Opusc. zool. flumin. 169(1999): 1-14 30 June 1999

CONTRIBUTION TO THE KNOWLEDGE OF THE ODONATE FAUNA OF SICILY, WITH SOME ADDITIONAL DATA FROM BASILICATA, SOUTHERN ITALY

M. BEDJANIČ[1] and A. ŠALAMUN[2]

[1] Fram 117/a, SI-2313 Fram, Slovenia; e-mail: matjaz.bedjanic@guest.arnes.si
[2] Čevljarska 28, SI-6000 Koper, Slovenia; e-mail: ali.salamun@guest.arnes.si

An annotated list is presented of 26 spp. collected between 7/18-VIII-1996 at 16 localities in Sicily and Basilicata. The records of *Lestes v. virens* (Charp.), *Aeshna mixta* Latr., *A. cyanea* (Müll.), *Onychogomphus uncatus* (Charp.) and *Orthetrum trinacria* (Sel.) from Sicily and *O. f. forcipatus* (L.) from Basilicata are of special regional interest. The breeding of *O. uncatus* and *A. cyanea* in Sicily could be confirmed for the first time. A list of 45 taxa known from the island with certainty is compiled and the late summer aspect of the fauna is briefly discussed.

INTRODUCTION

The information on the odonate fauna of Sicily is still rather fragmentary. In their monograph, CARFI & TERZANI (1993) refer to 59 taxa; 41 of which occur in Sicily with certainty, the occurrence of 11 species is uncertain, while references to 7 species are shown for various reasons to be erroneous.

Recently only a few faunistic data have been published on the dragonfly fauna of Sicily. MAUERSBERGER (1994) and KLINGEN-

BERG (1995) published on the *Orthetrum coerulescens* complex, and UTZERI et al. (1994b) reported on the occurrence of *Chalcolestes viridis* (Vander L.) and *C. parvidens* (Artobolevski). A critical survey of the data from the literature can be found in some European family monographs, viz. Platycnemididae (MARTENS, 1996; 1997), Gomphidae (SUHLING & MÜLLER, 1996) and Lestidae (JÖDICKE, 1997). RAINERI & FERRANDO (1995) refer to eight species from Sicily. In the checklist of Italian dragonflies (UTZERI, 1995), 54 species are listed for the island. Doubtful is the occurrence of *Chalcolestes parvidens* of which only a single, probably hybrid, specimen is known from Sicily (UTZERI et al., 1994b), and *Ischnura fountaineae* (Morton), which has not been found in Sicily as yet but it does occur on the island of Pantelleria (LOHMANN, 1989; PAVESI & UTZERI, 1995). *Calopteryx haemorrhoidalis papyreti* Zeller is merely a junior synonym of *C. haemorrhoidalis*.

The present paper is based on material collected between 7 and 18 August 1996 at 16 localities in Sicily and Basilicata. The specimens are deposited in the collection of the first author.

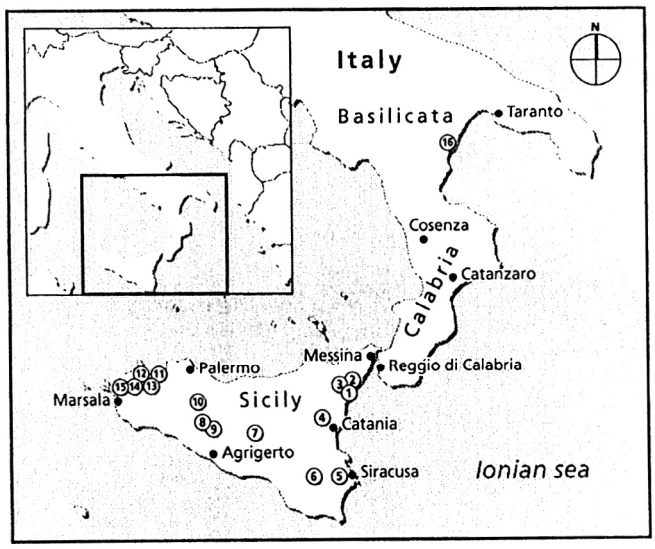

Fig. 1. Topographic position of the collection localities.

