
**NOTES ON DIAGNOSTIC CHARACTERS AND MORPHOLOGICAL VARIABILITY OF
CAPRELLA MUTICA SCHURIN, 1935 IN THE NETHERLANDS (CRUSTACEA:
AMPHIPODA: CAPRELLIDEA) - MARCO FAASSE**

Key words: introduction, *Caprella mutica*, *Caprella macho*, *Caprella acanthogaster*, juvenile morphology, Amphipoda.

ABSTRACT

The caprellid *Caprella mutica* Schurin, 1935 is recorded from several localities in The Netherlands, where it is locally extremely abundant. This species is an exotic invader originating from the West-Pacific, which has been introduced previously to the west coast of North-America.

C. mutica is morphologically close to *C. macho* Platvoet *et al.*, 1995 and *C. acanthogaster* Mayer, 1890. *C. macho* is considered a junior synonym of *C. mutica* (Platvoet, pers. comm.). Males of *C. mutica* show considerable morphological variation. Characters used in literature to distinguish *C. mutica* and *C. acanthogaster* are discussed. It proves to be difficult to reliably distinguish *C. mutica* from *C. acanthogaster* by the shape of the second gnathopod only. The only reliable characters to separate these species are the setosity of the first pereionites and the shape of the gills.

INTRODUCTION

The southwestern delta area of The Netherlands is situated between two of the largest ports of the world, Antwerp and Rotterdam, and the centre of shell-fish culture in this country is situated in the delta area as well. Consequently alien species become established here regularly. Researchers who have to identify these introduced species often encounter problems like taxonomic confusion and the occurrence of local species with a closely similar external morphology (e.g. Faasse & Van Moorsel 2003). The aim of this paper is to show which characters are diagnostic for *Caprella mutica*.

In 1995 an introduced *Caprella*-species has been described from The Netherlands as *C. macho* Platvoet *et al.*, 1995. It shows a morphological similarity to *Caprella mutica* Schurin, 1935 and *Caprella acanthogaster* Mayer, 1890. Both species occur in Japanese waters (Arimoto 1976; Takeuchi 1999). *C. macho* is now considered to be a junior synonym of *C. mutica* (Platvoet, pers. comm.).

Morphological variability of *C. mutica* from The Netherlands is compared with data on *C. mutica* and *C. acanthogaster* from literature. Distinguishing characters are reviewed. In the future *C. acanthogaster* might be introduced to Europe as well, hence it is important to be aware of the diagnostic characters.

MATERIALS & METHODS

Samples of *C. mutica* were taken from pontoons and subtidal boulders in the SW-Netherlands. Samples from subtidal boulders were taken by SCUBA-diving. Caprellids were separated from their substrate and preserved in ethanol 70%. Drawings of *C. mutica* second gnathopods, pereionites and one whole animal were prepared using a camera lucida.

RESULTS

The *Caprella*-species introduced to the North-east Atlantic in the 1990s (fig. 1) was compared with the descriptions of *C. macho*, *C. mutica* and *C. acanthogaster*, respectively. Part of the specimens fully agree with the description of *C. macho*, the two spines on the palmar margin of the second gnathopod being small and subequal and the ventral spines on pereionite 3 and 4 being absent. They co-occur with specimens, mostly of larger size, which agree with the descriptions of *C. mutica* by Schurin (1935), Vassilenko (1974) and Martin (1977, as *C. acanthogaster humboldtiensis*). In these specimens of larger size the spines on the palmar margin of the second gnathopod are distinctly dissimilar, the so-called poison spine being much more strongly developed, and ventral spines are present on pereionite 3 and 4. The two forms are linked by intermediate forms (fig. 2a,b,c,d).

DISCUSSION

In The Netherlands typical *C. mutica* specimens co-occur with specimens on average being smaller, agreeing with the description of *C. macho*, and intermediate forms. This leads to the conclusion that they all belong to *C. mutica* and that *C. macho* is a junior synonym based on specimens with a less advanced morphological development.

C. mutica is closely similar to *C. acanthogaster* and these species are frequently mixed up in literature. Discriminating characters given in literature are discussed hereafter.

