

Annotated checklist of the dragonflies (Insecta Odonata) of the islands of the Sicilian Channel, including the first records of *Sympetrum sinaiticum* Dumont, 1977 and *Pantala flavescens* (Fabricius, 1798) for Italy

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ABSTRACT

In this paper we report data on the historical and recent status of all dragonfly species (Insecta, Odonata) recorded for the Sicilian Channel islands: the Pelagie islands and Pantelleria, politically belonging to Italy, and Maltese Archipelago islands. The number of species known for the former group of islands raises from 7 to 20. Of these, 2 are new for the Italian fauna, namely the Desert Darter *Sympetrum sinaiticum*, noticed through likely sightings starting from 2010 on Lampedusa, and confirmed through voucher specimens collected in April 2012, and the Wandering Glider *Pantala flavescens*, first noticed in October 2012 on Lampedusa and Linosa; while *Calopteryx* sp. cf. *haemorrhoidalis*, *Ischnura genei*, *Aeshna mixta*, *Orthetrum nitidinerve*, *Orthetrum coerulescens anceps*, *Crocothemis erythraea*, *Sympetrum striolatum*, *S. meridionale*, *Brachythemis impartita*, *Trithemis annulata* and *T. kirbyi*, already known for Italy, are new for the Italian islands of the Sicilian channel. The Maltese fauna includes at present 18 recorded species; the previously reported *Trithemis arteriosa* is to be deleted from the list, since the concerned specimen upon re-examination proved to be *T. annulata*.

KEY WORDS

Odonata; Sicilian Channel Islands; *Sympetrum sinaiticum*, *Pantala flavescens*; new for Italy.

Received 12.05.2012; accepted 22.12.2012; printed 30.12.2012

Proceedings of the 1st International Congress "Insularity and Biodiversity", 11th-13th May 2012, Palermo, Italy

INTRODUCTION

Because of local scarcity of aquatic biotopes, resulting in low species richness, the dragonfly fauna (Insecta, Odonata) of the Italian islands of the Sicilian Channel has received little attention. Indeed, there are only three publications specifically dealing with the Odonata of the Pelagie islands and Pantel-

leria (Consiglio, 1960; Lohmann, 1989; Pavesi & Utzeri, 1995), while material from these islands is also briefly discussed in other works (Carchini & Di Domenico, 1992; Carfi & Terzani, 1993). Only 7 species are reported in the literature for the Italian islands of the Sicilian Channel, including one only known from historical records and considered locally extinct (Pavesi & Utzeri, 1995); of recently

reported ones, only 2 were found to breed, and of these only 1 with a doubtless viable population. This very low species richness no doubt largely results from near-absence of permanent or even temporary water bodies, suitable for Odonata breeding and larval development. Yet a lot of dragonfly species are strong fliers, able to cover long distances as occasional vagrants or regular true migrants, more so when supported by favourable winds, and often also to breed, at least temporarily, even in artificial, newly formed water bodies. Therefore the little number of recorded species is also due to limited field work carried out over the years; on the other hand, the number of actually occurring species may be subject to rapid changes, due to modifications of local conditions, e.g. newly created suitable biotopes. Other insect groups attracted greater interest and have been the object of more detailed studies, in parallel with the situation on mainland Sicily (Corso, personal unpublished data), which resulted in a clear, although limited, increase in the number of recorded species.

The islands of the Maltese archipelago, compared to Pantelleria and the Pelagie, despite of intensive habitat destruction still harbour many more bodies of either fresh or brackish water, and local Odonata received a greater deal of interest. Literature about Malta and its satellite islands is varied and extensive; in addition to historical works (Valletta, 1949, 1957), an increasing number of papers in recent years focused on single species or on the whole odonate fauna, including discussions of their biology and local status (Ebejer et al., 2008; Sciberras, 2008; 2011; Sciberras & Sammut, 2008; 2013; Sciberras et al., 2010; Gauci & Sciberras, 2010). This resulted in a more diverse known odonatological fauna, as far as certainly or supposedly breeding species are concerned: not less than 15 of the 18 species so far recorded. Even so, further additions are to be expected, since climate changes may result in formerly occasional or never found species becoming established, even with large populations. For example, two of the present-day most abundant dragonflies, *Orthetrum trinacria* and *Trithemis annulata*, were first recorded only after 2000.

From 2006 to 2012, we have visited the Pelagie islands and Pantelleria with the primary purpose of gathering ornithological data, but we kept a high interest in and have paid a great deal of attention to

other aspects of islands biodiversity, including Odonata. This paper presents the results of our field work, together with an overview of existing published data. As a result of our field work, the number of species recorded for the Pelagie and Pantelleria has more than doubled, with 20 species, including 2 new for the Italian fauna.

ABBREVIATIONS. AC = A. Corso; AS = A. Sciberras; COM = Comino; GOZ = Gozo; LIN = Linosa; LMN = Lampione; LMP = Lampedusa; MAL = Malta; MISC (Malati di Isolitudine allo Stadio Cronico) = a birding and nature group focused on islands of Mediterranean Basin; MP = M. Pavesi; MS = M. Sammut; MV = M. Viganò; OJ = O. Janni; PNT = Pantelleria.

MATERIALS AND METHODS

Taxonomy and nomenclature follow Dijkstra & Lewington (2006) and Dijkstra & Kalkman (2012). We consulted all the available literature on the Odonata of our study area, and analysed both recent and historical works in order to note any population trends (increasing/decreasing/stable) and have a baseline checklist against which to compare our findings.

Three of us (AC, OJ and MV) have visited Pantelleria and the Pelagie in spring (February-May), summer (June-August), autumn (September-November), and a few winter visits in December and late January. More specifically, between April 2004 and November 2012 they have visited the Pelagie for a total of almost 400 days, in the following periods: April-May 2004, September-October 2005, March-May 2006, September-October 2006, March-May 2007, September-October 2007, January 2008, March-May 2008, June 2008, October-November 2008, March-July 2009, September-November 2009, January 2010, March-May 2010, October-November 2010, February-April 2011, July-August 2011, October-November 2011, October-November 2012. As part of a LIPU-sponsored study on raptor migration across the Mediterranean, they visited Pantelleria for 30-days periods in April-May 2005-2012 and August-September 2008, during which they prospected all potentially suitable habitats, and as general rule tried to cover as much ground as possible, in order to find both odonates breeding in local water bodies and migrating individuals. Occasional field trips

were also made by AS (April 2010 and September 2010) and MP (November 2012).

As for Maltese islands, two of the authors (AS, MS) are resident on Malta, the largest one, and were able to monitor the local odonate fauna all over the last three decades. All species but very few have been photographed; voucher specimens for many have also been collected and are now housed in the private collections of three of the authors (AC, MP and AS). Each specimen collected, whether mounted or in an envelope, is accompanied by the following data: species (and subspecies if applicable), sex, locality (including GPS coordinates) and date of collection, number of observed individuals, collector (legit) and responsible for the identification (det.). Determinations for each record, either based on material evidence (voucher specimen/photo) or only on sighting, rely on the record's author himself, unless otherwise stated.

RESULTS AND DISCUSSION

Our study raises to 20 the number of odonate species altogether recorded for the Pelagie (20, of which 2 tentatively) and Pantelleria (9, of which 1 with the only European large viable population), vs. 7 previously reported in the literature (Table 1). More exactly, as for the Pelagie, recorded species richness is as follows: Lampedusa (17, of which 2 tentatively), Linosa (13, of which 2 tentatively), and Lampione (4). Two of the species recorded in the past for Pantelleria, one of which at that time supposedly breeding, have never been found again there during our survey (see below), while all the species previously recorded for the Pelagie were repeatedly confirmed.

It should be kept in mind that there is indeed no reason for which any species found on one of these islands would not to be expected, at least occasionally, also in the others. All of them are rather close to each other, therefore more or less equally exposed to migratory influxes, accounting for most odonate records, these islands being poor (Pantelleria) to almost or completely devoid of water bodies (the Pelagie). Very few of these exist on Lampedusa, where some species with evidence or presumption of breeding are recorded, although none is definitely known to have viable local populations; for instance a fairly large, temporary

rain pool at Ponente, within the island's nature reserve, a water-filled, shallow gravel pit at Albero Sole, a temporary pool at the mouth of a mostly dry creek at Cala Pulcino, or again man-made small water reservoirs (see below, under *Symptetrum fonscolombii*). Newly built-up water catchments or reservoirs, to be kept filled with some water throughout the year, where also aquatic vegetation may develop (e.g. within the Lampedusa Island Natural Reserve), could indeed result in conspicuous increase of breeding species, with some populations possibly becoming established. Some species may also, at least occasionally, breed on Linosa, where no natural water bodies, yet here and there some small reservoirs exist. Lampione on the other hand is a small, not inhabited rock, where not even the least water catchment exists, and therefore all Odonata there found are no doubt migrants. Dragonflies occurrence, sometimes massive, therefore results above all from migratory events, mainly linked to strong winds from southern quadrants, namely "libeccio" (from southwest) and "scirocco" (from south-east). The former above all seems to account for most of the influxes, because of much lesser distance, between the islands and the North-African coast, in southwest direction rather than in south-east one. Winds from north-east ("grecale") or north ("tramontana"), cooler than southern ones, are usually not considered as source of influxes, yet they may account for occasional arrivals from Sicily, including weak fliers such as zygopterans.