LIST OF LOCALITIES

S i c i l y:

(1) Camping San Marco, 6 km SW of Taormina, Catania, NE Sicily, alt. 10 m; 7-VIII-1996.
[*A. cyanea*]

(2) Alcantara River, 4 km E of Castiglione, Catania, NE Sicily, alt. 400 m; 8-VIII-1996.
[*C. haemorrhoidalis*, *O. coerulescens*-complex, *O. brunneum*]

(3) Alcantara River, 1 km N of Calatabiano, Catania, NE Sicily, alt. 50 m; 8-VIII-1996.
[*C. haemorrhoidalis*, *C. caerulescens caesarum*, *I. genei*, *O. brunneum*, *S. meridionale*, *C. erythraea*]

(4) Camping Etna in Nicolosi village, southern slopes of Mt Etna, Catania, E Sicily, alt. 700 m; 9-VIII-1996.
[*A. cyanea*, *A. mixta*]

(5) Archeological park at the amphitheatre in Siracusa, Siracusa, SE Sicily, alt. 10 m; 10-VIII-1996.
[*C. erythraea*]

(6) Anapo River, 3 km SE of Buscemi, Siracusa, SE Sicily, alt. 600 m; 11-VIII-1996.
[*C. haemorrhoidalis*, *L. v. viridis*, *C. lindenii*, *C. tenellum*, *I. genei*, *O. uncatus*, *A. cyanea*, *O. brunneum*, *S. fonscolombii*]

(7) Right tributary of the Belici River, 3 km NE of Villalba, Caltanissetta, central Sicily, alt. 400 m; 12-VIII-1996.
[*C. haemorrhoidalis*, *I. genei*, *O. brunneum*]

(8) Outflow of Lago di Prizzi, 2.5 km W of Prizzi, Palermo, central Sicily, alt. 700 m; 12-VIII-1996.
[*C. haemorrhoidalis*, *I. genei*]

(9) Lago di Prizzi, 2.5 km W of Prizzi, Palermo, central Sicily, alt. 700 m; 12-VIII-1996.
[*I. genei*, *O. coerulescens*-complex, *O. cancellatum*, *S. fonscolombii*, *T. annulata*]

(10) Small pond 5 km NE of Corleone, Palermo, W Sicily, alt. 500 m; 13-VIII-1996.
[*L. barbarus*, *I. genei*, *E. viridulum*, *A. imperator*, *O. cancellatum*, *S. fonscolombii*, *C. erythraea*, *T. annulata*]

(11) Small pool in the dry river bed 2 km SE of Scopello, under the bridge on the Scopello-Castellammare del Golfo road, Trapani, NW Sicily, alt. 0 m; 14-VIII-1996.

[*I. genei, C. lindenii, A. imperator, O. cancellatum, O. coerulescens*-complex, *O. brunneum, C. erythraea*]

(12) Pond 3 km SE of Scopello, Trapani, NW Sicily, alt. 150 m; 14-VIII-1996.
[*L. v. virens, I. genei, E. viridulum, A. imperator, A. imperator, A. parthenope, A. cyanea, O. cancellatum, O. trinacria, S. fonscolombii, C. erythraea, T. annulata, S. nigra*]

(13) Pond 5 km NW of Castellammare del Golfo, N of the Castellammare del Golfo-Trapani road, Trapani, NW Sicily, alt. 250 m; 14-VIII-1996.
[*L. v. virens, A. imperator, O. coerulescens*-complex, *O. cancellatum, C. erythraea, T. annulata*]

(14) Dry river bed 2 km WNW of Báglio Messina, Trapani, NW Sicily, alt. 140 m; 14-VIII-1996.
[*A. imperator*]

(15) Small lake 4 km E of Valderice, 700 m W of Báglio Messina, Trapani, NW Sicily, alt. 140 m; 14-VIII-1996.
[*L. v. virens, I. genei, E. viridulum, C. lindenii, A. imperator, A. parthenope, O. cancellatum, O. coerulescens*-complex, *O. trinacria, S. fonscolombii, C. erythraea, T. annulata, B. leucosticta*]

B a s i l i c a t a:

(16) Sinni River, 5 km W of the Trebisacce-Metapontum road, Matera, SE Basilicata, alt. 50 m; 18-VIII-1996.
[*C. haemorrhoidalis, P. pennipes, I. elegans, C. lindenii, O. f. forcipatus, O. coerulescens, O. brunneum, C. erythraea, T. annulata*]

COMMENTED LIST OF RECORDED SPECIES

"X" refers to >50 individuals

Calopteryx haemorrhoidalis (Vander Linden)

Loc. 2: 15♂, 4♀; — Loc. 3: 10♂, 1♀; — Loc. 6: X♂, X♀, 1♂ juv., 1 ex.; — Loc. 7: 1♂, 1♀; — Loc. 8: X♂, X♀; — Loc. 16: 2♂, 1♀.