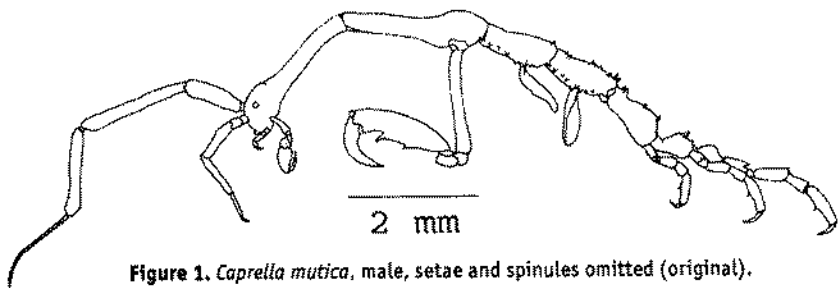


Figure 1. *Caprella mutica*, male, setae and spinules omitted (original).

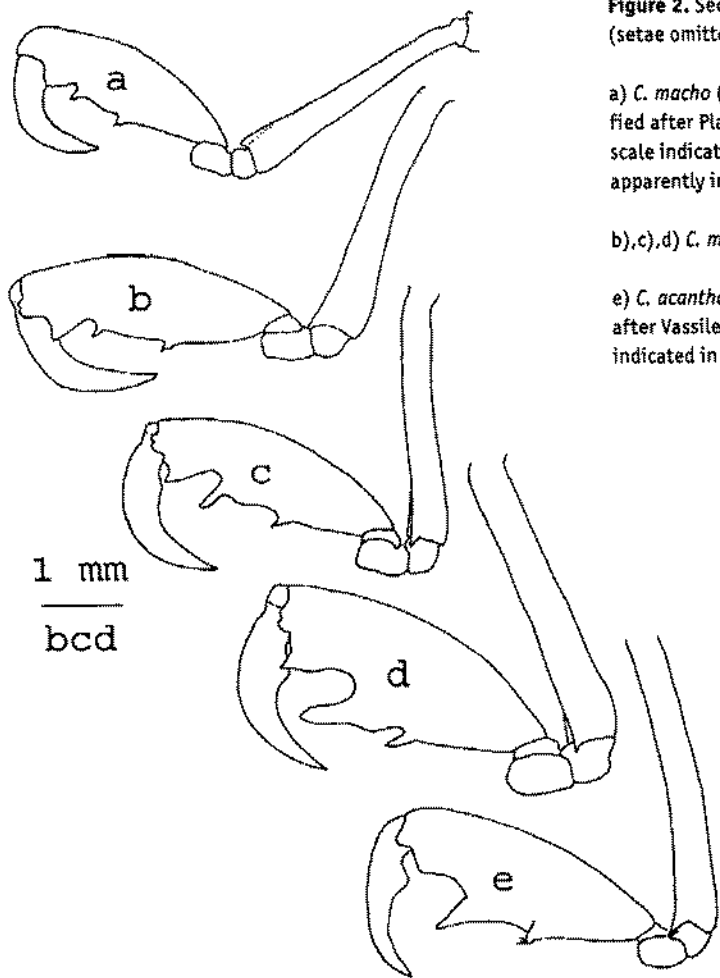


Figure 2. Second gnathopod (setae omitted) of:

a) *C. macho* (mirrored and modified after Platvoet *et al.* 1995, scale indicated in publication apparently incorrect);

b),c),d) *C. mutica* (original);

e) *C. acanthogaster* (modified after Vassilenko 1974, scale not indicated in publication).

1. Setosity pereionite 1 and 2 (including gnathopod 2) in males

The pereionites 1 and 2 are heavily setose in *C. mutica*, however smooth in *C. acanthogaster* (Schurin 1935; Vassilenko 1974; Marelli 1981).

Arimoto (1976) gives a figure of a *C. acanthogaster* specimen with setose pereionite 1 and 2. His treatment of *C. acanthogaster* probably was based on a mixed lot of *C. acanthogaster* and *C. mutica* (see Marelli 1981). The remark of Mayer (1903) that pereionite 2 of *C. acanthogaster* may be covered with fine setae probably pertains to some specimens of *C. mutica* as well, not recognised as a different species.

In the material of *C. mutica* from The Netherlands all specimens have setose pereionites 1 and 2.

2. Shape of gills

The gills of *C. mutica* are elongate oval and those of *C. acanthogaster* linear (Schurin 1935; Vassilenko 1974; Arimoto 1976; Marelli 1981).

The drawing of *C. acanthogaster* in Mayer (1903) shows a male with one elongate linear gill and one gill which seems more oval, however it may be drawn in an oblique position

In the material of *C. mutica* from The Netherlands all specimens have elongate oval, not linear gills.

