

Feeding biology and status in the food web of three coexisting species of the genus *Astropecten* (Asteroidea) in the Bay of Fetovaia (Elba)

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Abstract

The present study was carried out to clarify the coexistence of three *Astropecten* species - *A.bispinosus*, *A.jonstoni* and *A.platyacanthus* - in the bay of Fetovaia (Island of Elba/Italy). In the course of two diploma theses, parallel examinations were carried out with regards to the following aspects:

- spatial distribution and activity of the three *Astropecten* species (see MARHAN, 2000)
- feeding biology and status of the three species in the food web (present study)

The organisms of six sand samples of an underwater area of 10,240 m² were observed and the gained data were analysed statistically. Areas in which *Astropecten* species were sighted did not differ fundamentally in general organism composition and dominance structure. Polychaeta, followed by Bivalvia, dominated the habitat. Other classes were represented with much smaller shares.

The composition of the benthic communities in the bay of Fetovaia was compared to similar habitats of Sardinia (Italy; RIBI et al., 1977), the bay of Bandol (France; MASSÉ, 1972) and the bay of Cleveland (Australia; LEMMENS et al., 1995). The comparison revealed that sand bottom communities can be very special and variable. Stomach contents of the three *Astropecten* species were used for the analysis of the food spectrum. The organisms released the stomach contents whilst maintenance in aquaria with oxygen-poor water. All three species were bivalve-specific feeders, mainly feeding on *Chamelea gallina*. Smaller shares of Gastropoda and very little quanta of Polychaeta, Echinodermata, Crustacea and others were found.

Bigger organisms occurred in the stomach contents of the bigger species *A.bispinosus* and *A.platyacanthus* in comparison to *A.jonstoni*. Furthermore, they showed a wider food spectrum. *A.bispinosus* and *A.platyacanthus* therefore behaved more like specialist predators, *A.jonstoni* more like a generalist.

Thus, the coexistence of the three species in the bay of Fetovaia seems to be possible due to the following factors:

- spatial separation of *A.bispinosus*, *A.platyacanthus* and *A.jonstoni* (see MARHAN, 2000)
- consumption of differently sized prey
- differences in food spectra

The food web in the bay of Fetovaia was established, using the stable isotope ratios ¹³C/¹²C and ¹⁵N/¹⁴N gained from the tissue of different organisms. All analysed Pisces, *Astropecten*-species, Amphiura and Cephalopoda, as well as Crustacea, Nemertini, Polychaeta (*Sigalion mathildae*) and Cnidaria (*Actinaria* sp.) were

secondary consumers of the sand bottom community. Bivalvia, some Polychatea and Crustacea as well as plankton were identified as primary consumers, where plankton probably forms the basis of the food web. Although *P.oceanica* and red algae are primary producers, they probably just play a subordinate role as carbon suppliers of the system.