Differences in number of recorded species therefore result above all from different amount of observations. Lampedusa, the only one of the Pelagie with an airport, is the easiest to reach, even with stormy sea conditions, while the other two can be reached only by ship. Exceedingly low number of species recorded for Lampione partly relies on lack of observations, only resulting from short visits, because of non-existing local facilities; on the other hand, on its most limited extension, compared to Lampedusa and Linosa, therefore on its hardly acting as rest site for migrant individuals. Moreover, during strong winds periods, usually the best situation to observe dragonflies on the Pelagie, reaching the islet may prove impossible.

Pantelleria shows somewhat different conditions. Besides being by far the largest and highest in altitude (836 m), it has a permanent saline lake,

SPECIES	PNT	LMP	LIN	LMN	STATUS	NOTES
ZYGOPTERA CALOPTERYGIDAE						
<i>Calopteryx haemorrhoidalis</i>			?		accidental	
<i>C. virgo meridionalis</i>					no records	accidental on Maltese islands
COENAGRIONIDAE						
<i>Ischnura fountaineae</i>	X	?	X		breeding	Linosa records at reservoirs
<i>Ischnura genei</i>		?	X		breeding?	
ANISOPTERA AESHNIDAE						
<i>Aeshna mixta</i>	X	X	X		occasional?	large migrant swarms regularly observed in Sicily
<i>Anax imperator</i>	X	X	X	X	migrant, irregular breeding	oviposition and exuviae recorded on Pantelleria
<i>Anax parthenope</i>	X	X	X	X	migrant, irregular breeding?	oviposition recorded on Pantelleria
<i>Anax ephippiger</i>	X	X	X	X	migrant, possibly breeding	potentially suitable biotopes on Pantelleria
LIBELLULIDAE						
<i>Orthetrum brunneum</i>					no records	rare on Malta, breeding not confirmed
<i>Orthetrum nitidinerve</i>		X			vagrant	single record; occasional migration recorded on Malta
<i>Orthetrum coerul. anceps</i>		X			vagrant?	single record; common on Malta
<i>Orthetrum chrysostigma</i>					no records	records on Malta, status uncertain
<i>Orthetrum cancellatum</i>	X	?			vagrant, formerly breeding?	large population in the past on Pantelleria, extinct
<i>Orthetrum trinacria</i>	X	X			vagrant	migratory species, recently established on Maltese islands
<i>Crocothemis erythraea</i>		X	X		occasional migrant, irr. breeding?	oviposition recorded on Lampedusa, breeding not confirmed
<i>Sympetrum fonscolombii</i>	X	X	X	X	migrant, irregular breeding	large numbers regularly observed
<i>Sympetrum striolatum</i>	X	X	X		migrant, irregular breeding?	oviposition recorded on Lampedusa, breeding not confirmed
<i>Sympetrum meridionale</i>		X			vagrant	single record
<i>Sympetrum sinaiticum</i>		X	?		migrant	regular in winter-early spring, no reproductive behaviour
<i>Brachythemis impartita</i>			X		occasional migrant	scattered records; established on Italian major islands
<i>Trithemis annulata</i>		X			vagrant	recently established on Maltese islands
<i>Trithemis kirbyi</i>		X			vagrant	single record
<i>Selysiothemis nigra</i>					no records	breeding on Maltese islands
<i>Pantala flavescens</i>		X	X		vagrant	single cluster of records; migratory species

Table 1. Odonata of the Pantelleria and Pelagie islands.

SPECIES	MAL	GOZ	COM	STATUS	NOTES
ZYGOPTERA CALOPTERYGIDAE					
<i>Calopteryx haemorrhoidalis</i>	X	?		vagrant	local populations never recorded, despite potentially suitable habitats
<i>C. virgo meridionalis</i>	?	X		vagrant	
COENAGRIONIDAE					
<i>Ischnura fountaineae</i>				no records	possibly overlooked
<i>Ischnura genei</i>	X	X	X	breeding	
ANISOPTERA AESHNIDAE					
<i>Aeshna mixta</i>	X	X	X	occasional	
<i>Anax imperator</i>	X	X		breeding	partly declining, displaced by <i>A. parthenope</i> ?
<i>Anax parthenope</i>	X	X	X	breeding	
<i>Anax ephippiger</i>	X	X	X	migrant, irregular breeding	exuviae recorded; no viable population known
LIBELLULIDAE					
<i>Orthetrum brunneum</i>	X			breeding?	rare, breeding not confirmed
<i>Orthetrum nitidinerve</i>	X			occasional	single cluster of records
<i>Orthetrum coerul. anceps</i>	X	X		breeding	
<i>Orthetrum chrysostigma</i>	X			breeding?	scattered records, single emergence recorded; possibly underestimated
<i>Orthetrum cancellatum</i>	X	X		breeding	declining because of <i>O. trinacria</i> settlement
<i>Orthetrum trinacria</i>	X	X	X	breeding	recently established, abundant
<i>Crocothemis erythraea</i>	X	X	X	breeding	
<i>Sympetrum fonscolombii</i>	X	X	X	breeding	strongly declining, locally disappeared, overcome by <i>O. trinacria</i>
<i>Sympetrum striolatum</i>	X			formerly breeding?	no records in last years, overcome by <i>O. trinacria</i>
<i>Sympetrum meridionale</i>					no record
<i>Sympetrum sinaiticum</i>				no records	possibly overlooked
<i>Brachythemis impartita</i>				no records	scattered records on Linosa, established on Italian major islands
<i>Trithemis annulata</i>	X		X	breeding	recently established
<i>Trithemis kirbyi</i>				no records	
<i>Selysiothemis nigra</i>	X	X		breeding	
<i>Pantala flavescens</i>				no records	possibly overlooked

Table 2. Odonata of the Maltese islands.

with the only known viable population of Odonata throughout these islands, and a fair number of man-made water reservoirs and catchments, where occasional breeding of some species was observed. The lower number of recorded species, compared with Lampedusa or even Linosa, can therefore only result from inadequate prospecting, particularly in some periods (see above); little doubt exists that absence of observations during the appropriate periods actually accounts for non-existing local records of e.g. *Sympetrum sinaiticum* or *Pantala flavescens*.

Two species reported for Pantelleria in the literature (Pavesi & Utzeri, 1995) were not confirmed during our survey. *Orthetrum cancellatum*, recorded in 1875 in large numbers and probably breeding at that time, was never found again and is very likely to be locally extinct. *O. trinacria*, recorded in 1984 upon a single individual, was possibly never established. Breeding was recorded or supposed throughout different islands for some species, yet at present a definitely viable population is only known on Pantelleria: *Ischnura fountaineae*. *Sympetrum sinaiticum* and *Pantala flavescens* are new for Italy; *Calopteryx* sp. cf. *haemorrhoidalis*, *Ischnura genei*, *Aeshna mixta*, *Orthetrum nitidinerve*, *O. coerulescens anceps*, *Crocothemis erythraea*, *Sympetrum striolatum*, *S. meridionale*, *Brachythemis impartita*, *Trithemis annulata* and *T. kirbyi* are first recorded for the Italian islands of the Sicilian Channel.

The list of species recorded on Maltese islands at present remains at 18, the most recent being *Orthetrum chrysostigma*; at least 15 are certainly or supposedly breeding (Table 2).

Here follows a systematic and commented list of the recorded species.

Subordo ZYGOPTERA Selys, 1854

Family CALOPTERYGIDAE Selys, 1850

Calopteryx haemorrhoidalis (Vander Linden, 1825)

Sciberras & Sammut (2008; reported by Boudot et al., 2009) ascribed to *C. virgo* (Linnaeus, 1758), after some doubts about its possible belonging to *haemorrhoidalis*, one specimen, found dead in a rocky pool at Marsascala, Malta, considering it as possibly intermediate between ssp. *meridionalis* Selys, 1873 and ssp. *festiva* Brullé, 1832; few fur-

ther records for Gozo exist, one of which was checked by AS and proved identical to Marsascala specimen. Yet the latter, although badly damaged by dermestid beetles (only three wings and small debris of thorax still remain), from the picture rather resembles a *C. haemorrhoidalis*.

