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## Mass occurrence of an introduced crustacean (*Caprella cf. mutica*) in the south-eastern North Sea

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**Abstract** The caprellid amphipod *Caprella mutica* is indigenous to coastal waters of north-east Asia and was first recorded in European waters in 1995. We now detected mass occurrences of > 3000 individuals per m<sup>2</sup> in harbours of the two islands of Sylt and Helgoland in the German Bight, North Sea. Currently, *Caprella mutica* seems to be restricted to artificial hard substrata but we expect it to become a new species in natural hard bottom assemblages of that region as well.

**Keywords** *Caprella mutica* · Invasive species · Artificial hard substrates · Mass occurrence · New record

### Introduction

The caprellid *Caprella mutica* originates from coastal waters of north-east Asia where it was first described by Schurin (1935) from Peter the Great Bay, Siberian coast of the Sea of Japan, and re-described by Arimoto (1976) and Platvoet et al. (1995; originally described as *Caprella macho*). Willis et al. (2004) gave a brief description of *C. mutica* recently found in Scotland.

In North European waters, *C. mutica* has been reported from the Netherlands (Platvoet et al. 1995), Norway (Wim Vader, pers. comm.), Ireland (Tierney

et al. 2004) and from the Scottish west coast (Willis et al. 2004). In addition, there is anecdotal evidence about *C. mutica* occurring in Belgium. In the present paper we report on the occurrence of *C. mutica* in the south-eastern North Sea, and discuss briefly possible ways of introduction and the species habitat.

### Methods

In 2004, first specimens of *C. mutica* were detected in the harbours of List/Sylt (55°01' N, 008° 26'E) and of the island of Helgoland (54°11' N, 007°53'E). Careful inspection of material from previous years (fixed specimens and slides) confirmed the presence of *C. mutica* since 2000 or earlier. Following the first detection, densities of *C. mutica* were recorded in October 2004 by means of Scuba diving and by counting on pontoons that were just taken out of the water. Only specimens larger than 1 cm body length were counted. Individuals smaller than 1 cm body length were too thin and colourless for an appropriate in situ quantification. Body length of the largest individuals was measured from the basal part of antenna I to the posterior end of pereonite VII.

### Results and discussion

The estimated abundances of *C. mutica* on harbour pontoons were > 3.000 individuals per m<sup>2</sup>. Since only individuals larger than 1 cm body length were counted actual densities are probably much higher. In mid November, only specimens smaller than 1 cm body length were found, indicating that adult *C. mutica* die soon after their last brood in late fall. This kind of life history is common in amphipods of temperate regions (e.g. Bynum 1978).

Maximum body length of specimens found in the south-eastern North Sea was about 27 mm in males and 9 mm in females. This is slightly smaller than in Scottish

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specimens (up to 35.1 mm in males and 15.6 mm in females; Willis et al. 2004). The features of our individuals comply largely with the morphology of *C. mutica*. However, few characteristics remind of *Caprella acanthogaster* Mayer, another species indigenous to the Pacific Ocean (Krapp-Schickel, pers. comm.). The morphology and taxonomy of our specimens are currently investigated in detail.

Most likely, *C. mutica* reached European waters with shipments of Japanese oysters *Crassostrea gigas* (Thunberg) or in ballast water (Willis et al. 2004). It remains unclear how *C. mutica* reached the marinas of Sylt and Helgoland. Since *C. mutica* has no planktonic larval stage, it spends its entire life cycle attached to substrata. Thus, a direct transport is the most likely way of introduction to Sylt and Helgoland. Since both sites are regularly visited by small boats from many other marinas in the North Sea, *C. mutica* was possibly introduced while attached to boat hulls which are often covered with individuals (personal observation). Interestingly, the non-native Japanese brown seaweed *Sargassum muticum* (Yendo) Fensholt occurs abundantly along the North Sea coast including the islands of Helgoland and Sylt (Rueness 1989, Buschbaum 2005). Individuals of this seaweed disperse efficiently as floating thalli. It is known that caprellids attach to algae that may float for long distances (Thiel and Gutow 2005). *C. mutica* has been found attached to floating *S. muticum* in Japan (Sano et al. 2003) and “large caprellids” are commonly recorded on floating *S. muticum* near Helgoland (Saier, pers. comm.). Consequently, *C. mutica* may have reached the islands of Sylt and Helgoland via rafting.

*C. mutica* co-occurs with other introduced species such as the tunicate *Styela clava* Herdman and the Japanese oyster *C. gigas* on artificial hard substrata. By contrast, *C. mutica* has not yet been found in natural habitats. This is in accordance with findings of Willis et al. (2004) in Scottish waters where *C. mutica* was restricted to artificial structures such as mooring ropes, nets and boat hulls in marinas.

Since information on the ecology of *C. mutica* is scarce it is difficult to assess possible ecological effects on resident communities. The tunicate *S. clava*, too, was at first restricted to artificial hard substrata in harbours of the island of Sylt. But several years later it became a permanent member of epibenthic mussel beds (*Mytilus edulis* L.) (Buschbaum 2002). Possibly, the artificial hard

substrata in the relatively sheltered harbour basins provide an intermediate habitat for new species where they may acclimatise for some years until spreading into natural habitats of the new location. Accordingly, *C. mutica* might spread on natural habitats, too. Future studies should address the population development and potential ecological impacts of this highly abundant newcomer.

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