Cephalopod populations in Antarctic waters

Uwe Piatkowski

There are ca. 800 cephalopod species worldwide but relatively few of these species occur in polar seas in comparison to the rich squid populations in subpolar and adjacent seas.

In the Southern Ocean, there are fewer than 50 species of squids and octopodes. However, several squid species occur in large numbers and are consumed by seabirds, seals and whales amounting to a total estimate of ca. 34 million t annually (Clarke 1983). Biomass and total annual production are unknown and probably much higher but no Antarctic cephalopods have been exploited commercially. However, major cephalopod jigging and trawl fisheries exist nearby e.g. around the Falkland Islands and off New Zealand (see Pütz and Poncet, this book).

Of the ca. 20 squid species which regularly appear south of the Antarctic Polar Front, only a few are considered as being truly Antarctic. Of those, only two species are endemic: the Antarctic neo-squid *Alluroteuthis antarcticus* and the glacial squid *Psychroteuthis glacialis (Fig. 1)*. They are of pivotal importance in the high-Antarctic food web. Both species prey on krill and myctophids

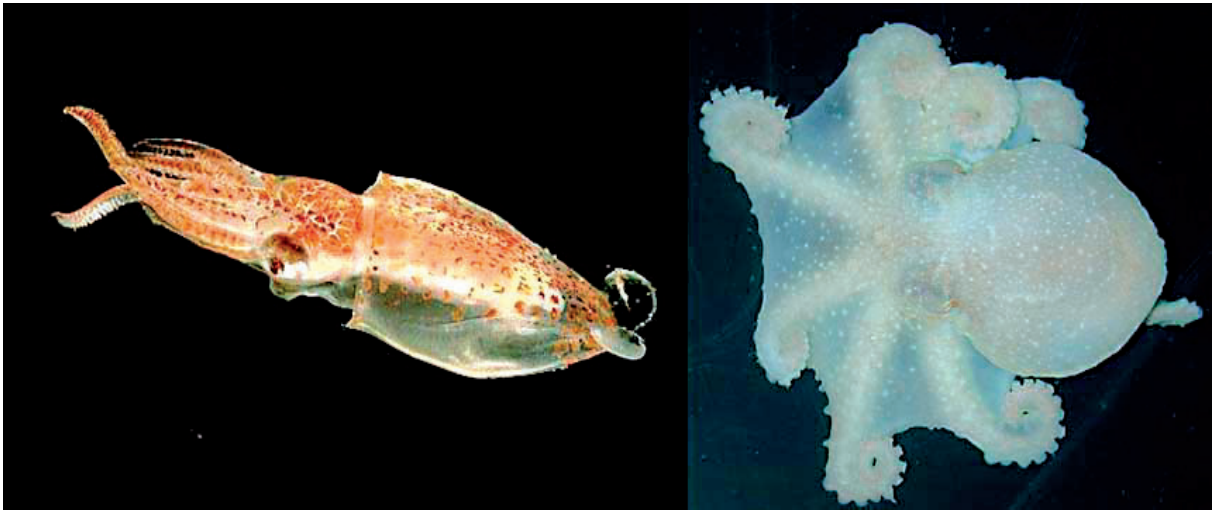
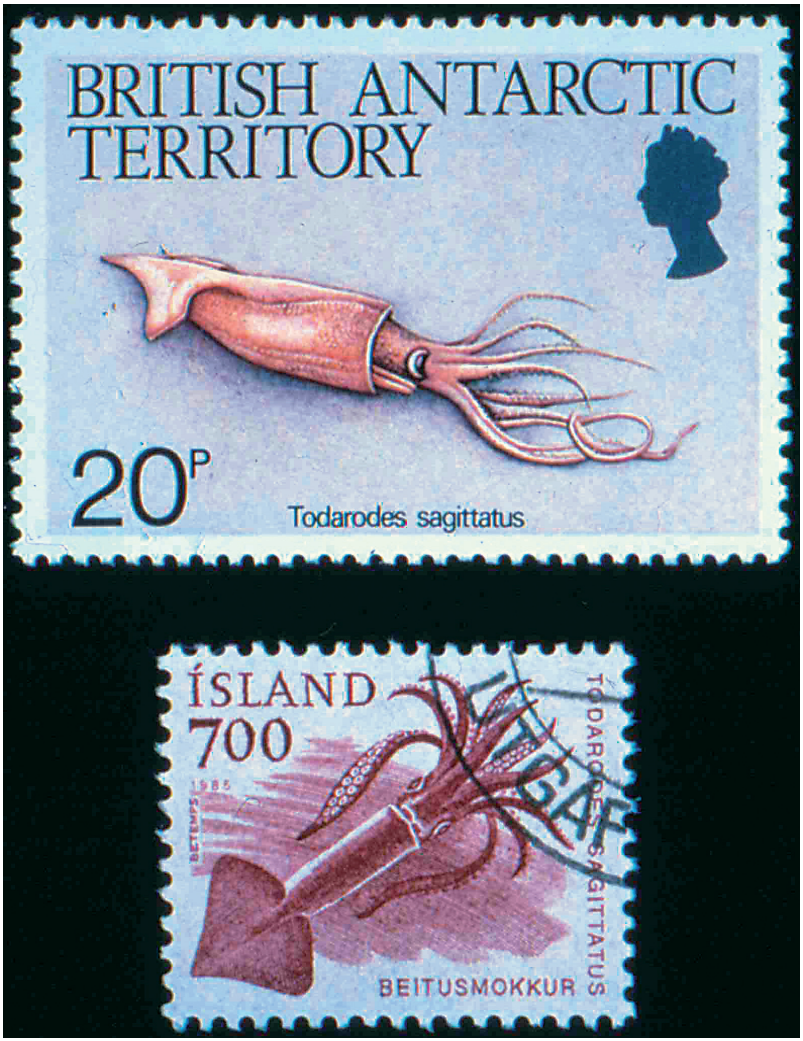


Figure 1. Left: Psychroteuthis glacialis. Early life stage, mantle length 15 mm. Right: Pareledone felix. Female, mantle length 45 mm.

(lanternfish) and are known to be the major prey of emperor penguins and elephant seals (see Zimmer and Wilson, this book).

As Antarctic top predators accumulate the indigestible cephalopod beaks in their guts, studies of the top predators' stomach contents yield valuable information about species composition, size and distribution of Antarctic cephalopods which are otherwise inaccessible to scientific sampling. In contrast to squid, information on Antarctic octopodes has grown considerably recently as they can easily be sampled by scientific bottom trawling. In fact, during the past decade we described twelve new octopod species from bottom trawl samples taken during several expeditions with the *RV Polarstern* in the vicinity of the Antarctic Peninsula (e.g. Allcock et al. 2007) (Fig. 1). The samples illustrate a higher than expected octopod species diversity and supply new information on their distribution patterns and ecological aspects. The samples also confirm that the isolation of the Southern Ocean and the Antarctic continental slope and shelf over the past 35-40 million years has contributed to the evolution of a rich endemic fauna and the radiation of Southern Ocean octopodes into the deep sea (Strugnell et al. 2008).

Furthermore, the trawl samples show that during recent years, octopus populations have gained significantly higher abundances around the Antarctic Peninsula than in similar areas nearby. This elevated abundance occurred after the rapid depletion of demersal fish stocks and may indicate a possible shift in the structure of the ecosystem (Vecchione et al. 2009).



Todarodes philippovae and T. sagittatus in Antarctic and Arctic waters. The species name in the Antarctic stamp is incorrect. Collection: U. Piatkowski.