

Fatty acid profiles reveal temporal and spatial differentiation in diets within and among syntopic rocky shore suspension-feeders

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ABSTRACT: Regional and temporal variations in the diets of rocky shore suspension-feeders (the volcano barnacle *Tectacella serrata*, the brown mussel *Perna perna* and the reef-building polychaete *Gammarus guineensis*) were assessed using fatty acid profiling. Specimens were collected up-current and down-current of a river mouth in 2 coastal regions ~50 km apart along southeastern South Africa during March and July of 2009. One of the sites represents a marine-dominated system, and the other a freshwater-dominated system. Our aims were to assess any dietary differences among the 3 suspension-feeders, spatial changes in diet within each species (at regional and local scales—50 and 15 km, respectively), and temporal changes in diet within each species. Fatty acid profiles clearly distinguished the species, with barnacles characterised by dinoflagellate and zooplankton-associated fatty acids, polychaetes, by diatom-associated fatty acids, and mussels, by a combination of mixed phytoplankton and mollusc-specific fatty acids (non-methylene interrupted). These interspecific differences probably arose in part from the contrasting feeding mechanisms employed. The distinctness in diet contribute to ecological partitioning of the suspended food within a highly competitive habitat. Regional- and local-scale intraspecific differences in diets were minimal to absent, but temporal distinctions in intraspecific diets were dominant features in the data set, confirming that the trophic environment for suspension-feeders can change markedly throughout a year.

KEY WORDS: *Perna perna* · *Tectacella serrata* · *Gammarus guineensis* · River discharge · Suspended particulate matter · Benthic partitioning · South Africa

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INTRODUCTION

Sessile suspension-feeders are the dominant frugivores of wave-exposed rocky shores (Sink et al. 2005). Filtration by such consumers allows the transfer of energy from the water column to the benthos, therefore creating an important trophic connection between adjacent habitats (Dolmer 2000). Coastal suspension-feeders derive their food from a variety of particulate sources including phytoplankton, bacteria, zooplankton and detritus (the latter comprised of a plethora of potential sources including macroalgae, microalgae, higher plants and animal material; Daygins et al. 1989, Ward & Shumway 2004). Terrestri-

ally derived organic matter can represent an important additional source of nutrition for nearshore coastal communities, particularly those in the vicinity of estuaries (Grange & Allanson 1992, Telfer 2009). However, higher plants generally represent low-quality food to suspension-feeders unless the material is substantially decomposed (McLeod & Wing 2000), and researchers have shown that terrestrial carbon has little impact in some rocky shore regions (Hill et al. 2008). As plankton communities and primary productivity in coastal and offshore waters are dynamic (Brown 1992, Barlow et al. 2010), and rocky shores may receive variable quantities and types of particulates (Bastamante & Branch 1996, Telfer 2009),