Caprella scaura Templeton, 1836 sensu lato (Amphipoda: Caprellidae) in the Mediterranean

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Abstract

Caprella scaura, first described from Mauritius and later reported in several ‘forms’ from all over the world, has now been found in the central and eastern Mediterranean. The morphology shows no significant difference to the topotypical material. Specimens from Venice and Sicily have been studied in detail, the former also by cytogenetic methods.

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Introduction

Now and then species are reported from the Mediterranean, that are not included in the Handbook of Mediterranean Amphipods. Such species are not always new to science; some clearly have been introduced from other areas. Since 1999, Caprella scaura has been recorded from the Venice lagoon (Danesi et al. 1999; Mizzan 1999). This species was described first from Mauritius in the Indian Ocean, and subsequently reported as distributed all over the world in several ‘forms’.

The present paper describes the Mediterranean material of C. scaura in detail and compares it with the various described ‘formae’. For the full set of data and illustrations, see the accompanying Organisms Diversity and Evolution Electronic Supplement (http://www.senckenberg.de/odes/06-03.htm).

Material and methods

In addition to classical procedures for dissection of the animals and drawing them from permanent mounts in Faure’s fluid, we studied some cytogenetical parameters (chromosome number, karyotype formula, size and base composition of the genome), made light-microscope photographs and drawings as well as SEM-pictures, and studied the ontogenetic development from juveniles to adults.

Results

Morphology

Summarizing the situation for the time being, we know five subspecies in which ventral spines are lacking: Caprella scaura scaura Templeton, 1836; loc. typ. Mauritius; length 14 mm (Guerra-García 2003a);
*Caprella scaura typica* Mayer, 1890; loc. typ. Brazil; length (male) 16–21 mm;

*Caprella scaura cornuta* Mayer, 1890; loc. typ. Brazil; length (male) 18 mm;

*Caprella scaura diceros* Mayer, 1890; loc. typ. Japan; length (male) 22.5 mm;

*Caprella scaura hamata* Utinomi, 1947; loc. typ. Japan; length (male) 24 mm.

The morphology of the Mediterranean material (Figs. 2 and 3) matches that of the nominotypical subspecies.

### Key to males of five subspecies of *Caprella scaura* without a ventral spine

1. Pereion 1–3 dorsally with a pair of processes .......................................................... 2
   — Pereion 1–3 dorsally smooth ......................................................................... 2

2. Pereion 4 distally with acute; backward-directed prolongation. Pereion five dorsally in both sexes with two pairs of tubercles at rear part of back .......................................................... C. s. diceros
   — Pereion four dorsally smooth ........................................................................ 3

3. Pereion five dorsally in both sexes with pair of processes ............................ C. s. typica
   — Pereion five dorsally smooth ......................................................................... 4

4. Head with short and blunt spine dorsally .......................................................... C. s. cornuta
   — Head with long and acute spine. ..................................................................... C. s. scaura

### Distribution of *Caprella scaura* sensu lato

**Indian Ocean:** Templeton (1836); Arimoto (1976); Ren and Zhang (1996); Laubitz (1995); Guerra-Garcia (2004).


**Atlantic Ocean:** Stimpson (1857); McCain (1968): N Atlantic; Mayer (1890); Serejo (1998): Brazil.

**Mediterranean:** Mizzan (1999); Danesi et al. (1999); Occhipinti Ambrogi (2000): Adriatic Sea; present work: Sicily, Greece.

### Cytogenetics of the Venetian material

The karyotype (Fig. 1) is composed of $2n=24$ chromosomes forming 12 pairs with a median centromere and gradually varying size. Flow-cytometric analyses assigned to *C. scaura* a haploid genome size (C-value) of $0.74 \pm 0.008$ picograms and an AT-DNA percentage in the whole genome of 77.09. The data on chromosome number, karyotype morphology and genome size agree with those published on Caprellidae earlier (Libertini et al. 2000, 2003; Libertini and Krapp-Schickel 2000; Libertini, A., unpublished data). Although genome size may vary significantly among caprellid species, the Caprellidae as a whole seem to be characterized by uniformity in karyotype morphology, along with the smallest genome sizes reported for Amphipoda. Moreover, among amphipods genome base composition is highly variable, with AT percentage ranging from 28.8 to 77.09 (Libertini et al. 2000; Electronic Supplement 06-03).

### Conclusions

An undoubtedly closely related clade of *Caprella* species with an occipital spine is distributed in warm waters all over the world. Its members are divided in those with and those without ventral spines; the species collected in the Mediterranean shows no ventral processes, therefore is close to *Caprella scaura scaura*, described from Mauritius by Templeton (1836) as well as Guerra-Garcia (2003a). In addition, it matches quite well the description given by McCain (1968) from the northern Atlantic. For the morphological habitus and...
details see Figs. 2 and 3. The species may have been dispersed by ships – some authors implying ballast water – but a more likely explanation seems that it travelled living among fouling on the hulls of the ships. At this time we exclude the subspecies lacking ventral spines – typica Mayer, 1890, diceros Mayer, 1890, and
hamata Utinomi, 1947 – as well as those with ventral spines currently subsumed under *Caprella californica* Stimpson.

The morphology of the Mediterranean material (from Venice, now also from the coast of Messina, Sicily, as well as from Greece; see Figs. 2 and 3) matches the descriptions of the type material from the Indian Ocean as well as specimens from California. However, from Aoki and Kikuchi (1990) we know that in some caprellid species both smooth and spiny specimens can be raised from the same brood; therefore, the length and shape of dorsal spination should be used for differentiation with caution. In the growth stages studied here, dorsal protrusions, especially the occipital spine, are as yet not developed, and on the body and its appendages we found differences in shape and relative sizes between juveniles and adults. This is most obvious when the antennae of both stages are compared. However, the mandibles and maxillae have their adult-specific characters fully developed already in the young animals. Due to the morphogenetic reconstruction involving some of the specific features of *C. scaura*, a more detailed observation of the growth stages in juveniles, adults and hyperadults is necessary. Only the integration of morphology, cytogenetics, DNA studies, and may be cultivation, will reveal whether the described morphs

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Fig. 3. *Caprella scaura* (Venice) habitus: male 14 mm; female 11 mm. Abbreviations: Abd = female abdomen; Gn 1, 2 = gnathopod 1, 2; Md = mandible, inner side; P6 = male peraeopod 6.
really belong to the same species. A first step in this direction has been taken here.

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