In spite of the fact that only a few specimens were measured, it became clear that those from Basilicata are smaller. It may be interesting that in some Sicilian specimens (e.g. 1♂ [Loc. 2] — TL: 47,1; AL: 36,7; HWL: 31,9; HWW: 9,9 in 1♀ [Loc. 6] — TL: 41,9; AL: 31,0; HWL: 32,8; HWW: 9,8), with shorter abdomen, the other morphometric values are higher than in those from Basilicata. JAHN (1996a) reported on dwarf specimens from the Iberian Peninsula, which are even smaller than the smallest specimen from Basilicata.

Also interesting is a comparison of some larger samples of normally sized specimens from Extremadura (Spain) with the entire Sicily sample, as the values for the abdomen and wing lengths are very much alike. The problem of dwarfness requires a detailed and extensive research, based on populations rather than on single specimens. It may be of interest that *C. haemorrhoidalis papyreti* Zeller, the dimensions of which are very small, was found in Sicily, but recent research has shown that in *C. haemorrhoidalis* no infraspecific forms can be distinguished (ASKEW, 1988).

Table I

Morphometric values of *Calopteryx haemorrhoidalis* (Vander L.) from Sicily and Basilicata — [Abbreviations: TL = total body length; — AL = abdomen length; — HWL = left hind wing length; — HWW = left hind wing width]

	Males				Females			
	TL	AL	HWL	HWW	TL	AL	HWL	HWW
Loc 16 (2♂, 1♀)	47,5	38,8	29,8	9,4	41,8	32,3	27,5	8,3
	44,2	35,5	26,3	8,4				
AVERAGE (Basilicata - 2♂, 1♀)	45,9 ±2,3	37,2 ±2,3	28,1 ±2,5	8,9 ±0,7				
Loč 2 (12♂, 4♀)	50,1 ±3,1	39,8 ±3,2	31,2 ±0,9	10,0 ±0,4	48,0 ±1,5	38,3 ±1,1	33,5 ±1,1	10,2 ±0,3
Loc 6 (2♂, 5♀)	52,9 ±0,1	43,1 ±0,5	31,9 ±0,1	10,1 ±0,6	45,7 ±3,4	35,5 ±3,9	32,4 ±1,0	9,8 ±0,3
Loc 7 (1♀)					49,7	38,8	32,8	9,6
AVERAGE (Sicily - 14♂, 10♀)	50,5 ±3,0	40,3 ±3,2	31,3 ±0,8	10,0 ±0,4	47,0 ±2,8	36,8 ±3,1	32,9 ±1,1	9,9 ±0,4

Chalcolestes viridis (Vander Linden)

Loc. 6: 1♂, 2♀, 3ex.

Material was identified after JÖDICKE (1997) and UTZERI et al. (1994a). CARFI & TERZANI (1993) are listing two localities and although UTZERI et al. (1994b) add a few more, the species is not common in Sicily. The occurrence of *C. parvidens* (Artobolevski) in Sicily is doubtful, based on a single, possibly intermediate specimen (UTZERI et al., 1994b; UTZERI, 1995).

Lestes barbarus (Fabricius)
Loc. 10: 1♂, 1 ♀.

Lestes virens virens (Charpentier)
Loc. 12: 5♂, 3 cop.; — Loc. 13: 2♂, 1 cop.; — Loc. 15: 5♂, 1♀.
It is known from a single locality in Sicily (BUCCIARELLI, 1977) and from Sardinia (UTZERI, 1995), while the range of ssp. *vestalis* Ramb. covers the entire peninsular Italy.

Platycnemis pennipes (Pallas)
Loc. 16: 5♂, 3♀.

