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COMMENT

# 2-Ethyl-1-hexanol: contaminant or sex pheromone in *Arenicola marina*?

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In a recent publication Hardege et al. (1996) concluded that 2-ethyl-1-hexanol is possibly a natural sex pheromone for *Arenicola marina*. This alcohol, an industrial chemical, is used on a fairly large scale particularly in a phthalate ester that is often misnamed 'dioctyl' phthalate (Shantha & Ackman 1991). This phthalate ester (di-2-ethyl-1-hexyl phthalate) is very prevalent as a plasticizer and unfortunately is also commonly found in laboratory solvents, as detailed in our recent publication (Ackman & Macpherson 1996). This study showed that a heavy plastic wrap contaminated fish lipids with the phthalate ester, lists references to contamination of food, hospital equipment etc., and demonstrates that phthalate esters give a strong signal in the electron capture detectors used for determining organohalogen materials such as PCBs (polychlorinated biphenyl) by gas-liquid chromatography. If Hardege et al. (1996) used polyvinyl plastic tubing and other plasticware in equipment for their live-holding of *A. marina*, as well as solvents such as hexane, there could have been contamination in their analyses. In a similar instance with lipids of *Gammarus duebeni* held 2 mo in captivity (Morris et al. 1982) the authors comment that phthalate esters found in these gammarids could have come from such pollutants 'either during the experiment or prior to their capture'. Lyophilization equipment, where di-2-ethyl-1-hexyl phthalate has been used as a working fluid, could also contaminate a working environment. It is less likely, but also possible, that the 2-ethyl-1-hexanol could have originated in North Sea waters from industrial activity. In this case it might be in true solution or in part in the surface layer of foam such as is common around likely habitats for *A. marina* (Napolitano et al. 1992). In foams the analytical focus has been on high molecular weight lipids (Velimirov 1982, Barlocher et al. 1988). A simple 8-carbon alcohol in very dilute solution could easily be lost in recovery of lipids from water samples into most organic solvents as it is somewhat water soluble and relatively low boiling (183°C), but phthalate esters from the laboratory environment are the more likely origin (Parrish 1988).

Hydrolysis of the phthalate ester can take place within the *Arenicola marina* or can be achieved by associated environmental bacteria (Sakagami et al. 1982a, b). If the parent compound were the phthalate ester, the degradation of the phthalate moiety by bacteria could be an alternative to hydrolysis of the ester bond. Most lipids, including aromatic hydrocarbons, are subject to bacterial degradation in solution or in sediments (Nagata 1982), but 1-alkanols do survive (Cranwell 1982).

There is considerable similarity between the 2-ethyl-1-hexanol and the 5-methyl-3-heptanone recovered by Hardege et al. (1996) from *Arenicola marina* spawning water Both are $C_8$ aliphatic chains with 1 alkyl branch and 1 oxygen atom. The further work proposed by Hardege et al. (1996) may show that this is the basis of the biochemical signal or 'pumping factor' they have observed.

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## ERRATUM

### Nutritional quality of two cyanobacteria: How rich is 'poor' food?

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• Fig. 6 on page 8 contained an error—line 1 was incorrectly labelled. The corrected figure and its caption appear here.

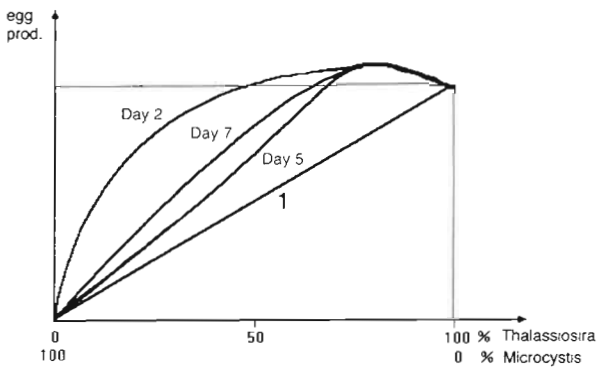


Fig. 6. A schematic presentation of our results in the ratio experiment; Days 2, 5 and 7 (compare Fig. 1). At all tested mixtures the measured egg production rates were above line 1 and indicate a positive effect of *Microcystis aeruginosa* on egg production. The nutritional benefit from *M. aeruginosa* is best shown at a proportion of 75% *Thalassiosira weissflogii* to 25% *M. aeruginosa*. This mixture has a nutritional advantage compared to the pure diatom. During the first 4 d a running out of reserves from *Rhodomonas baltica* was evident at low and median proportions of *T. weissflogii*, but not at high proportions