

**A novel arsenolipid
biosynthesised by Dunaliella
tertiolecta under varying
arsenate/phosphate regimes**

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Arsenic-containing lipids are natural products of marine animals and algae. Their biosynthesis and possible role in organisms is currently unknown. We investigated the formation of arsenolipids by the unicellular alga Dunaliella tertiolecta under batch culture conditions with varying arsenate/phosphate regimes. We monitored by HPLC/mass spectrometry the formation of the various arsenic metabolites – both water- and lipid-soluble species but focussing on the latter. Two of the major known arsenolipid classes (arsenic hydrocarbons and arsenosugar phospholipids) were identified in the alga; both increased with increasing arsenate exposure, with the arsenosugar lipids becoming the more dominant of the two classes at higher phosphate exposure. The major lipid in the alga, however, was from a new arsenolipid group as revealed initially by HPLC behaviour and by mass fragmentation patterns. The new lipid constituted >90% of the total arsenic-lipids at control arsenic exposure, but this dominance decreased to ca 50% of total arsenic-lipids at high arsenate & phosphate exposure. We report investigations into the structure of this novel arsenolipid by using a combination of high-resolution electrospray mass spectrometry, chemical conversions of the natural product, and chemical synthesis of model compounds. The significance of this new lipid class in the biotransformation and cycling of arsenic is discussed.