Cercion lindenii (Sélys)
Loc. 6: 10♂, 1 cop.; — Loc. 11: 1♂, 1♀; — Loc. 15: 1♂; — Loc. 16: 5♂.

Coenagrion caerulescens caesarum (Schmidt)
Loc. 3: 1♂.

Erythromma viridulum (Charpentier)
Loc. 10: 30♂, 2♀; — Loc. 12: 10♂; — Loc. 15: 5♂.
CARFI & TERZANI (1993) list a few localities from SE Sicily.

Ischnura genei (Rambur)
Loc. 3: 1♂; — Loc. 6: 1♂; — Loc. 7: 3♂; — Loc. 8: 1♂; — Loc. 9: 2♂; Loc. 10: 10 juv., 30♂, 5♀; — Loc. 11: 20♂, 5♀; — Loc. 12: 3♂; — Loc. 15: 5♂.

Ceriagrion tenellum (de Villers)
Loc. 6: 3♂.

Aeshna mixta Latreille
Loc. 4: 2♂.
It was known from a single, old record. Our 2♂, captured near the village of Nicolosi, confirm its occurrence in Sicily after more than a century (cf. CARFI & TERZANI, 1993).

Aeshna cyanea (Müller)
Loc. 1: 1♂; — Loc. 4: 2♂; — Loc. 6: 2ex.; — Loc. 12: 1 ex.
Although reported from Sicily by many authors, only two localities have been known to date (CARFI & TERZANI, 1993). The species is

here reported from four additional localities; in two cases its local breeding could be confirmed.

Anax imperator Leach

Loc. 10: 2♂, 1 ovip.; — Loc. 11: 2♂; — Loc. 12: 2♂, 1♀, 3ex.; — Loc. 13: 1♂; — Loc. 14: 1♂; — Loc. 15: 2♂.

Anax parthenope (Sélys)

Loc. 12: 2♂; — Loc. 15: 1♂.

Onychogomphus forcipatus forcipatus (Linnaeus)

Loc. 16: 1♀, 1♂+1♀ ten., 20 ex.

The identification is based on exuviae, which have lateral spines on abdominal segments 6-9. In a single teneral male the inferior appendages were damaged by pressure. Females are rather small and have partly yellowish infumed wings. Thoracic markings are very similar to those of *O. f. unguiculatus* (Vander L.) and cannot be used for separation of the two subspecies (F. Suhling, pers. comm.).

According to BOUDOT et al. (1990) and SUHLING & MÜLLER (1996), the nominotypical subspecies is restricted to the extreme southern part of Italy and to Sicily, while *O. f. unguiculatus* occurs in the rest of the Apennine peninsula towards the Northwest. However, it seems that the present records are the first for the region (M. Pavesi, pers. comm.). It is also interesting that D'ANTONIO (1994) reported *O. f. unguiculatus* from almost the same locality (the upper course and the tributaries of the Sinni R.) and from a few additional places; some of his records are based on larvae, throughout Basilicata. The same author reports this subspecies also from Calabria (D'ANTONIO, 1996) and Campania (D'ANTONIO, 1995), but the precise range of the two subspecies in southern Italy is yet to be defined.

Onychogomphus uncatus (Charpentier)

Loc. 16: 1♂, 3 lar.

It is rare in southern Italy, reported from a few localities in Calabria (CARCHINI & ROTA, 1986; D'ANTONIO, 1996) and Campania (D'ANTONIO, 1995). A single male has been known from Sicily (CARFI et al., 1980). Our larvae document its autochthony in the island.

Orthetrum cancellatum (Linnaeus)

Loc. 9: 2♂; — Loc. 10: 2♂; — Loc. 11: 2♂; — Loc. 12: 5♂; — Loc. 13: 2♂; — Loc. 15: 10♂.

Orthetrum brunneum brunneum (Fonscolombe)

Loc. 2: 2♂; — Loc. 3: 10♂, 3♀, 3 cop., 10 lar.; — Loc. 7: 5♂, 1 cop.; — Loc. 11: 1♀; — Loc. 16: 1♂.

Orthetrum coerulescens (Fabricius)

Loc. 2: 1♂; — Loc. 6: 1 lar.; — Loc. 9: 1♂; — Loc. 11: 1♂; — Loc. 13: 5♂; — Loc. 15: 2♂; — Loc. 16: 4♂.