3. Relative size of poison spine and closing spine of the second gnathopod in males

In mature specimens of *C. acanthogaster* the poison spine is much larger than the closing spine (Mayer 1890, 1903; Vassilenko 1974; Arimoto 1976). In mature specimens of *C. mutica* the poison spine grows larger than the closing spine, not quite as large as in *C. acanthogaster*, but approaching the condition in the latter species (photograph in Vassilenko 1974; Marelli 1981). However, mature specimens of *C. mutica* exist with a poison spine and a closing spine of similar very small size (drawing in Schurin 1935; drawing Vassilenko 1974).

In the mature specimens of *C. mutica* from The Netherlands we found the size of the poison spine to be extremely variable, from similar in size to the closing spine to much larger, approaching the condition in *C. acanthogaster* (fig. 2b,c,d).

4. Relative length of ventral and dorsal spines on pereionites 3 and 4

The dorsal spines on pereionites 3 and 4 of *C. mutica* develop earlier than the ventral spines. However, in material from The Netherlands some large

specimens were found in which some ventral spines on pereionites 3 and 4 are longer than dorsal ones (fig. 3).

According to Marelli (1981) the dorsal spines on pereionites 3 and 4 are longer than the ventral spines on the same pereionites in *C. mutica*, whereas the ventral spines are longer than the dorsal ones in *C. acanthogaster*. Apparently this is not a reliable character.

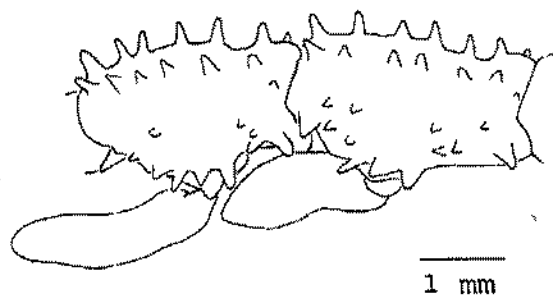


Figure 3. *Caprella mutica*, male, pereionite 3 (right) and 4 (left) (original).

5. Dorsal 'spines' on cephalon, pereionite 1 and pereionite 2 in males

In male *C. mutica* spines, denticles or tubercles are absent from head and pereionite 1 (Vassilenko 1974). In contrast to Vassilenko (1974) Marelli (1981) states that pereionite 2 may bear 1 pair of small spines postero-dorsally in larger males.

In males of *C. acanthogaster* a couple of tubercles may be present on the head, at the end of pereionite 1 and at the end of pereionite 2 (Mayer 1890, 1903). According to Vassilenko (1974) one pair of dorsal denticles is always present on pereionite 2. Arimoto (1976) mentions a pair of very small tubercles on the head and 5 pairs of spines on pereionite 2. The syntype of *C. acanthogaster* examined by Marelli (1981) possesses a pair of dorsal denticles on pereionite 2.

Apparently, spines on cephalon or pereionite 1 are unknown in males of *C. mutica*. About spines on pereionite 2 there is no agreement in literature. Most authors mention the presence of protuberances on pereionite 2 of *C. acanthogaster*. However, according to Mayer (1890, 1903) they may be present or absent.

In the material of *C. mutica* from The Netherlands we never found protuberances on cephalon, pereionite 1 or pereionite 2.

Apparently, the setosity of the first pereionites and the shape of the gills are the most useful and reliable characters to separate *C. mutica* and *C. acanthogaster*.

In The Netherlands all specimens collected possess the setose first pereionites and oval gills considered to be characteristic of *C. mutica*. However, in both other characters mentioned by Marelli (1981) there is a development from a typical *C. mutica* morphology towards a morphology more resembling that of *C. acanthogaster*. The dorsal spines on pereionites 3 and 4 appear earlier in development than the ventral spines. After the ventral spines have appeared they grow in size, relative to the dorsal spines, until the ventral spines are equal in size or even somewhat larger. In mature specimens of *C. mutica* initially both the poison spine and the closing spine of the second gnathopod are small. As morphological development continues the poison spine grows much larger than the closing spine. In males in which the development of the second gnathopod has proceeded furthest, the morphology of *C. acanthogaster* is approached (fig. 2d). Furthermore we found that size and morphological development are not strictly connected. Specimens of different size may show a similar morphology and from fig. 2b,c,d it can be concluded that specimens of similar size may differ considerably in morphology.