Wing length/width, considered by Sciberras & Sammut (2008) as diagnostic, proved an unreliable feature, since considerable variations may be observed even within a single population throughout the season, depending on emergence period: the earlier the emergence, the broader the wing, and also the larger the individual size (Gallesi et al., in preparation). On the other hand, wing venation, dark blackish instead of bright metallic blue, remnants of thorax cuticle also dark black-bluish, basal clear area of wings light tan instead of almost colourless hyaline, all argue for *C. haemorrhoidalis* and against *virgo* s.l. However, having the specimen been found dead in a rocky pool, these colour features may also result from a post mortem alteration. More recently, Sciberras & Sammut (2013) dealt with some additional collection materials; besides the above material, they also report and figure a fairly preserved specimen from Marsascala, clearly recognizable as *C. haemorrhoidalis* (along with a true *meridionalis*, see below). It is somewhat surprising that no local population was ever noticed, since in Maltese islands some flowing-water bodies exist, very likely unsuitable for the highly rheophilous and microthermophilous *C. v. meridionalis*, but potentially matching *C. haemorrhoidalis* requirements. Therefore the local occurrence of *C. haemorrhoidalis* is to be regarded as occasional, consequent to either human accidental introduction (e.g. by ship) or to arrival of single straggler individuals, possible supported by natural events, such as strong winds (Sciberras & Sammut, 2008) or even floating debris drift. The likely origin areas are Sicily or North Africa; in both of them *C. haemorrhoidalis* is common and widespread, often with large populations.

A single female on Linosa, 12.X.2009, not far from Cala Mannarazza, near a small fountain in a private garden (AC), was only briefly observed and could not be caught; we cannot assign it to a definite species, yet what could be noticed argues for the most likely *C. haemorrhoidalis*. This is the only known record of a Calopterygidae for the Italian islands of the Sicilian Channel, where no potentially

suitable habitat for viable populations is known to exist; small man-made fountains or springs, such as the concerned one, may only prove temporary attractive sites for straggler individuals.

***Calopteryx virgo* ssp. *meridionalis* Selys, 1873**

Formerly recorded for the Maltese islands (Sciberras & Sammut, 2008; again dealt with in Sciberras & Sammut, 2013) upon poorly preserved material, considered as possibly intermediate between *C. virgo meridionalis* and *C. virgo festiva* Brullé, 1825. This record is herewith tentatively ascribed to *C. haemorrhoidalis* (see above). However, the same authors (Sciberras & Sammut, 2013) also found in a collection another specimen from Dwejra (Gozo), clearly to be assigned to *C. virgo meridionalis*. No other record is known, nor any evidence exists that the species ever occurred with breeding populations in the Maltese islands. Since *virgo meridionalis* is not known for Sicily (nor it does occur in southern Italian mainland, replaced by forms supposedly referable to *festiva*), the likely origin areas is only North Africa, where the species only occurs in few, scattered places.

Family COENAGRIONIDAE

***Ischnura fountaineae* Morton, 1905**

The species in literature is often reported as *I. fountainei*; however, since it is dedicated to a woman, Miss Margaret E. Fountaine, under provisions of International Code of Zoological Nomenclature, 4th edition, art. 31.1.2, the correct spelling is *fountaineae*, as correctly reported e.g. in Dijkstra & Lewington (2006) or in the website Fauna Europaea.

Lohmann (1989) reported the first Italian (and European) record for Pantelleria, at the volcanic lake named Bagno dell'Acqua (the locality name used by the author and by subsequent ones) or Specchio di Venere, on the basis of sightings made on 14 and 15.VIII.1984; subsequently larvae, exuviae and adults were seen and collected by Pavesi, Ratti, Carchini, Di Domenico and others (Pavesi & Utzeri, 1995). More precisely, a very large number of adults, partly emerging, and exuviae was recorded on 7.VIII.1985 (MP); no reproductive beha-

viour was observed, possibly because of stormy wind throughout the day, and no females with coloration other than immature bright orange were noticed. However, 1 female from Pantelleria with the following data: VII.1954, leg. E. Moltoni, with mature olive-greenish coloration, was already housed, without determination, in the Museo di Storia Naturale, Milano (Pavesi & Utzeri, 1995). Ragusa (1875), about Odonata noticed on Pantelleria at the lake, made no mention of any *Ischnura*; the species may of course have been overlooked, yet it is well possible that the species is a more recent coloniser, not occurring there at that time. Besides supposed changes in physical conditions (namely salinity), the reported huge population of *Orthetrum cancellatum* may have prevented a small zygopteran from becoming established (see also below, under this species). As for the Pelagie, a very teneral female (MP det.) was found on Linosa, Monte Rosso, 19.IX.2010 (AS), where some Roman age small reservoirs ("gebbie") exist. Further observations are needed to assess whether small breeding populations of this species and the following one locally occur. Not reported for the Maltese islands, possibly because overlooked.

From 2006 to 2012, we have monitored the Specchio di Venere population, the only one known for Italy and Europe, in order to evaluate population trends, identify actual or potential threats and launch a genetic study (R. Ana Sánchez, unpublished). The population appears to be numerically stable, and although a slight decrease was noted in 2012, it may simply reflect later emergence rather than an actual decline; indeed, all our observations were made in the months of April and May. Although Pavesi & Utzeri (1995) report 1 male and 1 female collected by Ratti on 2.V.1984, we never observed emergence before 14.V. One of the said authors (Utzeri) found no adults or larvae on 28.IV.1991, so that they speculated on possible local repeated extinctions of the species because of exceedingly arid conditions and therefore high saline concentration in some years, followed by subsequent recolonisation; which may have accounted for supposed absence of the species in the said period. The same authors, on the other hand, do not exclude the cycle may be primarily univoltine, with late mass emergences, and partly (occasionally) semivoltine, with some larvae delaying emergence until following year.

Despite intensive searches, we never could find any larvae except for the days immediately preceding emergence. Considering the high numbers of individuals occurring in the site, this very likely depends on larvae behaviour, to remain hidden inside thick cane tufts until ready to emerge, and may have been the real reason for the reported lack of findings. Considering observed emergences starting from May, and definitive coloration of females found in July, yet totally absent in the huge population observed in August, there is no reason not to suppose a bivoltine/multivoltine cycle, as usual in *Ischnura*. On the other hand, this elusive larval habit makes even more difficult to monitor the status of the Pantelleria population, under current situation threatened with extinction. Although the Specchio di Venere is a Nature Reserve, SPA (Special Protection Area) and SCI (Site of Community Importance), it is in fact exposed to continuous and very strong human pressure, from both local people and tourists swimming in the pond and walking along the edges, so trampling the breeding area of the species. Moreover, the cultivated fields immediately adjacent to the lake are regularly and heavily subject to pesticides and fertilizers application. Urgent actions are strongly required for an effective, not only virtual protection of this unique biotope; the best preserved part of the area, delimited following researchers' indications, should be closed to people's transit and access should be only allowed for scientific research, while the remaining could remain open for recreational purposes. Such measures should be of course strictly enforced with adequate patrol service by rangers (see also Pavesi & Utzeri, 1995).

Ischnura genei (Rambur, 1842)

Recorded for the Maltese islands already in past literature (Ebejer et al., 2008; Boudot et al. 2009), where it occurs with healthy populations on the islands of Malta, Gozo and Comino. Never recorded for Pantelleria. As for the Pelagie, two specimens, male and female (MP det.), were collected on Linosa, Cala Mannarazza, 18.IX.2010 (AS). Although the breeding is not confirmed (yet possible, see above), the record is quite interesting, being an evidence that migratory influxes from Sicily, mediated by northern ("tramontana") or north-eastern ("grecale") winds, may occasionally occur. *I. genei*, en-

demic of major (and some of the smaller) Italian islands and Maltese archipelago, does not occur in North Africa.

AS also observed two *Ischnura* individuals on Lampedusa, Spiaggia dei Conigli, 16.IX.2010, not collected, therefore not to be identified. They may belong to either previous species, as well as to *I. saharensis* Aguesse, 1958. Considering the proximity with the Tunisian coast, and the zoogeographic composition of the Pelagie, local occurrence, at least occasional, of *I. saharensis* is not unlikely; the species occurs with very large breeding populations e.g. on Djerba island (AC, unpubl.). The above spottings, as for number of species known for each island (see above), are treated as belonging to a single species.