In the last few years much attention has been given to the complexity of distinguishing between *O. c. coerulescens* and *O. c. anceps*. MAUERSBERGER (1994) emphasized that the two taxa are hard to differentiate, the only distinguishing feature being the shape of the anterior lamina in the male secondary sex organ. Both taxa and their intermediate forms are known from Sicily (CARFI & TERZANI, 1993). In order to compare different populations across Europe, KLINGENBERG (1995) used the RAPD fingerprinting method, but was unable to find any distinctions between *c. coerulescens* and *c. anceps*. In addition, intermediate forms were reported from southern Spain (KLINGENBERG & MARTENS, 1996) and Greece (LOPAU & WENDLER, 1995).

Using MAUERSBERGER's (1994) classification: at Locality 13 we had *c. anceps* (phenotype 5) and the intermediate form (phenotype 3). The intermediate form (phenotype 3) was also caught at Locality 2. The Basilicata material is referable to *c. coerulescens* (phenotype 1).

Considering that the morphometric research has shown a continuum in almost all characters and that the sole distinguishing feature remains the shape of the anterior lamina in males we believe, particularly in view of the geographical distribution and of the results of biochemical research, that the two taxa would deserve a subspecific rank at the most.

Orthetrum trinacria (Sélys)

Loc. 12: 2♂; — Loc. 15: 3♂, 1 ovip.

After its description from Sicily in 1841, the species was not sighted there during more than a century, when rediscovered at a locality in

SE Sicily (BUCCIARELLI, 1977, CARFI et al., 1980). It has also been known from the island of Pantelleria (LOHMANN, 1989; PAVESI & UTZERI, 1995), but not from NW Sicily. This African species occurs also in Sardinia (BUCCIARELLI, 1977; UTZERI & COBOLLI, 1993), Spain (HARTUNG, 1996) and in Portugal (JAHN, 1996b). It is rare in Greece, known from a single locality in the island of Rodhos (LOPAU & WENDLER, 1995).

Brachythemis leucosticta (Burmeister)
Loc. 15: 1♂, 1♀.

Crocothemis erythraea (Brullé)
Loc. 3: 3♂; — Loc. 5: 1♂; — Loc. 10: 30♂, 2 cop., 2 ovip; — Loc. 11: 10♂; — Loc. 12: 3 ex.; — Loc. 13: 10♂; — Loc. 15: 10♂; — Loc. 16: 2♂.

Due to their small size, the exuviae collected at Locality 12 have caused some identification problems. Measurements (in mm) were as follows: body length: 13.0, 13.4, 15.1; left hind tibia: 5.2, 4.8, 5.7, respectively. According to HEIDEMANN & SEIDENBUSCH (1993) exuviae of *C. erythraea* from central Europe measure 17-19 mm. As stated already by HAGEN (1996), some caution is required in identification of Iberian Sympetrinae larvae without dorsal spines (JÖDICKE, 1995). According to the key, exuviae of *C. erythraea* should be bigger than 15 mm. Due to variable size of its exuviae, some confusion may occur in separating this species from *Diplacodes lefebvrei*. In this case, the ratio between the length of cerci and that of epiproct (1 : >1.5 in *C. erythraea* and 1 : $\simeq 1.2$ in *D. lefebvrei*), as stated by SEIDENBUSCH (1995), proved very useful.

Sympetrum fonscolombei (Sélys)
Loc. 6: 2♂, 3♀; — Loc. 9: 6♂, 3♀; — Loc. 10: 2♂, 3 cop.; — Loc. 12: 20♂, 5♀, 2 cop., 6 ex.; — Loc. 15: 30♂, 15♀, 5 cop.

Sympetrum meridionale (Sélys)
Loc. 3: 1♂.

Trithemis annulata (Palisot de Beauvais)
Loc. 9: 10♂, 1 cop.; — Loc. 10: 10♂, 1♀; — Loc. 12: 2♂, 1 ex.; — Loc. 13: 20♂; — Loc. 16: 15♂, 1 cop., 1 ovip.

Selysiothemis nigra (Vander Linden)
Loc. 12: 15♂, 2♀.

