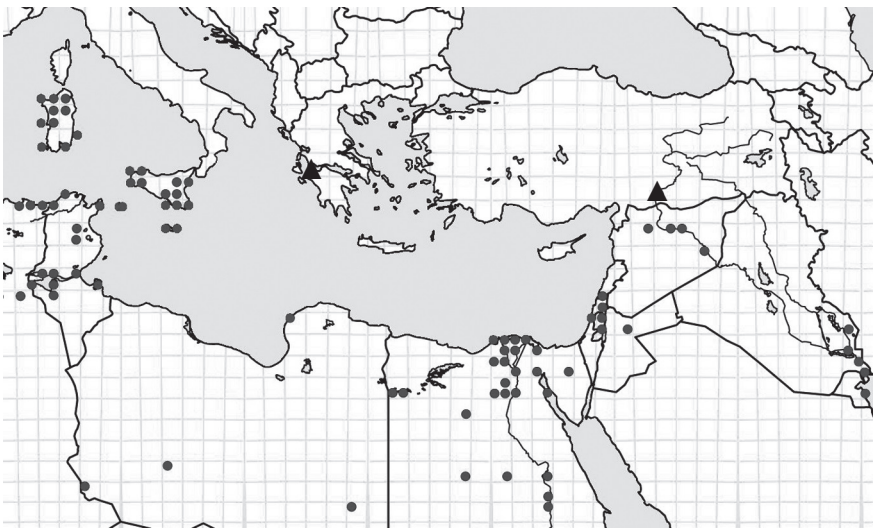


Figure 3: Distribution of *Orthetrum trinacria* in the eastern Mediterranean (map by courtesy of J.-P. Boudot). The triangles refer to the new records in Greece and Turkey. Each dot represents 45 km and may cover several localities. Some of the dots in Syria come from OBSERVADO.ORG (2012). The Italian records are based on the database of 'Odonata.it'. – Abbildung 3: Verbreitung von *Orthetrum trinacria* in der östlichen Mediterraneis (Karte: J.-P. Boudot). Dreiecke stellen die neuen Nachweise in Griechenland und der Türkei dar. Einige Fundpunkte in Syrien stammen aus OBSERVADO.ORG (2012) und die Nachweise in Italien aus der Datenbank von 'Odonata.it'.

first confirmed record for Greece. The species was already listed on the Greek checklist and the number of species known from Greece therefore remains 78 (LOPAU 2010). Only one individual was observed in 2011, and as no search was conducted it is unclear whether more individuals were present. The Akheloos delta probably has suitable habitats for *O. trinacria*. Further exploration of this area is needed to confirm if the species reproduces in the area.

Orthetrum trinacria was already listed for Turkey by KALKMAN et al. (2003), KALKMAN (2006) and BOUDOT et al. (2009), based on records published by DUMONT (1977), and DEMIRSOY (1982). All records by DEMIRSOY (1982) and KAZANCI (2008) are considered doubtful while it is not certain that the one published by DUMONT (1977) stems from present-day Turkey. The record presented here is therefore the first well documented for this species in Turkey. No documented evidence is available for the earlier record of a male from the same area (J. Renault pers. comm.), but the observer is familiar with the species and we do not doubt the identification. These two records, taken very closely only five months apart, suggest that a population may be present in the area. Since the check-list of Turkey (BOUDOT et al. 2009), *Ischnura senegalensis* and *Sympetrum danae* have been published as new for the Turkish fauna (KAZANCI 2010; MIROĞLU 2011). The former is however regarded as a misidentification as the records were made at rather high altitude (800 and 1,800 m a.s.l.), i.e. in an area where the occurrence of *I. senegalensis* is highly unlikely. Furthermore, neither KAZANCI (2010) nor other papers by the same author mention the common and widespread *I. elegans*.

Until recently the only published information on the presence of *O. trinacria* in Syria was given by SCHNEIDER (1986), presenting a map that shows a dot on the Golan Heights without further details. However in 2006 and 2010, the species was found at five localities across the country (MOUSATAT et al. 2010; OBSERVADO.ORG 2012; J. van't Bosch pers. comm.). The relatively little effort with which the species was found at several localities in this country in 2010 compared with the scarcity of records in the past suggest that *O. trinacria* has expanded its range in Syria and that the Turkish record might be part of this expansion. The latter is near the Syrian border at 115 km from the nearest Syrian location. It is not clear if the species expanded its range into Syria from a population in the Jordan Valley or from populations found in southern Iraq, Kuwait and nearby Iran. The latter populations are isolated from the main species range and have been described as a poorly differentiated subspecies, *O. t. igarashii* Asahina, 1973, characterized by a smaller size and a one-celled Rspl field. The Greek locality lies approximately 500 km from populations in Sicily, over 600 km from the nearest North African records in Libya, and nearly 1,500 km from the nearest locality in Turkey, Syria and Israel. The Turkish south coast and many parts of Greece have been well explored in the last decade and one can reasonably assume that the species is at present either absent or very rare in this area. The record from the southwestern part of mainland Greece therefore seems to be either part of a recent colonization from Sicily or a wanderer.