Subordo ANISOPTERA Selys, 1854
Family AESHNIDAE Rambur, 1842

Aeshna mixta Latreille, 1805

It was not previously recorded for the Pelagie or Pantelleria (Pavesi & Utzeri, 1995). During our study, we found it on Pantelleria, Punta Spadillo, 19.V.2011, 1 male (AC). This is the only record known to us for the island. Single spotting were noticed in 2010 on Lampedusa, Cala Calandra, 15.IX and on Linosa, Monte Rosso, 19.IX (AS). In autumn 2012, a rather relevant influx has been noticed on the Pelagie, with notably up to 5 a day on Linosa on last week of October and first week of November, of both sexes (but mostly females), and single individuals on Lampedusa by the end of October (AC, OJ, MV, I. Maiorano & G. Soldato). No sighting was noticed on Lampedusa between 23.XI and 29.XI (MP). In April and May, dozens and sometimes hundreds of immature individuals of this species and of *Aeshna affinis* Vander Linden, 1820 can be seen migrating along the eastern coast of Sicily (from Capo Peloro to Capo Passero), and many are seen coming in off the sea in the Syracuse area, probably arriving from the Sicilian Channel. The paucity of records for Pantelleria and the Pelagie is therefore rather puzzling and may only be due to lack of observers during its peak migration period. The present records confirm the species as highly migratory and able to cover large distances (Boudot et al., 2009), therefore also to colonise new areas or to appear far out of range.



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2



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4



5



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Figures 1-6. *Ischnura fountaineae*, Specchio di Venere, Pantelleria (AC). Figure 1. Mature male. Figure 2. Immature female, C-type. Figure 3. Mature male, display. Figure 4. Immature female, C-type, display. Figure 5. Mature female, C-type. Figure 6. Mating pair (female C-type).

Recorded for the Maltese islands by Boudot et al. (2009) upon a single specimen (Ebejer et al., 2008; Sciberras, 2008). During the spring of 2012 a total of six specimens were recorded for Malta, Comino and Gozo (Sciberras & Sammut, 2013).

Anax imperator Leach, 1815

Pavesi & Utzeri (1995) report a single record of 1 female, collected at Mursia, Pantelleria, on 9.IX.1994. During our study, we have repeatedly observed it in May at various localities on Pantelleria: Specchio di Venere, Punta Spadillo, Rukia, Rekhale, Grazia, Scauri, Ghirlanda, Pian di Monastero. Both sexes have been observed, with preponderance of females. There are also records, documented with photos, in VI-VII.2010 and 2011, and X.2011 (A. Belvisi). At least some of these individuals may be stragglers from Africa, or even Sicily. However, breeding was photographically documented in 2011, when a few females were observed laying eggs and exuviae were found in a water catchment pool in the locality of Arenella (A. Belvisi). The species has also been repeatedly observed, from April to September, on Lampedusa and Linosa (AC, OJ, MV, AS & I. Maiorano), always in limited numbers compared to the other two reported *Anax* species. Also spotted on Lampione, 5.IV.2010 (AS).

In the Maltese islands it was always reported in old literature as common to very common, deemed to be the most abundant Aeshnidae; this possibly resulted either from being the species in the past much more common, or from confusion with the sometimes similar *A. parthenope*. Although it is indeed common and widespread, with several breeding sites, as for abundance it is at present exceeded by the latter. In most coastal water bodies, the formerly dominant *A. imperator* in recent years has been progressively overcome by *A. parthenope* (Sciberras, 2008). It can be observed searching for prey in a variety of habitats, including cultivated fields or urban areas, even far away from water. It catches several insects, especially Diptera, but also larger ones, including various Lepidoptera, e.g. *Lasiocampa quercus* (Linnaeus, 1758) and *Vanessa cardui* (Linnaeus, 1758), and other Odonata. Sometimes it catches preys standing on vegetation or ground (Sciberras, 2008), either lifting them or devouring them on the spot; in Italy a female was observed to hawk upon a motionless *Orthetrum*

cancellatum female perched on the ground, to block it with legs over its wings and to feed upon it (MP, unpubl.). At the same time this species also forms an important food source for migrating birds, especially Hobby *Falco subbuteo* Linnaeus, 1758 and European Bee-eater *Merops apiaster* Linnaeus, 1758 which are regularly seen catching it (MS, personal data).

Anax parthenope (Selys, 1839)

Recorded for Lampedusa (common in August, mainly during southern winds periods) and for Pantelleria (a single record in 1994) by Pavesi & Utzeri (1995) which consider it as regular and potentially breeding, although with no evidence of the latter. During our study it was repeatedly observed in numbers, besides on Lampedusa, also on Linosa and Lampione (AC, OJ, MV, AS & I. Maiorano), e.g. on VII.2009 and 2010. On some days, in spring (March to May), it arrives erratically by hundreds from southern quadrants. This mass of individuals forms an important food source for the breeding Eleonora's Falcon *Falco eleonora* Gené, 1839, and for many other migratory birds (Corso, 2011), including passerines (MISC, unpubl.). At least attempt of breeding was documented on Pantelleria at the Specchio di Venere, where in 2009 it was observed laying eggs. No reason however does appear, for which water catchments, reported as oviposition site for *A. imperator* (see above), could not be also suitable for *A. parthenope*.

In the Maltese islands it is reported as common (Ebejer et al., 2008), found by Sciberras (2008) to be the commonest local aeshnid, generally dominant in coastal areas, including a number of biotopes formerly dominated by *A. imperator*. Mass migrations have been reported, as well as small numbers mixed with large migrating swarms of *A. ephippiger* (Sciberras, l.c.). Definitely recorded for Malta and Gozo. It is to note that records only based on collection materials may lead to largely underestimate its frequency, individuals being often exceedingly difficult to catch.

Anax ephippiger (Burmeister, 1839)

Recorded for Lampedusa only by Pavesi & Utzeri (1995), with a single record in IV.1987. The same authors however suggested that it may have

