Zoosymposia 2: 447–456 (2009)
www.mapress.com/zoosymposia/

ISSN 1178-9905 (print edition)
ZOOSYMPOSIA
ISSN 1178-9913 (online edition)

Arenicolid behaviors: similarity of *Arenicola marina* and *Abarenicola pacifica*

SARAH ANN WOODIN[1] & DAVID S. WETHEY
University of South Carolina, Department of Biological Sciences, 715 Sumter St, Columbia, SC 29208, USA.
E-mail: woodin@biol.sc.edu; wethey@biol.sc.edu
[1]Corresponding author

Abstract

The hydraulic activities of two arenicolid polychaetes, *Abarenicola pacifica* and *Arenicola marina,* result in strikingly similar pressure waveforms. The principal hydraulic activities are defecation, burrowing and feeding/ burrow maintenance. Both the duration and magnitudes of the pressures are very similar. The behavioral periodicities of the two species are also quite similar, although burrowing is more common in *A. pacifica* than in *A. marina.* Additionally burrowing activities in *A. marina* appear to be more influenced by tidal stage than those in *A. pacifica*. The link between burrowing and pore-water pressure reductions makes this difference potentially important in terms of drawing oxygenated water into surface sediments.

Key words: bioirrigation, bioturbation, infauna, lugworm, pore-water

Introduction

Arenicolid polychaetes are obvious residents of sedimentary habitats worldwide (Wells 1964). Two species in particular are of interest, in the north Pacific *Abarenicola pacifica* Wells, 1959 and in the north Atlantic *Arenicola marina* (Linnaeus, 1758). They are very abundant; densities of > 50 m^{-2} are common for even *A. marina,* the larger of the two species. An important aspect of both species is that they feed from subsurface pockets often 10 to 25 cm below the surface and defecate onto the surface, thus bringing sediment from depth onto the sediment surface. However, as numerous investigators have described (Ashworth 1912; Hylleberg 1975; Wells 1945), they are actually primarily feeding on surface material moved to the depth of the feeding pocket by the activities of the individual; thus they greatly increase the rate at which labile organic material is buried (Riisgård & Banta 1998; Banta et al. 1999; Hylleberg 1975). Their effects on sediments are thus several fold. First, they create areas of elevated sediment turnover surrounding the exit of the tail shaft of the burrow, where defecation occurs approximately every 15 to 45 min when the animal is feeding (Wells 1953; Woodin 1985). Second, they both move subsurface sediment back onto the surface, exposing it to oxic mineralization and move potentially labile materials on the sediment surface rapidly to depth, potentially reducing its exposure to oxic processes, depending on the "sloppiness" with which the individual feeds on the subducted materials. Third, their activities, both feeding and irrigation, are known to affect the biogeochemical gradients in the vicinity of the burrow and those of *A. marina* in particular have been the subject of considerable modeling effort with regard to biogeochemical effects and rates of pore-water flux (Timmerman et al. 2002; Meysman et al. 2006; Huettel et al. 1996). Finally, their activities create surface topographic features that in permeable sediments alter flows through surface sediments (Huettel et al. 1996).

Accepted by N. Maciolek: 20 Apr. 2009; published: 31 Aug. 2009