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BRANCHIOPOD CRUSTACEANS
FROM CIRCUM-SICILIAN ISLANDS, I: USTICA
(SOUTHERN TYRRHENIAN SEA, ITALY)
(*Crustacea Branchiopoda*)

SUMMARY

A census of freshwater branchiopod crustaceans from Ustica (PA), a small volcanic island in southern Tyrrhenian sea, has been made for the first time. Five species belonging to three orders occur on the island: *Chirocephalus diaphanus* Desmarest, *Triops cancriformis cancriformis* (Lamarck), *Moina brachiata* (Jurine), *Alona elegans* Kurz and *Macrobrax* sp. All the species were collected in temporary ponds and pools, the only freshwater systems present in the island.

Punta Gorgo Salato is actually outside the "R.N.O. Isola di Ustica". Considering its interesting and vulnerable branchiopod fauna the author suggests the insertion of this area within the borders of the protected area.

RIASSUNTO

Crostacei Branchiopodi delle isole circumsiciliane, I: Ustica (Tirreno meridionale, Italia) (Crustacea Branchiopoda). Sono stati censiti per la prima volta i crostacei branchiopodi dulciacquicoli di Ustica (PA), una piccola isola vulcanica del Tirreno meridionale. Sull'isola sono presenti cinque specie appartenenti a tre ordini: *Chirocephalus diaphanus* Desmarest, *Triops cancriformis cancriformis* (Lamarck), *Moina brachiata* (Jurine), *Alona elegans* Kurz and *Macrobrax* sp. Tutte le specie sono state rinvenute in stagni e pozze temporanee, gli unici corpi d'acqua dolce presenti sull'isola.

Punta Gorgo Salato è attualmente al di fuori dei confini della "R.N.O. Isola di Ustica". Alla luce della sua interessante e vulnerabile fauna a branchiopodi l'autore suggerisce l'inserimento di quest'area all'interno dei confini dell'area protetta.

INTRODUCTION

Ustica is a small island located in southern Tyrrhenian Sea, 60 km North of Palermo, about 9 km² wide. It is entirely comprised between 13° 09' and 13° 12' of long. E and between 38° 41' and 38° 44' of lat. N. Its highest altitude is 245 m a.s.l. at Monte Guardia dei Turchi.

About a half of its surface is formed by outcrops of volcanic rocks, the rest of the island being covered by marine deposits. (FORESTA MARTIN, 2000).

The average temperature is 17.1 °C, the average annual precipitation is 320 mm (ZAMPINO *et al.*, 1997). Distribution of rainfalls defines a wet and a dry period lasting six months each, respectively from late October to March and from April to the beginning of October (Fig. 1).

In the wet period the average temperature is 12.8 °C and 78% of total annual precipitation occurs.

Ustica's climate and geological nature do not allow the presence of a permanent surface hydrographic network. On the contrary four typologies of temporary water bodies are well-spread throughout the island: semi-natural ponds, concrete ponds, ground pools and rock pools (Tab. 1).

These freshwater temporary systems, with the only exception of Rupe

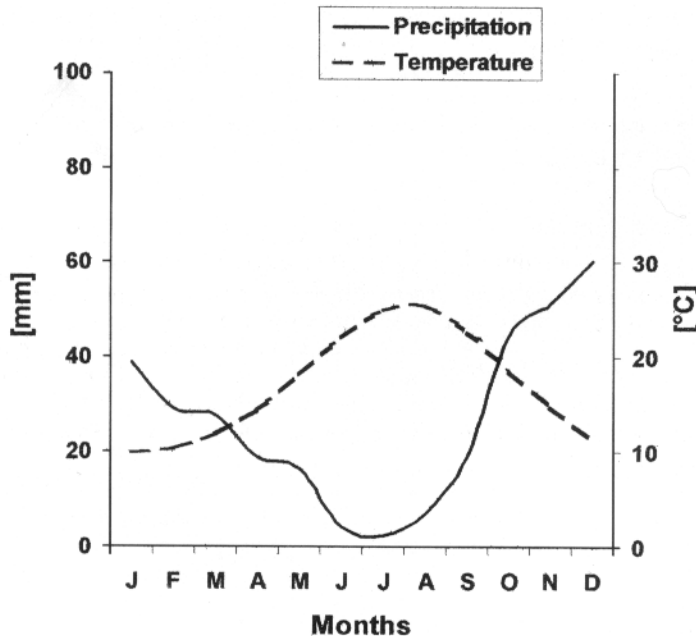


Fig. 1 — Ombrothermic diagram of Ustica (Palermo, Italy). From ZAMPINO *et al.* (1997), modified.