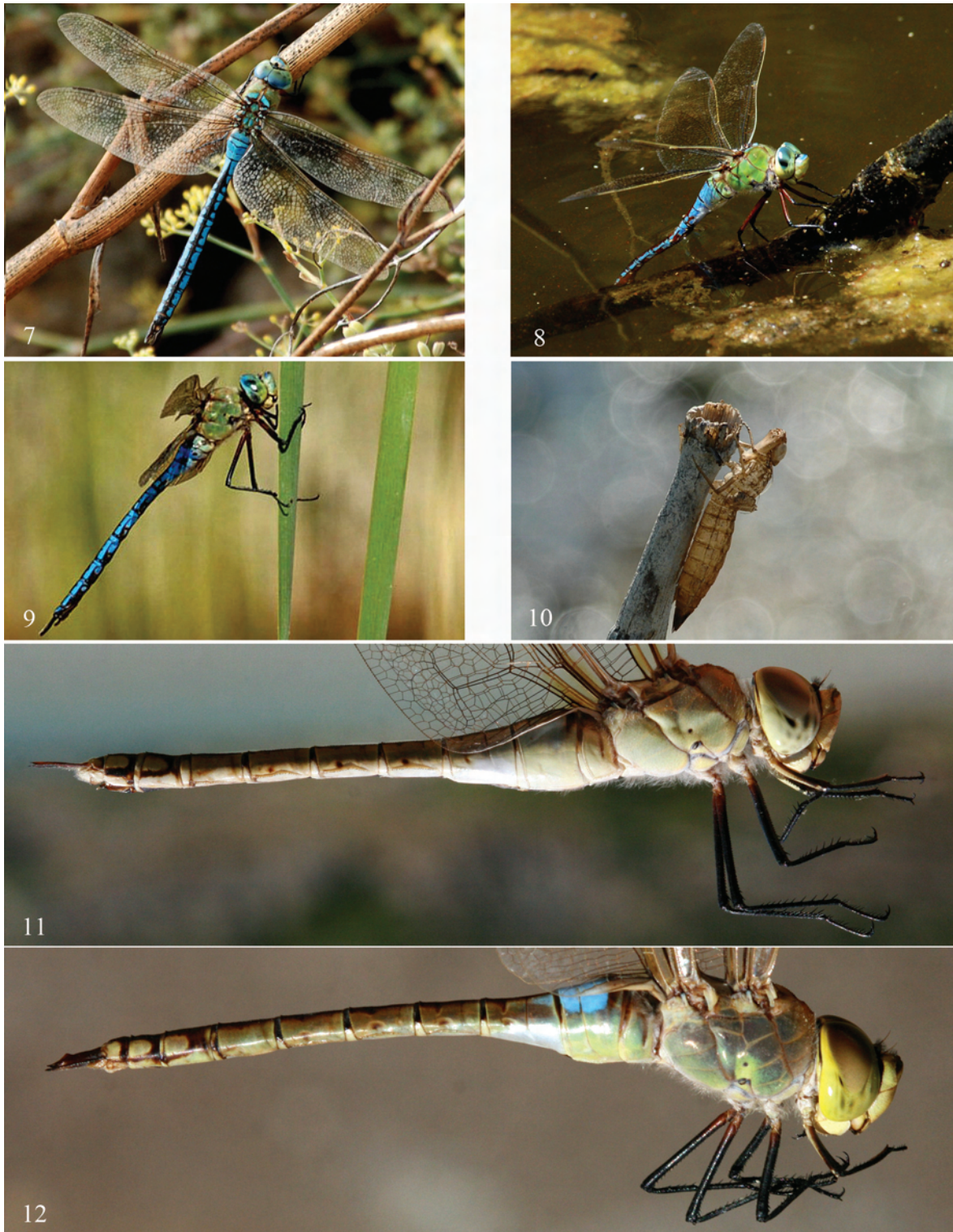


Figure 7. *Anax imperator*, mature male, found on the small pool at Arenella, Pantelleria, 6.X.2011, A. Belvisi. Figure 8. Idem, egg-laying female, 1.VII.2011. Figure 9. *A. imperator*, mature male, Specchio di Venere, Pantelleria, 28.VI.2011, A. Belvisi. Figure 10. Exuvia of *A. imperator*, Arenella, Pantelleria, 4.X.2011, A. Belvisi. Figure 11. *A. ephippiger*, mature female, caught at Specchio di Venere, Pantelleria, 20.IV.2011 during a passage of thousands through the Sicilian Channel (AC). Figure 12. Idem, mature male.

been largely overlooked, and that possible breeding in small natural or artificial water catchments, as well as in the Bagno dell'Acqua, was to be verified, considering its ability to breed in temporary pools in arid environments, because of very rapid larval development. We have found it to be common during all our visits to Pantelleria and the Pelagie, including Lampione (AC, OJ, MV & I. Maiorano). On some spring days, especially in March and April, but occasionally from late February, thousands of individuals can be seen arriving off the sea from North Africa. Much like *A. parthenope* and *Sympetrum fonscolombii*, they are an important food source for breeding Eleonora's Falcon *Falco eleonora* and for many other species of migratory birds (Corso, 2011), including passerines (MISC, unpubl.). For example, in March-April 2011 an impressive influx of thousands of individuals was recorded in Sicily (Corso, personal data) and on 28.IV.2011 almost two thousands individuals were estimated at the Specchio di Venere, with many specimens collected (AC). Breeding was not documented; however, since the other two *Anax* were definitely found (*imperator*) or supposed (*parthenope*) to breed, the same habitats may prove suitable also for *A. ephippiger*.

On Maltese islands the species is a regular migrant from March to October, and breeding has recently been confirmed on Malta (Sciberras, 2011). Much like in Sicily, this author reports that the largest influx of migrants was noted in March 2011, with about 4,000 individuals estimated on 18.III.2011 on the island of Gozo (Maltese archipelago).

Family LIBELLULIDAE Rambur, 1842

Orthetrum brunneum (Fonscolombe, 1837)

Not recorded for the Pelagie or Pantelleria, where on the other hand no suitable biotopes exist. In the Maltese islands it is rare and only occurs in some freshwater streams on Malta (Ebejer et al., 2008).

Orthetrum nitidinerve (Selys, 1841)

A stream-dweller, on the Pelagie or Pantelleria only recorded upon a single sighting, on Lampedusa,

Cala Croce, 14.IX.2010 (AS), obviously vagrant. As for *brunneum* or *coerulescens anceps*, no suitable habitat does exist anywhere on these islands.

Boudot et al. (2009) do not report it for the Maltese islands. Only recorded by Sciberras et al. (2010), who report males and females for different localities on Malta, over a very short period only, 18-22.VII.2008, without any observed reproductive behaviour; never noticed since. Therefore the same authors regard its occurrence as resulting from migration not followed by successful breeding, which is very likely correct.

Orthetrum coerulescens anceps (Schneider, 1845)

On the Pelagie or Pantelleria only once observed, on Lampedusa, Punta Sottile, 14.IX.2010 (AS), most likely a vagrant. *O. coerulescens* is recorded for the Maltese islands by Boudot et al. (2009), who refer to clinal populations, seemingly intermediate between nominal subspecies and *coerulescens anceps* (cf. *anceps/cline obsolescent*); yet according to Sciberras (2008; 2011), Ebejer et al. (2008) and Gauci & Sciberras (2010), Maltese populations should be ascribed to ssp. *anceps*. Their taxonomic status and variability indeed deserve an in-depth study. In fact, according to Boudot et al. (2009), mainland Sicily populations appear intermediate between *coerulescens* and *anceps*. Mauerberger (1994) and Dyatlova (2006) are of the same opinion. On the other hand, studies carried out throughout Sicily from 2006 to 2012, as for accessory genitalia have shown a number of intermediate specimens, together with others seemingly referable to the nominal subspecies, but none really matching ssp. *anceps* as Sardinian or North African animals do (Corso, personal data). Two Maltese specimens collected by AS, from the pictures were found (by AC and MP) to be, one obviously a true *anceps*, the other a *chrysostigma* (see below). Unfortunately part of Maltese *Orthetrum* material, sent for study by AS to AC, never reached the latter and is definitely lost. It is therefore at present rather difficult to know whether some other *anceps* records actually refer to *chrysostigma*.

Orthetrum chrysostigma (Burmeister, 1839)

Not recorded for the Pelagie or Pantelleria, where nevertheless its occurrence may be expected

(Pavesi & Utzeri, 1995), because of its ability to breed also in temporary pools in desertic environments, so presumably also in man-made water catchments.

Boudot et al. (2009) do not report it for the Maltese islands too. First records for the Maltese archipelago, all from Malta, are reported by Gauci & Sciberras (2010), a total of 4 females, from 2008 to 2010. One of these, found by Gauci at a man-made small freshwater pond in the Ghadira Nature Reserve, a saline marshland, on 12.VI.2010, from the photo is clearly newly emerged, no doubt locally, and most likely in the very same spot, although exuvia was not found. This record was also discussed on Forum Natura Mediterraneo on 19-20.XII.2012, between Charles Gauci (“Selys”) and MP (“gomphus”). No other records exist; this may argue for only temporary breeding, resulting from occasional arrivals and followed by local extinction. However a fully mature male collected by AS, first believed to be *coerulescens anceps*, from the picture was recognized by AC and MP separately as actually being *chrysostigma*. It is to be stressed that light stripes on the thorax, considered by the authors as diagnostic, are obvious only in females and not fully mature males when thorax is not yet covered with pruinescence. Old males have dark, densely blue-pruinose thorax, with obsolete, un conspicuous stripes, therefore quite resembling *anceps*, and when occurring in low numbers among large populations of the latter may remain overlooked and unnoticed. As said above, because of partly lost material, it is at present impossible to check some of previous Maltese *anceps* records, maybe partly to actually refer to *chrysostigma*.

Orthetrum cancellatum (Linnaeus, 1758)

Pavesi & Utzeri (1995) report a single historical observation for Pantelleria by Ragusa (1875), referring to “hundreds” of individuals seen at the Specchio di Venere, as well as to large numbers of dead dragonfly larvae, supposedly belonging to this species and to equally abundant *Sympetrum fonscolombii*, on the bottom of the lake. The species was never found again there, and the same authors presumed it to be locally extinct, or at least to have become extremely rare. Historical data about other groups of insects lead to suppose at that time a much lesser salinity of the lake, likely related to greater rainfall

amount. Increased salinity because of rainfall shortage may have led to disappearance of *O. cancellatum*, providing in the same time a suitable, almost predators-free habitat to the highly tolerant *Ischnura fountaineae* (Pavesi & Utzeri, 1995). No further record for the island exists, despite small water catchments and reservoirs (see above, under *Anax imperator*) being a well-known habitat of this species. Not positively recorded for the Pelagie. On 20.XI.2012, a supposed female of this species was observed, but not caught or photographed, on Lampedusa, Albero Sole, at a water-filled gravel pit (AC). Few days later, on 23.XI.2012, quite close to the previous spot, a large libellulid, tentatively referred to this species (possibly the very same individual), was briefly observed at some distance, perched on the ground of a small dirty road (MP). It disappeared before a clear sighting was possible. No other individual was seen.

