

Association for the Sciences of Limnology and Oceanography





Home

Members

Libraries

Publications

Meetings

Employment

Activities

Search

Oxidative coupling during gut passage in marine deposit-feeding invertebrates

Giessing, Anders M. B., Lawrence M. Mayer

Limnol. Oceanogr., 49(3), 2004, 716-726 | DOI: 10.4319/lo.2004.49.3.0716

ABSTRACT: We tested for oxidative coupling of phenolic materials, including organic contaminants and tyrosine, in gut fluid from marine deposit-feeding invertebrates. A phenolic metabolite (pyrenol) of a polycyclic aromatic hydrocarbon (PAH), which can arise during accumulation by deposit-feeding invertebrates, was found to participate in oxidative coupling reactions to organic matter in gut fluid. Gut fluid from four species of marine deposit-feeding invertebrates (three polychaetes and one holothuroid) catalyzed oxidative coupling of pyrenol (1-hydroxypyrene) in rough proportion to their enzyme activity and dissolved organic matter levels. Nereis virens gut fluid also catalyzed coupling of tyrosine monomers to form dityrosine, a common marker of oxidative damage in proteins. An antioxidant enzyme activity, similar to that of heme peroxidase and capable of oxidative coupling, was tentatively identified in gut fluid from N. virens by protein precipitation, dye decolorization assays, and enzyme inhibitor studies. Unaltered N. virens gut fluid had high total oxyradical scavenging capacity, indicating the presence of fast-acting antioxidants. Oxidative coupling of PAHs will reduce subsequent bioavailability, toxicity, and transport of these compounds in marine environments. Furthermore, oxidative coupling of PAHs represents a hitherto overlooked sink for organic contaminants in marine sediments and suggests a biological mechanism for formation of aquatic humic material.

Article Links

Download Full-text PDF

Return to Table of Contents

Please Note

Articles in L&O appear in PDF format. Open access articles may be freely downloaded by anyone. Other articles are available for download to subscribers only, or may be purchased for \$10 per article. All L&O articles are moved into Open Access after three years.