Table 1

Main features of the sampled freshwater environments. Dimensions of the main axes are given in meters and refer to maximum capacity. Pozze della Rupe Falconiera and Uricieddi group several rock pools of different size. Pozza di Megna was partially filled up in winter 2003.

Typology	Name	Size	Coordinates
Concrete pond	S. Bartolicchio	35x35	38° 42' 00" N 13° 10' 22" E
	Gorgo Salato	40x30	38° 43' 09" N 13° 10' 34" E
Semi-natural ponds	Gorgo di Tramontana	12x12	38° 43' 03" N 13° 11' 20" E
	Gorgi Di Lorenzo 1	16x13	38° 42' N 13° 09' E
	Gorgi Di Lorenzo 2	16x13	38° 42' N 13° 09' E
Rock pools	Pozze della Rupe Falconiera	—	38° 42' N 13° 11' E
	Uricieddi	—	38° 41' N 13° 09' E
Ground pools	Pozza del ponte	15x3	38° 42' 09" N 13° 09' 26" E
	Pozza di Megna	9x5	38° 42' 44" N 13° 09' 46" E
	Pozza limpida	5x1	38° 43' 12" N 13° 10' 47" E
	Pozza lunga	6x2	38° 43' 11" N 13° 10' 47" E

Falconiera's pools, lie on marine terraces of the third and fourth orders according to FORESTA MARTIN (2000), which were originated about 132,000-100,000 years ago.

The freshwater environments of this small island were never studied before as far as it concerns Crustacea Branchiopoda, while some surveys on their plants were carried out (e.g. RONISVALLE, 1973).

MATERIALS AND METHODS

Specimens were collected by a 50 µm mesh hand net. In some occasions the scarce depth of the water bodies made impossible the use of the net, thus water samples were taken with a flask and filtered on a 50 µm mesh sieve. The collected animals were fixed in ethanol 95% and preserved in author's collection. Species were identified according to ALONSO (1996), COTTARELLI & MURA (1983), MARGARITORA (1985) and SMIRNOV (1992).

All sites were sampled monthly from December 2002 to March 2003; in this last month all sites but four were completely dried up.

RESULTS

Branchiopoda collected in the island belong to three orders: Anostraca, Notostraca and Anomopoda (Tab. 2).

Table 2
Checklist of branchiopod crustaceans (Crustacea: Branchiopoda) from Ustica, Sicily.

Taxa	Chorology	Ecology	Sites
Ordo Anomopoda			
Familia Moinidae <i>Moina brachiata</i> (Jurine, 1820)	CEM	HFF<	3
Familia Chydoridae Subfamilia Aloninae <i>Alona elegans</i> Kurz, 1875	EUM	DFF<	6
Familia Macrothricidae <i>Macrothrix</i> sp.	?	DFF<	3
Ordo Anostraca			
Familia Chirocephalidae Subfamilia Chirocephalinae <i>Chirocephalus diaphanus</i> Desmarest, 1823	TEM	HDFP>>	2
Ordo Notostraca			
Familia Triopidae <i>Triops cancriformis cancriformis</i> (Lamarck, 1801)	ASE	DPRE>>	2

Chorology: ASE (Asiatic-European)
 CEM (Middle Asiatic-European-Mediterranean)
 EUM (European-Mediterranean)
 TEM (Turanic-European-Mediterranean)

Ecology: HFF< (Herbivorous filter-feeder < 0.85 mm)
 DFF< (Detritivorous filter-feeder < 0.85 mm)
 HDFP>> (Herbivorous/Detritivorous filter-feeder > 20 mm)
 DPRE>> (Detritivorous/Predacious > 30 mm)

Taxonomy follows ALONSO (1996) and DUMONT & NEGREA (2002).

Ecological roles and chorological categories according to NASELLI FLORES *et al.* (1998) and VIGNA TAGLIANTI *et al.* (1992), modified.

ANOSTRACA: Chirocephalidae

Chirocephalus diaphanus Desmarest 1823

Mat.: Gorgo Salato (December to March), Gorgo di Tramontana (February and March).

Widely distributed in the temperate and subtropical zones of Europe, Asia Minor and Africa (BELK & BRTEK, 1995). It is the most common anostracan in Italy (MURA, 2001), Spain (ALONSO, 1996), France (DEFAYE *et al.*, 1998) and southern Yugoslavia (PETROV & PETROV, 1997). *C. diaphanus* is considerably eurieicous ranging from plain to high altitude ponds. It was already reported for Sicily (COTTARELLI & MURA, 1979).

NOTOSTRACA: Triopidae

Triops cancriformis cancriformis (Lamarck, 1801)

Mat.: Gorgo Salato (December to March), Gorgi Di Lorenzo (February).