In the Maltese islands it is recorded for Malta and Gozo (Ebejer et al., 2008) as common and occurring in any type of water bodies, including garden ponds. However Sciberras (2008) reports it as declining, possibly also because of progressive invasion of biotopes by *O. trinacria*. Some observations exist of *O. cancellatum* caught and devoured by *O. trinacria*.

Orthetrum trinacria (Selys, 1841)

Pavesi & Utzeri (1995) report a single record for Pantelleria, a sighting by Lohmann (1989) on 14-15.V.1984, presumably a vagrant. The species was collected on Lampedusa, Cala Croce and Spiaggia dei Conigli, 14.X.2010 (AS), no doubt upon migrant individuals. *O. trinacria* is a strong flier, well known as a migratory species (cfr. e.g. Fraser, 1936). No further records for any of the Italian islands of the Sicilian Channel exist.

In Maltese archipelago large breeding populations occur on Malta and Gozo, first recorded in 2003 (Ebejer et al., 2008). Today the species is widespread and common especially on Gozo, where because of its highly aggressive territoriality and predatory attitude, it has locally overcome most other Odonata (Balzan, 2008; Sciberras, 2008; Sammut, personal data), systematically chasing away, when not hunting, any other dragonfly; cases were reported of *O. trinacria* preying upon *O. cancellatum*. *Sympetrum fonscolombii*, as well as the

more occasional *S. striolatum*, were reported to disappear, following *O. trinacria* settlement (Sciberas, l.c.). The only smaller dragonflies able to coexist with large *O. trinacria* numbers seem to be *Crocothemis erythraea* and *Trithemis annulata*, the latter another recent coloniser, whose populations had over last years a spectacular increase (Balzan, l.c.; Sammut, personal data).

Crocothemis erythraea (Brullé, 1832)

This is one of the commonest and most widespread odonates all over Italy, including Sicily (Corso, personal data), also known for its migratory attitude. It was not reported for Pantelleria or the Pelagie by Pavesi & Utzeri (1995), who nevertheless anticipated possible future records. On the former island, man-made water reservoirs, such as those mentioned as breeding sites for *Anax imperator* or *Sympetrum fonscolombii*, may well prove suitable for this species. In September 2005, it was observed and photographed on Lampedusa for the first time by M. Romano. In this island, we have only seen it in July 2009, September 2010 and last week of October 2012 (AC, AS). During the last sighting, 26-28.X.2012, not less than 4 pairs were observed mating and egg-laying in a small sewer outlet in the old harbour of Lampedusa town (AC & I. Maiorano). No occurrence was noticed there on 23-24.XI.2012 (MP). Its occurrence on Lampedusa is likely to be only occasional, due to the lack of large enough, permanent water bodies; the actual successful breeding in the above reported, heavily polluted outlet remains in need of confirmation. Also noticed on Linosa, Monte Nero and Cratere, 18.IX.2010 (AS).

Recorded for the Maltese islands by Ebejer et al. (2008), Sciberras (2008), Boudot et al. (2009), as the most abundant and widespread dragonfly all over the Maltese archipelago, and one of the very few small species surviving habitat invasion by *Orthe-trum trinacria*.

Sympetrum fonscolombii (Selys, 1840)

Reported for Pantelleria, Lampedusa and Linosa by Pavesi & Utzeri (1995), who mentioned numerous records, including exuviae from Lampedusa, Cala Pisana, and deemed it to be one of the commonest odonates on these islands, as well as the

possibly only species able to breed in man-made reservoirs on Lampedusa. Known for Pantelleria as early as the 19th century (Ragusa, 1875). It is indeed quite common on all circum-Sicilian islands (Terzani & Lo Cascio, 1997; Corso, personal data), including those of the Sicilian Channel. Because of its attitude to regularly migrate, it can very often be seen in large numbers even on small islands completely devoid of any water body. We have regularly observed egg-laying tandems on Pantelleria and Lampedusa. On the former island, exuviae and dead adults are often found in the Roman cisterns at the San Marco acropolis (AC & OJ), and it can be seen at various localities along the coast, especially near the locality of Arenella, where a semi-permanent rain-fed pool is present, but also quite far from water, e.g. at Scauri, Punta Spadillo, Kamma, Ghirlanda (AC & V. Penna). On Lampedusa we have observed territorial behaviour, mating pairs and tandems from June to November in various localities (e.g. Albero Sole, Ponente, Cala Pulcino, Cala Pisana, Cala Madonna, Cala Francese, Valle Imbriacola). Egg-laying has regularly been observed at Ponente, in a fairly large, temporary rain pool in the western clearing of the pine grove within the island's nature reserve (the latest recorded on 25.XI.2012, MP), and also in a water-filled, shallow gravel pit at Albero Sole (see above, under *Orthe-trum cancellatum*). As reported by Pavesi & Utzeri (1995), large numbers of this species arrive, together with *Anax parthenope* (Selys, 1839), during summer (especially August), on southern winds; we found this to happen not only in summer, but also in spring (April-May) and autumn (September-October). At these times, hundreds and sometimes thousands of individuals can be seen arriving off the sea, as in many other European coastal sites (cfr. Owen, 1958; Heyne, 1989). These influxes are often accompanied by numerous migratory birds, as noted for other species of migratory dragonflies (Anderson, 2009). Indeed, it seems that this species, together with *Anax parthenope* and *A. ephippiger* (see above), is a key food source for many migratory birds, especially raptors, as well as for breeding Eleonora's Falcons *Falco eleonora* (Corso, 2011). Numerous specimens, including late records (December), have been collected, held in AC and MP collections. Pavesi & Utzeri (1995) report the sighting of two unidentified *Sympetrum* on Pantelleria, 3.XII.1992, tentatively attributed to *fonscolombii* as

the most likely species. Although identification is not confirmed, the late date indicate a winter activity for *Sympetrum* sp. already in the early 90's, like regularly observed nowadays in both Sicily and Sicilian channel islands (Corso, personal data).

In the Maltese islands formerly considered very common and widespread, it has drastically declined in recent years and locally disappeared, because of predatory pressure from the increasingly abundant *Orthetrum trinacria*. It is still quite common in sites, mostly in coastal areas, not suitable to support breeding populations of *O. trinacria*.

In nearly all specimens from the Pelagie examined by us, the yellow area at the base of hind wings is highly reduced to hardly visible, on fore wings almost always absent. Also body size is somewhat diminutive. North African populations have an identical pattern (Corso pers. obs.; C. Mancin pers. com). However a series of specimens collected on Ponente, 23.XI.2012 (MP) mostly have indeed on hind wings the yellow area reduced, reaching up to about mid-length between base of wing and base of triangle, not invading the median space; yet in two the yellow reaches up to the triangle base, with median space lightly tinged, and in another the yellow encloses the entire triangle and also fore wings are distinctly tinged at base. In Sicilian populations, the extent of yellow area is generally larger, and the same proved for Maltese ones, the yellow on hind wings often reaching about the base of triangle, upon an overview (MP) of photos, on the website Forum Natura Mediterraneo, by Albert Floridia ("xilpa") and Charles Gauci ("Selys").

Since large numbers of *S. fonscolombii* regularly migrate across the Mediterranean, the existence of genetically separate and morphologically different populations on their north and south sides is highly unlikely. It is to be stressed that most of the individuals occurring on the Pelagie or Pantelleria very likely originate from Africa; although this species is definitely recorded to breed e.g. on Lampedusa, there is little doubt that no viable resident population actually does exist, the locally emerged stocks likely being inadequate in numbers to support a such population, also because of local aquatic biotopes becoming completely dried-up all over summer; and on the other hand, locally emerged stocks being totally overcome by large, ceaseless influx from North Africa. The situation on Maltese islands is quite different; given the greater distance from

North African coast, as well as the local existence of suitable biotopes with large breeding populations, it can be supposed that migrant individuals are a minority compared to those locally emerged, and that most of individuals found on Maltese islands originate from locally breeding populations. Influxes from Sicily, if any, are supposed to be numerically insignificant.

Evidences exist that exposure of larvae to different average temperatures prior to emergence may result both in reduced marking pattern and in decreased size of adults. Waiting for a confirmation from rearing experience, we speculate that occasional individuals with more or less large yellow pattern found on Lampedusa may result from local breeding, while the majority, with reduced pattern, may be of North African origin. The Maltese islands do not have an obviously different climate, when compared with the Pelagie, yet unlike the latter ones they harbour large viable populations (see above), which may account for having Maltese individuals usually larger yellow pattern than those from the Pelagie.

