

## Organic arsenic compounds in seawater

RONALD GLABONJAT<sup>1</sup>, GEORG RABER<sup>1</sup>,  
BENJAMIN A. S. VAN MOOY<sup>2</sup>  
AND KEVIN A. FRANCESCONI<sup>1</sup>

<sup>1</sup>University of Graz, Institute of Chemistry-Analytical  
Chemistry, 8010 Graz Austria

<sup>2</sup>Woods Hole Oceanographic Institution, Department of  
Marine Chemistry and Geochemistry Woods Hole, MA  
02543, USA

\*correspondence: kevin.francesconi@uni-graz.at

Arsenic occurs in marine waters, typically at concentrations of about 1-2  $\mu\text{g As/L}$  (ca 13-26 nM), present primarily as the inorganic species arsenate. Marine organisms are able to accumulate arsenic – they contain high levels (typically 2,000 - 20,000  $\mu\text{g As/kg wet mass}$ ), and most of this arsenic is present as organoarsenic compounds such as arsenobetaine ( $\text{Me}_3\text{As}^+\text{CH}_2\text{COO}^-$ ) and arsenosugars. Despite the predominance of arsenobetaine in marine biota, this simple organoarsenic compound has never been reported in seawater; direct methods of analysis are restricted by the complex seawater matrix, and indirect methods suggest that if arsenobetaine were present, the levels would likely constitute < 1 % of the total arsenic (i.e. be present at < 20 ng As/L). We report a method to detect and quantify trace amounts of arsenobetaine and related organoarsenic compounds in marine waters. Furthermore, the method was applied to samples of seawater collected during the scientific cruise aboard R/V *Knorr* (KN207-01) at various depths from two sites in the Sargasso Sea, with the aim of obtaining preliminary data on the depth profile of arsenobetaine in the ocean. The method involved removing the complex salt matrix by preparative cation-exchange (Dowex 50  $\text{H}^+$ ), while simultaneously concentrating arsenobetaine and other cationic arsenic species, and measuring the arsenicals by HPLC coupled to elemental and molecular mass spectrometry. With this method it was possible to quantify arsenobetaine and seven other cationic organoarsenicals, six of which had never been found in marine waters before. Depth profiles (6-200 m) for two sampling sites revealed arsenobetaine concentrations between 0.5 and 14 ng As/L with maxima occurring in the euphotic zone (down to ca 30 m) indicating positive correlation to zones of maximum primary production. The data for the other organoarsenicals found in this study also suggest correlation to primary production with a clear decrease of all arsenic species at depths below 60 meters.