DISCUSSION

CARFI & TERZANI (1993), who collected and very accurately presented the data on dragonflies of Sicily and the neighbouring islands, grouped the species into those occurring in this area with certainty (Group 1), those the occurrence of which is not certain and should be checked (Group 2), and those the reference to which is based on error (Group 3). Most "problematical" is Group 2, for it consists of 10 species (*Hemianax ephippiger* should be placed into group 1) the data on which are more than a century old and for which no voucher material is available. In the checklist of Italian dragonflies (UTZERI, 1995), the occurrence of these species in Sicily is not marked with a question mark, which may lead to false conclusions. For this reason the authors wish to take this opportunity to offer the list of dragonflies of Sicily itself, without the neighbouring islands: it includes only those species, the occurrence of which has been well documented.

The present list is almost identical to Group 1, of CARFI & TERZANI (1993). Added are *Aeshna mixta* (data from the present paper), *Orthetrum c. coerulescens* (data from MAUERSBERGER, 1994 and KLINGENBERG, 1995), as well as *Hemianax ephippiger* and *O. b. brunneum*, which were omitted (by mistake) from Group 1 (CARFI & TERZANI, 1993). *Ischnura fountaineae*, known from the island of Pantelleria (LOHMANN, 1989; PAVESI & UTZERI, 1995), is omitted. Unpublished records for two additional species, *Coenagrion puella* and *Aeshna affinis*, which were communicated to the authors by M. Pavesi (pers. comm.) will be published elsewhere.

The list of 45 taxa that occur in Sicily with utmost certainty is as follows: *Calopteryx haemorrhoidalis, C. splendens xanthostoma, Sympecma fusca, Chalcolestes viridis, Lestes barbarus, L. dryas, L. v. virens, Ischnura genei, I. pumilio, Enallagma cyathigerum, Cercion lindenii, Coenagrion caerulescens caesarum, C. mercuriale castellani, C. scitulum, C. puella, Erythromma viridulum, Ceriagrion tenellum, Aeshna mixta, A. affinis, A. cyanea, Anaciaeschna isosceles, Anax imperator, A. parthenope, Hemianax ephippiger, Paragomphus genei,*

Onychogomphus forcipatus, O. uncatus, Cordulegaster bidentata sicilica, C. trinacriae, Libellula fulva, L. depressa, Orthetrum b. brunneum, O. cancellatum, O. c. coerulescens, O. c. anceps, O. nitidinerve, O. trinacria, Brachythemis leucosticta, Crocothemis erythraea, Sympetrum fonscolombei, S. meridionale, S. sanguineum, S. striolatum, Trithemis annulata and *Selysiothemis nigra.*

Due to their general distribution in Europe and frequent occurrence in southern Italy (D'ANTONIO, 1994; 1995; 1996) the following species can be also expected to occur in Sicily: *Chalcolestes parvidens, Lestes macrostigma, Coenagrion pulchellum, Brachytron pratense* as well as *Ischnura fountaineae* and *Boyeria irene. Calopteryx virgo festiva, Platycnemis pennipes, Pyrrhosoma nymphula, Libellula quadrimaculata* and perhaps even *Onychogomphus forcipatus unguiculatus* are less likely to occur there. However, until reliable data and fresh material are at hand, it is better to withdraw these species from the Sicilian list.

The list of 24 species recorded by ourselves in Sicily is somewhat surprising, since it represents more than 50% of the fauna, while the research was everything but intense, only a small number of localities were explored, and each of them was visited but briefly. The season was not very suitable either. However, in addition to species evidenced by us, BUCCIARELLI (1977), CARFI et al. (1980), GALLETTI et al. (1987) and M. Pavesi (pers. comm.) recorded also *Lestes dryas, Aeshna affinis, Anaciaeschna isosceles, Hemianax ephippiger, Cordulegaster trinacriae, Orthetrum nitidinerve* and *Sympetrum sanguineum,* all on the wing in August and even later. It can be asserted that the late summer aspect of the dragonfly fauna of Sicily is relatively well known, but a survey of its spring aspect will require more attention in the future.

ACKNOWLEDGEMENTS

The authors would like to express their sincere thanks to Dr MAURIZIO PAVESI (Milano, Italy), Dr FABIO TERZANI (Firenze, Italy) and Dr CARLO UTZERI (Rome, Italy) for their critical review of the manuscript and for help with literature. The identifications of larval and imaginal *Onychogomphus* material were kindly checked by Dr FRANK SUHLING (Braunschweig, Germany), who also has identified the "problematic" specimens. Mr MITJA POGOREVC (Leskovec, Slovenia) skilfully draw the map of Sicily.

