Do bacteria and nutrients control faunal assemblages in alluvial aquifers?

L. Mauclaire, J. Gibert and C. Claret
Université Claude-Bernard – Lyon I

With 3 figures and 3 tables

Abstract: Bacterial abundance and activity were studied at the scale of a regional aquifer. The focus was on spatial and temporal distribution patterns in relationship with groundwater quality and with potential food resources for meio- and macrofauna. Six wells located along an agricultural/urban gradient were sampled at three dates. The physical and chemical characteristics of the ground water showed few differences among wells except for nitrate content which was higher in the agricultural area. Metal contents in water and sediments indicated a chronic metal contamination of this aquifer. Abundances of bacteria in the water (total and ETS-active bacteria) were homogeneous throughout the aquifer but varied over time. These variations were correlated with DOC content. The faunal abundances varied according to wells and dates, and correlated with total number of ETS-active bacteria. At all sampling dates assemblages were dominated by the same taxa: oligochaetes in the northern part of the aquifer and nipharid amphipods in the southern part of the aquifer.

Introduction

During the past few decades, research by subsurface microbiologists and groundwater ecologists has documented distribution, dynamics and activities of subterranean life in various geological substrata (GINET & DECOU 1977, CHAPELLE 1993, CULLIMORE 1993, GIBERT et al. 1994 a). Aquifers harbour diverse and active communities of microorganisms which participate in the cycling of nutrients and in biological degradation of pollutants; thus microorganisms can play a major role in maintaining groundwater quality. Because of the urgent need to understand microbial processes in polluted aquifers research in subterranean microbiology has increased (GHIORSE & WILSON 1988, GHIORSE 1997).

Authors' address: ESA CNRS n° 5023 – Laboratoire d’Ecologie des Eaux Douces et des Grandes Fleuves, HydroBiologie et Ecologie Souterraines, Université Claude-Bernard – Lyon I, 43 bd du 11 Novembre 1918, 69622 Villeurbanne Cedex, France.