The nominal subspecies of *T. cancriformis* is an Asiatic-European element. It is widely distributed from Western Europe to Russia, in Asia Minor and from Middle East to India (LONGHURST, 1955). This taxon presents both gonochoric and parthenogenetic populations, the formers being typical of the southern distributional range of the subspecies (ZAFFAGNINI & TRENTINI, 1980). In Sicily both strains are represented but the gonochoric one is currently known for Favignana island only (COTTARELLI & MURA, 1995).

ANOMOPODA: Chydoridae

Alona elegans Kurz, 1875

Mat.: Gorgo Salato (December, January and March), Gorgo di Tramontana (February), Pozze della Rupe Falconiera (from December to March), Uricieddi (from December to February), Pozza del ponte (from December to February), Pozza lunga (February).

Alona elegans is a small benthic cladoceran, typical of small water bodies and astatic waters. It has a scattered distribution in Europe, Middle East and North Africa (MARGARITORA, 1985) and was already recorded in two Sicilian sites (MARGARITORA *et al.*, 1982).

ANOMOPODA: Macrothrichidae

Macrothrix sp.

Mat.: Pozza di Megna (January and February), Pozza limpida (February), Pozza lunga (February).

It is a species attributable to the "narrow antennulae species group" of the genus *Macrothrix*. The sampled populations were represented by a few specimens. It was found only in small temporary pools, both with turbid and clear water.

ANOMOPODA: Moinidae

Moina brachiata (Jurine, 1820)

Mat.: Gorgo Salato (December, January and March), Gorgo di Tramontana (February), Gorgo di S.Bartolicchio (from December to March).

Moina brachiata is a planktonic cladoceran, typical of temporary waters. It was found only in the deeper ponds surveyed: Gorgo Salato, Gorgo di Tramontana and Gorgo di S. Bartolicchio. In Sicily *M. brachiata* was already found in a pond near Gela (CL) (MARGARITORA *et al.*, 1982).

GENERAL REMARKS

Sicilian temporary waters, at present, are not studied as far as it concerns crustaceans. This lack of information is poorly understandable since temporary pools and streams are the most expressive natural water bodies in Sicily and in the small circumsicilian islands.

Moreover, according to the EU directive 92\43, the "Mediterranean temporary ponds" are considered natural systems of Community interest, whose preservation needs the designation of protected areas. Considering these remarks it is interesting to highlight that, up to now, almost no attention was paid to their fauna.

Ustica branchiopod fauna has shown fairly interesting features with several uncommon species as *Triops cancriformis cancriformis*, *Alona elegans* and *Macrothrix* sp.; conversely, *Chirocephalus diaphanus* and *Moina brachiata* are rather common in Sicily (*pers. obs.*).

T. c. cancriformis is an Asiatic-European taxon, somewhere abundant (LONGHURST, 1955), but in Sicily it is strongly threatened by habitat loss (*pers. obs.*). Both the populations found in Ustica are parthenogenetic.

Alona elegans is a rare species (MARGARITORA *et al.*, 1982) whose Sicilian status is currently unknown. In Italy only the subspecies *Alona elegans arcuata* Herbst was recorded, which, nevertheless, is not considered a valid taxon by ALONSO (1996). Waiting for a revision of the subspecies, the specimens collected in Ustica were identified only to species level.

Macrothrix sp., showing an unusual combination of features, is probably a new species. More detailed morphological studies are in progress to enlighten its taxonomical status.

Temporary waters' branchiopods usually present large populations and considerable cyst banks, but are confined to small basins. These are highly susceptible to changes in land use. Thus the main requirement for their protection is habitat conservation (BELK, 1998). Unfortunately, most of Ustica freshwater environments are outside of protected areas, and the opportunity of enlarging the Nature Reserve should be considered carefully to preserve their interesting and vulnerable fauna. On March 2003, for instance, during some roadworks Punta di Megna puddle was partially filled up with gravel, seriously endangering the most abundant population of *Macrothrix* sp. now-

days found. Actually, by safeguarding Punta Gorgo Salato with its pond and puddles, all the Ustica branchiopod crustaceans will have at least a population in a threat-free area.

Moreover, Punta Gorgo Salato and its pond and pools should deserve monitoring and protection even for their flora (Pasta, *pers. comm.*) and vertebrate fauna (Lillo & Sicilia, *pers. comm.*).

Acknowledgements — I wish to thank Miguel Alonso and Luigi Naselli Flores for their helpful suggestions during the preparation of the manuscript. I am deeply indebted with Francesco Lillo for the logistic support he gave me on the island.

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