Confusion in literature of *C. mutica* and *C. acanthogaster* apparently has been caused by descriptions in which the continuous development of secondary sexual characters is neglected and by descriptions based on mixed lots of the two species.

SAMENVATTING

Het harige spookkreeftje of machospookkreeftje, dat in Nederland geïntroduceerd is, behoort tot de soort *Caprella mutica* Schurin, 1935. *Caprella macho* Platvoet *et al.*, 1995 is een junior synoniem van *C. mutica* (Platvoet, mond. meded.). In dit artikel wordt dat verder geïllustreerd en uitgewerkt aan de hand van morfologische kenmerken. Voor de beschrijving van *C. macho* zijn kennelijk morfologisch minder ver ontwikkelde exemplaren gebruikt. Verder worden de verschillen met een derde beschreven soort behandeld. *Caprella acanthogaster* Mayer, 1890 lijkt sterk op *C. mutica* en deze soorten zijn vaak verwisseld. Er zijn maar twee betrouwbare kenmerken bekend waarmee *C. acanthogaster* onderscheiden kan worden: het ontbreken van haren op de eerste twee lichaamssegmenten en de grote schaarpoet, en de staafvorm van de kieuwblaasjes. Gezien de hoge frequentie van nieuwe introducties is het goed bekend te zijn met deze verschillen.

ACKNOWLEDGMENTS

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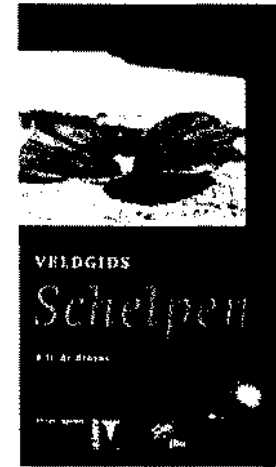
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BOEKBESPREKING: VELDGIDS SCHELLEN - WIM VOORTMAN

R.H. DE BRUYNE: *VELDGIDS SCHELLEN*. UTRECHT: KNNV/JBU, 2004. GEBONDEN, 21 x 12 CM, 224 BLZ. REG., ILLS., LIT.OPG. € 24,95. ISBN 90 5011 140 8.



Al jaren was hij aangekondigd, en net voor het eind van 2004 is hij dan toch verschenen: de *Veldgids Schellen* van Rykel de Bruyne. En hij ziet er schitterend uit. Gebonden, harde kaft, strak ingedeelde bladzijden met zachtlija randen. Rustig en duidelijk. Wat meteen opvalt zijn de prachtige kleurenfoto's, foto's waarop de schellen nu eens echt herkenbaar zijn, ook de kleine soorten. En bij tweekleppigen foto's van de buiten- én de binnenzijde van de schelp. In vergelijking met andere min of meer moderne en complete standaardwerken met zeeschellen uit het Noordzeegebied vormen zulke afbeeldingen een verademing. Nordsieck (3 delen, 1968-1972) vergast ons op wel zéér simpele pentekeningen (en op nog zo wat bezwaren), Tebble (*British bivalve seashells*, 1976) geeft naast eenvoudige kleurenfoto's wel gedetailleerde tekeningen, maar behandelt alleen tweekleppigen. Poppe & Goto (*European seashells*, 2 delen, 1991 en 1993) zijn erg compleet, maar de soortbeschrijvingen zijn summier en de foto's tonen zelden voldoende detail. De laatste druk van Entrop's bekende *Schellen vinden en herkennen*, met 'alle' recente Nederlandse soorten, is al ruim 30 jaar oud en ook zijn afbeeldingen laten te wensen over. Het werd dus wel tijd voor iets nieuws. De Bruyne heeft met *Schellen van de Nederlandse kust* (2e druk in 1994) geprobeerd dat gat op te vullen, maar doet dat met de nieuwe veldgids veel degelijker, al zijn er duidelijke parallellen aan te wijzen (verklarende woordenlijst!).

Het grootste deel van het boek wordt ingenomen door de soortbeschrijvingen (130 blz., 2 soorten per bladzijde). De determinatiesleutel, met veel duidelijke tekeningen, omvat 39 bladzijden. De rest van het boek is gevuld met informatie over de opzet, weekdieren in het algemeen, soorten zoekkusten, verzamelen en determineren, literaturopgave, register e.d.