Based on nine localities in southern Portugal and four in Sicily, DE KNIJF & DEMOLDER (2010) suggested that the optimal habitats for *O. trinacria* in south-western Europe are ponds with well-developed vegetation at the water edge and, less often, also with aquatic vegetation. SÁNCHEZ et al. (2009) described the habitats in Extremadura as unshaded reservoirs, marshes and ponds often in or near floodplains of rivers. These kinds of habitats are available in southern Turkey and coastal Greece and the former absence of this species seems therefore mainly caused by climatic conditions. Increased temperatures might enable the species to become more widespread in the eastern Mediterranean as it has done in the Iberian Peninsula. The increase of southern species due to climate change has been well documented for most parts of Europe (OTT 2010). In the Iberian Peninsula this has resulted in African species becoming established or expanding their ranges northwards. Well-known examples are *Brachythemis impartita*, *O. trinacria* and *Trithemis annulata*. The most recent example is *Trithemis kirbyi*, of which the first two European records are from Sardinia in 2003 (HOLUŠA 2008) and southern Spain in 2008 (CHELMICK & PICKESS 2008). Since the first Spanish record, it has been found at several sites in Andalucia, reaching as far north as the southern tip of the Extremadura (CANO-VILLEGAS & CONESA GARCIA 2009; MÁRQUEZ RODRÍGUEZ 2011; OBSERVADO.ORG 2012).

The increase of southern species seems also to take place in the eastern part of the Mediterranean but remains so far less documented. LOPAU (2010) described the expansion of the range of *T. annulata* which happened roughly in the same period as its expansion in the western Mediterranean. The best examples of range expansions in Turkey are *Trithemis arteriosa* and *B. impartita*. The second Turkish record of the latter was made in 2002 but since then it has expanded its range and has been found as far west as in the Muğla province (HOPE 2007). The Turkish record presented here of *B. impartita* at Birecik from the same location as *O. trinacria* constitutes another extension of its range. It also constitutes to date the northernmost record from this part of its range, corresponding to a number of recent records from northern Syria (MOUSATAT et al. 2010; J. van't Bosch & P. Schrijvershof pers. comm.). The African *T. arteriosa* was first recorded for Turkey in 1988 (DUMONT et al. 1988) and has since expanded westwards, having been found as far west as the Muğla province in 2011 (E. van der Ploeg pers. comm.). The first records of these species on the Greek islands adjacent to Turkey seem to be just a matter of time. The new records of *O. trinacria* for Turkey and Greece might also fall into the pattern of expanding ranges of southern species, and might be a first sign of *O. trinacria* becoming established along coastal Turkey and Greece.

Acknowledgements

The Italian dragonfly organization (Odonata.it) is thanked for giving permission to use the database on Italian odonates. Julien Renoult kindly shared informa-

tion on his record from Turkey. Johan van't Bosch kindly shared information on the Syrian records of *Orthetrum trinacria*. Jean-Pierre Boudot made the map and commented on an early draft of the paper. Jean-Pierre Boudot and Sönke Hardersen reviewed the paper and helped with additional information.