Sympetrum striolatum (Charpentier, 1840)

Not reported for the Pelagie or Pantelleria by Pavesi & Utzeri (1995), nor by other authors, it actually occurs on all these islands (not yet reported for Lampedusa), as well as on other circum-Sicilian islands, although erratically and in much smaller number than the previous species (Corso, personal data). No spotting was noticed in autumn 2012 (AC, MP). It occurs in spring (March-May) and again in autumn (October-November). However, from several specimens collected and held in AC collection, all spring individuals, as well as for late winter to early spring *S. sinaiticum* (see below) are quite aged according to general appearance and worn-out wings, which obviously indicates they have overwintered, either on the Pelagie or in North Africa. Absence of February records, contrary to *S. sinaiticum*, may be simply coincidental and only result from insufficient observations. *S. striolatum* may breed at least on Lampedusa, at Ponente, where we have occasionally seen pairs in tandem; yet no evidence from exuviae or newly emerged individuals does exist.

In the Maltese Islands already in the past it was found to be scarce; only in a single instance, in

2007, a fairly good number of individuals was noticed (Sciberras, 2008). Strongly declined, if not totally disappeared in recent years (the last record on 18.VI.2009), most likely because of its breeding sites being progressively invaded by *Orthetrum trinacria* (Sciberras, 2008).

Sympetrum meridionale (Selys, 1841)

The hitherto only record for Sicilian Channel islands is a male, caught and subsequently released on Lampedusa, Cala Croce, 14.IX.2010 (AS), no doubt a straggler. The species, widespread in North Africa, is known to migrate over long distances.

Sympetrum sinaiticum Dumont, 1977

Not recorded previously for the islands of the Sicilian Channel, or anywhere else in Italy. On mid-March 2009, at various localities on Lampedusa, we observed several unfamiliar *Sympetrum* individuals, quite pale, the wings without any trace of basal yellow spot, obviously quite aged according to general appearance and worn-out wings; particularly male features, such as pattern of thorax and abdominal segments, matched none of the locally likely species we are familiar with, such as *S. striolatum*, *S. meridionale* or *S. fonscolombii*, conversely these argued for the Saharan and Near-Eastern *Sympetrum sinaiticum* Dumont, 1977. The females, without close-up view or in-hand examination, remained somewhat puzzling. An individual of the same species was seen on 14.IX.2010 (AS). In February 2011, several individuals, of which 4 males, were observed again in various localities on Lampedusa (AC); also on Linosa individuals, possibly belonging to the same species, were observed later in March 2011, yet no close enough to enable definite identification. Finally, on 12-15.IV.2012, of 6 males seen on Lampedusa at Albero Sole, 4 mature to aged could be collected (K. Bacon leg.), enabling definite identification by AC; now housed in AC (2) and MP (2) collections. All these likely reached Lampedusa from North Africa supported by southern winds.

In North Africa *S. sinaiticum* breeds in winter (Jödicke, 2003; Boudot et al., 2009), after which many individuals disperse, often reaching the coast of Tunisia. For instance, numerous individuals were seen on the island of Djerba (Gulf of Gabés) in Fe-

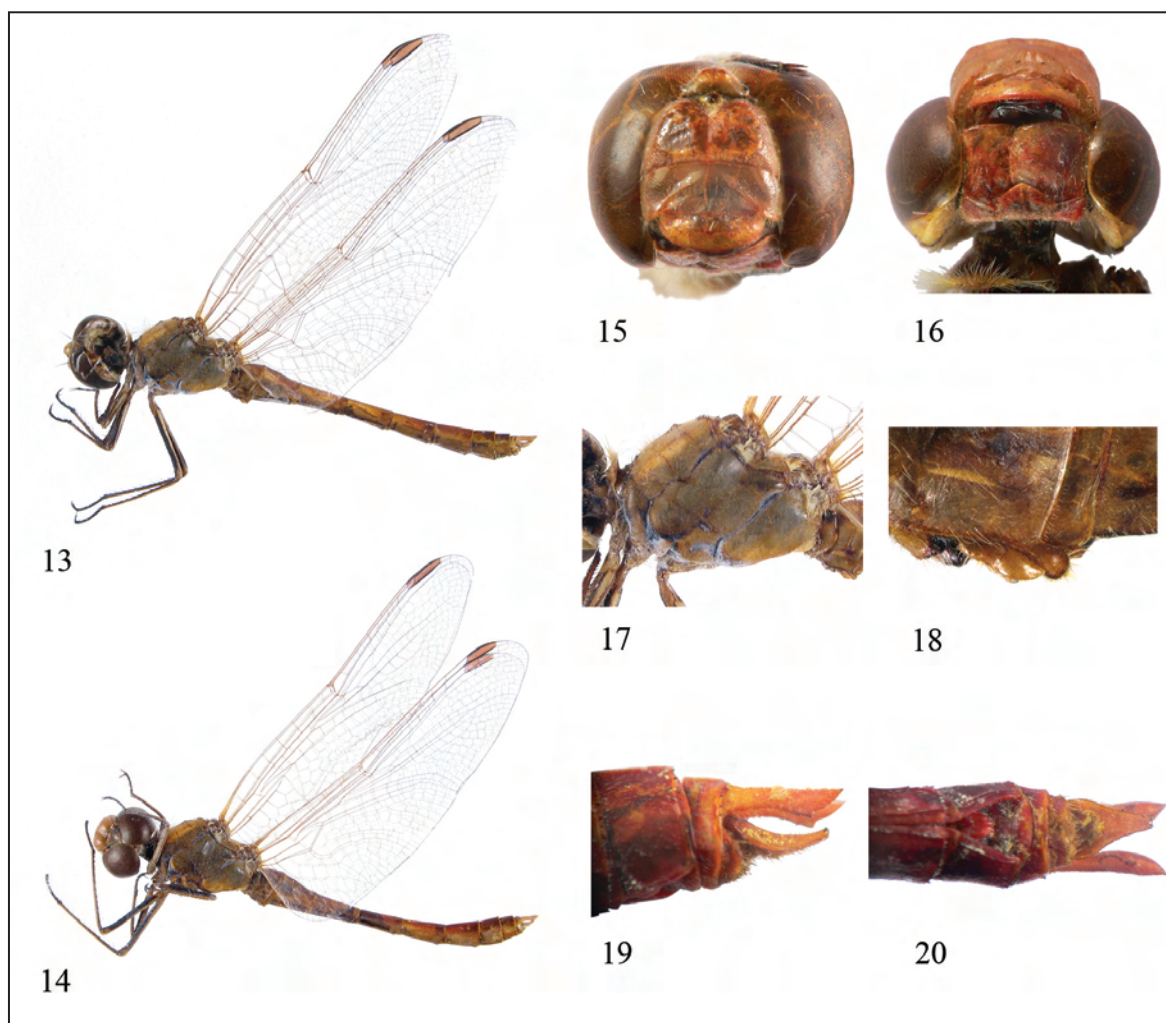
bruary 2009-2011 (AC, personal data). Emergences take place in late spring, but the newly hatched individuals estivate, often travelling far from the emergence site, and do not breed until late autumn or early winter. Therefore during years with high breeding success, some individuals disperse northwards, and under favourable conditions may reach the southernmost islands of the Sicilian Channel, such as Lampedusa, more often in February-April. Although a single record on September exists (see above), it should be noted that throughout October/November 2012, when strong southern wind periods resulted in outstanding records of North African dragonflies (see also under *Trithemis kirbyi*), not a single sighting was noticed (AC, MP). It should also be stressed that only more or less aged individuals were observed on Lampedusa; moreover no mating pairs or ovipositing tandems were ever noticed, despite observations period falls into reproductive season of the species. Therefore at present no evidence exists even to suppose that the species may breed on Lampedusa, despite its seemingly quite regular occurrence from late winter to early spring.

On the other hand, *S. sinaiticum* breeds in desertic environments, in temporary, summer-dry water bodies, and European populations, widespread in Mediterranean Spain (Dijkstra & Lewington, 2006; the same authors suggest it may be overlooked elsewhere), are reported to breed also in concrete water reservoirs, where exuviae were found. Therefore further investigations are needed, in order to assess the actual status in the Pelagie, as well as likely winter occurrence, or even possible breeding, on Pantelleria. Never reported for Maltese islands, possibly because overlooked.

Brachythemis impartita (Karsch, 1890)

Only recently (Dijkstra & Matushkina, 2009) recognized as separate species, a long time confused with the supposedly unmistakable *B. leucosticta* (Burmeister, 1839). Therefore, all papers cited in the following text refer to the species as to *leucosticta*. The latter is not known to occur north of Sahara (Dijkstra & Matushkina, 2009).