REFERENCES

ASKEW, R.R., 1988. *The dragonflies of Europe*. Harley Books, Colchester.

BUCCIARELLI, I., 1971. Presenza in Sicilia di una colonia di Selysiothemis nigra (V. D. Linden) e note su altre specie raccolte nell' isola e nell' Italia meridionale (2 contributo alla conoscenza degli Odonata). *Boll. Soc. ent. it.* 103(9): 175-185.

BUCCIARELLI, I., 1977. Dati preliminari sul populamento odonatologico di Calabria, Sicilia e Sardegna (8 contributo alla conoscenza degli odonati). *Annali Mus. civ. St. nat. Genova* 81: 374-386.

BOUDOT, J.-P., G. JACQUEMIN & H. DUMONT, 1990. Revision of the subspecies of Onychogomphus forcipatus (Linnaeus, 1758) in Europe and Asia Minor, and the true distribution of Onychogomphus forcipatus unguiculatus (Vander Linden, 1823) (Odonata, Gomphidae). *Bull. annls Soc. r. belge Ent.* 126: 95-111.

CARCHINI, G. & E. ROTA, 1986. Attuali conscenze sulla distribuzione degli odonati dell'Italia meridionale. *Biogeographia* 10(1984): 629-684.

CARFI, S., P. DEL CENTINA & F. TERZANI, 1980. Odonati raccolti in Sicilia, Calabria e Basilicata negli anni 1963-1977. *Redia* 53: 37-47.

CARFI, S. & F. TERZANI, 1993. Attuali conoscenze del popolamento odonatologico della Sicilia e delle isole dipendenti (Odonata). *Mem. Soc. ent. ital.* 71(2): 427--454.

CONCI, C. & C. NIELSEN, 1956. *Fauna d'Italia*, Vol. 1: *Odonata*. Calderini, Bologna.

D'ANTONIO, C., 1994. Gli odonati della Basilicata (Odonata). *Boll. Soc. ent. ital.* 126(2): 121-133.

D'ANTONIO, C., 1995. Gli odonati della Campania (Odonata). *Boll. Soc. ent. ital.* 127(2): 103-116.

D'ANTONIO, C., 1996. Gli odonati della Calabria (Odonata). *Boll. Soc. ent. ital.* 128(1): 3-16.

GALLETTI, P.A., M. PAVESI & F.P. ROMANO, 1987. Brachythemis leucosticta (Burm.) e considerazioni su altri odonati nuovi per la Sicilia. *Naturalista sicil.* (IV) 11(1/4): 27-46.

HARTUNG, M., 1996. Odonata from the Iberian Peninsula with a description of Calopteryx haemorrhoidalis almogravensis ssp. n. from Portugal. *Adv. Odonatol.* (Suppl.) 1: 53-59.

HEIDEMANN, H. & R. SEIDENBUSCH, 1993. *Die Libellenlarven Deutschlands und Frankreichs. Handbuch für Exuviensammler*. Erna Bauer, Keltern.

JAHN, P., 1996a. Dwarf forms of dragonflies in Portuguese costal waters (Zygoptera: Calopterygidae; Anisoptera: Libellulidae). *Adv. Odonatol.* (Suppl.) 1: 61-63.

JAHN, P., 1996b. Libellen im Einzugsgebiet des Guadiana in Südostportugal. *Adv. Odonatol.* (Suppl.) 1: 65-76.

JÖDICKE, R., 1995. Die Larve von Sympetrum sinaiticum tarraconenesis Jödicke (Anisoptera: Libellulidae). *Odonatologica* 24(3): 353-360.

JÖDICKE, R., 1997. *Die Binsenjungfern und Winterlibellen Europas: Lestidae*. Westarp, Magdeburg. — [Neue Brehm-Bücherei 631]

KLINGENBERG, K., 1995. Comparative field and molecular genetic relationship

analyses between Orthetrum coerulescens (Fabricius) and O. anceps (Schneider) (Anisoptera: Libellulidae). *Abstr. Pap. 13th Int. Symp. Odonatol.*, Essen, p. 28.