References

- BAIXERAS J., J.M. MICHELENA, P. GONZÁLEZ, F.[J.] OCHARAN, C. QUIRCE, M.A. MARCOS, E. SOLER, J. DOMINGO, S. MONTAGUD, A. GUTIÉRREZ & M. ARLES (2006) Les libèl·lules de la Comunitat Valenciana. Generalitat Valenciana, Conselleria de Territori i Habitatge, Valencia
- BELLE J. (1984) *Orthetrum trinacria* (Selys) new to the fauna of Spain, with records of three other Afrotropical Odonata Anisoptera. *Entomologische Berichten*, Amsterdam, 44: 79-80
- BENTIVOGLIO T. (1929) Odonati. Ricerche faunistiche nelle isole Italiane dell'Egeo. *Archivio Zoologico Italiano, Napoli* 13: 199-210
- BOUDOT J.-P., V.J. KALKMAN, M. AZPILICUETA AMORÍN, T. BOGDANOVIĆ, A. CORDERO RIVERA, G. DEGABRIELE, J.-L. DOMMANGET, S. FERREIRA, B. GARRIGÓS, M. JOVIĆ, M. KOTARAC, W. LOPAU, M. MARINOV, N. MIHOKOVIĆ, E. RISERVATO, B. SAMRAOUI & W. SCHNEIDER (2009) Atlas of the Odonata of the Mediterranean and North Africa. *Libellula Supplement* 9: 1-256
- BUCCIARELLI I. (1977) Dati preliminari sul popolamento odonatologico di Calabria, Sicilia e Sardegna (VIII contributo alla conoscenza degli Odonati). *Annali del Museo Civico di Storia Naturale "Giacomo Doria"* 81 [1976-1977]: 374-386
- CANO-VILLEGAS F.J. & M.A. CONESA GARCÍA (2009) Expansion de *Trithemis kirbyi* Selys, 1891 (Odonata: Libellulidae) en la provincia de Málaga (sur de la Peninsula Ibérica). *Boletín de la Sociedad Entomológica Aragonesa* 44: 569-572
- DE KNIJF G. & H. DEMOLDER (2010) Odonata records from Alentejo and Algarve, southern Portugal. *Libellula* 29: 61-90
- DEMIRSOY A. (1982) Odonata Türkiye Faunası. Türkiye Faunası (VIII) 4 (8). TÜBİTAK, Ankara [in Turkish]
- DUMONT H.J. (1977) A review of the dragonfly fauna of Turkey and adjacent Mediterranean islands (Ins. Odonata). *Bulletin et Annales de la Société Royale Belge d'Entomologie* 113: 119-171
- DUMONT H.J. (1991) Fauna Palaestina. Insecta V Odonata of the Levant. The Israel Academy of Sciences and Humanities, Jerusalem
- EBEJER M.J., G. DEGABRIELE & A. SCIBERRAS (2008) An annotated checklist of Odonata of the Maltese Islands, with evidence for a recent influx of species. *Libellula* 27: 133-145
- FLIEDNER H. (1997) Die Bedeutung der wissenschaftlichen Namen europäischer Libellen. *Libellula Supplement* 1: 5-111
- HOPE P. (2007) The dragonflies of eastern Muğla province, south-west Turkey. Land of light publishing, Fethiye
- JAHN P. (1996) Libellen im Einzugsgebiet des Guadiana in Südostportugal. *Advances in Odonatology, Supplement* 1: 65-76
- KALKMAN V.J. (2006) Key to the dragonflies of Turkey, including species known from Greece, Bulgaria, Lebanon, Syria, the Transcaucasus and Iran. *Brachytron* 10: 3-82

- KALKMAN V.J., M. WASSCHER & G.J. VAN PELT (2003) An annotated checklist of the Odonata of Turkey. *Odonatologica* 32: 215-236
- KAZANCI N. (2008). Contribution to the knowledge of Odonata Fauna of Turkey: Central Anatolia. *Review of Hydrobiology* 2: 119-128
- KAZANCI N. (2010) Contribution to the knowledge of Odonata (Insecta) Fauna of Turkey: Eastern and Southeastern Anatolia. *Review of Hydrobiology* 3: 1-11
- LOPAU W. (2010) Verbreitungsatlas der Libellen in Griechenland (Odonata). *Libellula Supplement* 6: 5-153
- MÁRQUEZ RODRÍGUEZ J. (2011) *Trithemis kirbyi ardens* (Gerstaecker, 1891) (Odonata: Libellulidae); datos de campo sobre su ecología en el Sur de España y primeros registros para la provincia de Sevilla (España). *Métodos en Ecología y Sistemática* 6 (1-2): 10-20
- MIROĞLU A. (2011) First record of the Black Darter, *Sympetrum danae* (Sulzer, 1776) (Odonata: Libellulidae), from Turkey. *Zoology in the Middle East* 53: 129
- MOUSATAT F., H.J. DUMONT, M. KARROM & N.M. ALI (2010) Dragonflies from northern Syria (Insecta: Odonata). *Zoology in the Middle East* 51: 105-112
- OBSERVADO.ORG (2012) Online on the Internet (16-vi-2012), URL: <http://observado.org/index.php>
- OTT J. (2010) Dragonflies and climatic changes – recent trends in Germany and Europe. In: OTT J. (Ed) Monitoring climatic change with dragonflies. *BioRisk* 5: 253–286
- SAMWAYS M.J. (2008) Dragonflies and damselflies of South Africa. Pensoft, Sofia-Moscow.
- SÁNCHEZ A., J. PÉREZ, E. JIMÉNEZ & C. TOVAR (2009) Los Odonatos de Extremadura. Consejería de Industria, Energía y Medio Ambiente, Cáceres
- SANTOS LOUREIRO N. DE (2012) New data on the distribution of *Orthetrum trinacria* in Algarve, southern Portugal (Odonata: Libellulidae). *Libellula* 31: 77-87
- SCHNEIDER W. (1986) Systematik und Zoogeographie der Odonata der Levante unter besonderer Berücksichtigung der Zygoptera. Dissertation, Universität Mainz
- SUHLING F. & A. MARTENS (2007) Dragonflies and damselflies of Namibia. Gamsberg Macmillan Publishers, Windhoek

Manuskripteingang: 16. November 2011