Previously unrecorded for the Pelagie or Pantelleria; on Linosa 1 male found on 20.X.2009 (AC), and again spotted on Monte Vulcano, 7.IV.2010, 1 female according to entirely colourless wings (AS).



Figures 13-20. *Sympetrum sinaiticum*, male, Lampedusa, Albero Sole, 15.IV.2012, the first confirmed record for Italy of this species, widespread in North Africa; some distinctive features. Figures 13-14. Two specimens (MP coll.). Figure 15. Head, frontal view. Figure 16. Idem, ventral view. Figure 17. Thorax, lateral view. Figure 18. Accessory genitalia, lateral view. Figure 19. Terminal appendages, lateral view. Figure 20. Idem, ventral view. Note highly reduced dark markings, pale wing venation, hind wings totally devoid of basal amber spot, peculiar accessory genitalia. Photos 13, 14, 17, 18 by M. Zilioli.

Healthy populations of this species are found in central and Northern Tunisia and throughout southern Sicily (Galletti et al., 1987; Boudot et al., 2009; Corso, personal data) and whole Sardinia. As such, considering the ability of the species to breed also in water reservoirs, colonisation of the islands of the Sicilian Channel would not be unexpected, as suggested already by Pavesi & Utzeri (1995). The Linosa records came, the former on a rather late date, the latter on a quite early one, compared to the main flight period of this species in mainland Sicily (Corso, personal data), arguing for a North African origin, where

the flight season extends into October (Dijkstra & Lewington, 2006). Indeed, much of the Pelagic fauna originates from North Africa rather than from Sicily, both with regards to arthropods (cf. Massa, 1995) and birds (Corso, 2005). On the other hand, *B. impartita* is a well-known migrant, since all Italian established populations result from recent colonisation from North Africa (Galletti et al., 1987; Pavesi & Utzeri, 1995), as well as South European ones; previous records for North Mediterranean countries were referred to vagrant individuals not breeding in the area. Not recorded for the Maltese islands.

Trithemis annulata (Palisot de Beavois, 1807)

Only reported for Pantelleria and the Pelagie through the sighting of 2 males and 1 female on Lampedusa, Cala Calandra, 14.IX.2010 (AS); additional records are to be expected, given the recent colonisation and very rapid population increase in the nearby Maltese islands, where it was first recorded in 2005. From 2007 forward, regular records followed (Sciberras et al., 2007; Balzan, 2008; Ebejer et al., 2008). In a very short time, the observations became more frequent and the population increased rapidly. The first exuviae were found on Malta, at Chadwick Lakes and the Chinese Gardens in Santa Lucia. In recent years, exuviae have also been found at il-Qattara (Gozo). Today it is the second most abundant anisopteran species in the Maltese islands, superseded only by *Crocothemis erythraea*. It seems to be among the few small dragonflies to thrive in territories dominated by *Orthetrum trinacria* (MS, personal data). *T. annulata* is indeed extremely aggressive, also towards other species; in Greece it was seen attacking and chasing away considerably larger dragonflies such as *O. cancellatum* or even *Lindenia tetraphylla* (Vander Linden, 1825) (MP, unpubl.). Some cases are known in which habitat colonisation by *T. annulata* resulted in local decline of the formerly abundant *C. erythraea* (see Balzan, 2008; MP, unpubl.).

Trithemis kirbyi Selys, 1891

Not previously reported for Pantelleria and the Pelagie, nor for Maltese archipelago. On 28.X.2012 morning 1 male and 1 female were very well and long observed at Capo Grecale, Lampedusa (AC & R. Finati), yet they proved impossible to catch; already in the early afternoon of the same day they were no longer to be seen, nor any further sighting occurred later. This constitutes also the first record for Sicily and the first Italian record outside Sardinia, where it was recorded on 23.VI.2003 at Oridda stream, Villacidro (VS) (Holusa, 2008) but never noticed since, despite active researches in recent years (B. Kunz, pers. comm.).

The record for Lampedusa raises some doubts about the actual status of *T. kirbyi* in Italy. Although the species may breed also in water reservoirs, there is little doubt that the above individuals did not result from local breeding on the island, nor else-

where on the Pelagie or Pantelleria. The above record shows that *T. kirbyi*, at least with favourable conditions of southern winds, is able to migrate over long distances. Indeed, the simultaneous occurrence on the Pelagie, during a period of sustained “libeccio” (south-western wind), of two African, never locally recorded species such as *T. kirbyi* and *Pantala flavescens* may hardly be regarded as coincidental. Such wind periods are also particularly fruitful for observation of several bird species migrating across the Sicilian Channel; the above-said one also resulted in several North African bird species records in the Mediterranean basin (Corso, unpublished data). The minimum distance between southern Sardinia and Tunisia is about 180 km, no doubt within the reach of even a less strong flier, when supported by wind. Given the complete lack of further records, in subsequent years and despite intensive researches, in the concerned locality or elsewhere in Sardinia, the actual occurrence of breeding Italian populations of *T. kirbyi* clearly needs confirmation.

Selysiothemis nigra (Vander Linden, 1825)

Not recorded for Pantelleria or the Pelagie. Given the status and positive trend in the Maltese islands, possible future records are to be expected. The species is well known also for mass migrations (Fraser, 1936); on the other hand, Compte-Sart (1960) reports for Mallorca (Balearic islands) large populations breeding in concrete water reservoirs.

First recorded for the Maltese islands by Valletta (1957), with 2 specimens collected in 1952; no further records until 1996, when a specimen was collected (AS). In 2007, a single specimen was collected in July, at Ramla Bay, Gozo, and 5 females were observed in August in a burnt field at Tassellun, Xaghra, Gozo. During the same period, a permanent population was discovered in two artificial pools in a valley at Marfa, Malta. In 2008 two further, rather large populations were found at L-Ahrax and Ghadira, Malta, where from 19.VII to 22.VIII the species was observed daily with a maximum of 15 observed at the same time. Although an increased abundance of *S. nigra* in recent years is likely, it is suspected that in the past this species was simply overlooked and may have been more regular than believed. This is primarily due to its elusive behaviour; its tendency to fly very low,

along with small size and unobtrusive colouring, make it more difficult to detect than other Odonata, even more when the species is unexpected and therefore not expressly searched for. Since 2009, it has been regularly observed in small numbers even in other areas, including Buskett and Dingli (Malta), especially on August-September (MS). On 17.VII.2011 e.g., not less than 13 individuals were observed at Cirkewwa (AS).

Pantala flavescens (Fabricius, 1798)

First records for Italy, and among the very few for Europe, on Lampedusa and Linosa, X.2012 (OJ, MV, AC, I.Maiorano & G. Soldato), no doubt in the same days also to be found on Pantelleria. No longer recorded on 23-25.XI.2012 (MP). Because of their outstanding interest, they will be thoroughly dealt with in a separate paper. Never recorded for Maltese islands.

SPECIES ERRONEOUSLY RECORDED TO DELETE FROM LOCAL FAUNAL REPORTS

Trithemis arteriosa (Burmeister, 1839)

Reported for Malta upon a single specimen, an aged female, collected in 2002 (Ebejer et al., 2008). However, after re-examination the specimen was found to be *T. annulata* (Sciberras, 2008), determination now confirmed (AC, MP). Although its occurrence may be not unlikely, at present *T. arteriosa* is to be deleted from the list of Maltese Odonata.

ACKNOWLEDGEMENTS

We would like to express our heartfelt thanks to our longstanding travel and research companions and island lovers from our MISC group: Hans Larsson, Igor Maiorano, and Lucio Maniscalco. For their help in the field and unpublished data, we would like to thank Giacomo Assandri, Giovanni Soldato, Cosmic Mancin, Kevin Bacon, Andrea Belvisi, Piero Ferrandes, Rosa Ana Sánchez, Sonia Ferreira, Jean-Pierre Boudot, Bernd Kunz, Sönke Hardersen, Elisa Riservato, Verena Penna and Raimondo Finati. Finally, we thank Marco Gustin, Elena d'Andrea, and LIPU, who funded most of AC

visits to Pantelleria and partially to Lampedusa primarily for ornithological studies. Also AS greatly thanks his family for their support: Esther, Romario and Jeffrey Sciberras. MS thanks his many field companions, but especially Joseph Grech, Christopher Cachia Zammit, and Dominic Frendo and the late John Azzopardi and for various discussions and communications with Charles Gauci who shares a high interest in Odonata. MP also thanks Charles Gauci for discussions about Maltese Odonata on the website Forum Natura Mediterraneo. Finally many thanks to Michele Zilioli (Museo di Storia Naturale, Milano) for the beautiful photos of *Sympetrum siniticum* material.

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