KLINGENBERG, K. & A. MARTENS, 1996. Record of an intermediate form between Orthetrum coerulescens (Fabricius) and O. anceps (Schneider) in southern Spain (Anisoptera: Libellulidae). *Adv. Odonatol.* (Suppl.) 1: 117-121.

LOHMANN, H., 1989. Ischnura fountainei Morton auf der Insel Pantelleria, Italien: Erstnachweis für Europa (Zygoptera: Coenagrionidae). *Notul. odonatol.* 3(4): 61.

LOPAU, W. & A. WENDLER, 1995. Arbeitsatlas zur Verbreitung der Libellen in Griechenland und den umliegenden Gebieten, Rasterkarten nach den in der Literatur vorhandenen Nachweisen sowie unveröffentlichten Beobachtungen. *Naturk. Reiseber.* 5: 1-109.

MARTENS, A., 1996. *Die Federlibellen Europas: Platycnemididae*. Westarp, Magdeburg. — [Neue Brehm-Bücherei 626]

MARTENS, A., 1997. Platycnemis pennipes (Pallas) on European islands (Zygoptera: Platycnemididae). *Odonatologica* 26(1): 17-33.

MAUERSBERGER, R., 1994. Zur wirklichen Verbreitung von Orthetrum coerulescens (Fabricius) und O. ramburi (Selys) = O. anceps (Schneider) in Europa und die Konsequenzen für deren taxonomischen Rang (Odonata: Libellulidae). *Dt. ent. Z.* (N.F.) 41(1): 235-256.

PAVESI, M., 1973. Interessanti reperti di odonati in Puglia e Basilicata. *Boll. Soc. ent. ital.* 105(9/10): 151-155.

PAVESI, M. & C. UTZERI, 1995. Arthropoda di Lampedusa, Linosa e Pantelleria (Canale di Sicilia, Mar Mediterraneo). Odonata. *Naturalista sicil.* 19 (Suppl.): 151-162.

RAINERI, V. & L. FERRANDO, 1995. La collezione odonatologica di Felice Capra (Insecta, Odonata). *Doriana* 6(290): 1-6.

SEIDENBUSCH, R., 1995. Description of the last instar larva of Diplacodes lefebvrei Rambur, 1842 (Anisoptera: Libellulidae). *Sulzbach-Rosenberger Libellenrundbriefe* 1: xii-xiii.

SUHLING, F. & O. MÜLLER, 1996. *Die Flußjungfern Europas: Gomphidae*. Westarp, Magdeburg. — [Neue Brehm-Bücherei 628]

UTZERI, C., 1995. Odonata. *In*: A. Minelli, S. Ruffo & S. La Posta, [Eds], Checklist delle specie della fauna italiana, pt 35, pp. 1-7, Calderini, Bologna.

UTZERI, C. & M. COBOLLI, 1993. Ricerche zoologice della nave oceanografica "Minerva" (C.N.R.) sulle isole circumsarde. 14. Gli odonati delle isole circumsarde (Odonata). *Annali Mus. civ. St. nat. "G. Doria"* 89: 457-476.

UTZERI, C., L. DELL'ANNA, M. COBOLLI & E. DE MATTHAEIS, 1994a. Preliminary data on the genetic differentiation between Chalcolestes parvidens (Artobolevski, 1929) and C. viridis (Vander Linden, 1825) (Zygoptera: Lestidae). *Abstr. Pap. 1st Odonatol. Symp. Alps-Adriatic Reg. Comm.*, Maribor, p. 17.

UTZERI, C., L. DELL'ANNA, F. LANDI, E. DE MATTHAEIS & M. COBOLLI, 1994b. Nota preliminare sulla distribuzione di Chalcolestes viridis (Vander Linden, 1825) e C. parvidens (Artobolevski, 1929) in Italia (Zygoptera: Lestidae). *Notul. odonatol.* 4(3): 46-50.

VON HAGEN, H., 1996. Notiz zu den Exuvien von Selysiothemis nigra und Diplacodes lefebvrii (Anisoptera: Libellulidae). *Adv. Odonatol.* (Suppl.) 1: 47-51.

Received 6 May 1999
Revised and accepted 18 June 1999