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Dimethyl sulphide: The oyster-like odourant of *Mertensia maritima*

William F. Wood[1]

1 *Department of Chemistry, California State Polytechnic University, Humboldt, Arcata, California 95521, USA*

Corresponding author: William F. Wood (wfw2@humboldt.edu)

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Abstract

The oyster plant (Britain) or oyster leaf (North America), *Mertensia maritima* (L.) Gray has a strong oyster-like odour. Headspace volatiles from fresh crushed leaves of this plant were analysed using solid phase microextraction (SPME) and gas chromatography–mass spectrometry (GC–MS). Dimethyl sulphide was detected emanating from the crushed leaves, a compound that is noted for being a major part of the odour profile of raw oysters.

Key Words

GC-MS, *Mertensia maritima* (Boraginaceae), Oyster Leaf, Oyster Plant, Oyster Odour, SPME

Introduction

Mertensia maritima (L.) Gray, a plant with circumboreal distribution is called the oyster plant in Britain and Ireland, and oyster leaf in North America. It grows just above the high-tide mark, most often on exposed maritime shingle bars (Alton and FitzGerold 2009; Williams 1937). As this plant's name implies, the leaves of this plant have long been known to emit an oyster-like odour as described in modern field guides (Mabrey 1997). This study investigated the source of this plant's distinct odour.

Methods

Live *M. maritima* plants that were used in this study were collected at the Homer Spit, Homer, Alaska [59°37'18"N, 151°27'23"W (DMS)]. Williams (1937) noted two collections from this location. They were transported to Humboldt County, California before analysis of freshly picked plant leaves. A voucher specimen (HSC101381) was placed in the Herbarium at California State Polytechnic University, Humboldt. Tissue disruption of *M. maritima* leaves increases the oyster-like odour of this plant, so headspace analysis of volatiles was done using freshly crushed samples. The absorbent tip of a 75 µm Carboxen-polydimethylsiloxane Supelco® solid phase microextraction (SPME) apparatus was placed 1 mm above the crushed leaves for 20 minutes to collect volatiles. Immediate analysis was done by gas chromatography–mass spectrometry (GC-MS). Data was collected on GC injection to identify highly volatile compounds captured on the SPME filament.

Results and discussion

The SPME and GC-MS analysis showed dimethyl sulphide as a component in the volatiles emanating from the leaves. Identical mass spectra and retention times were obtained by GC-MS analysis using commercial samples of this compound. The mass spectrum of dimethyl sulphide was: [m/z = 64(M^++2, 4), 63(M^++1, 4), 62(M^+, 78), 61(28), 59(3), 58(4), 57(3), 49(4), 48(4), 47(100), 46(46), 45(69), 42(3) and 41(3)]. No other sulphur compounds were identified.

There has been a previous study on odour compounds identified from this plant (Delort et al. 2012). Hydrodistillation of pureed *M. maritima* grown in the Hebrides resulted in the identification of 109 compound by GC-MS. In this study using GC−olfactometry, 4 compounds were described as having fresh or marine-like odours; (E)-3-hexen-1-ol, decanal, 2-undeanone, and (E,Z)-3,6-nonadien-1-ol. But, dimethyl sulphide, a compound with a distinct oyster-like odour was not identified in this report.

This highly volatile compound was likely lost, on preparation of samples for the GC analyses.

The characteristic odours from raw oysters has been extensively studied. Ronald and Thomson (1964) showed that dimethyl sulphide was the main volatile constituent in the aroma from fresh Pacific oysters (*Crassostrea gigas*). Piveteau et al. (2000) used a purge-and-trap concentrator to identify dimethyl sulphide in *C. gigas*. Zhang et al. (2009) found dimethyl sulphide in the headspace volatiles of fresh *C. gigas* by SPME.

The strong oyster-like odour is clearly a chemotaxonomic marker of fresh crushed leaves of *M. maritima*. Other than oysters, dimethyl sulphide has only been previously identified from a few marine or terrestrial organisms. It has been found from marine plankton (Stefels et al. 2007). In this case, significant dimethyl sulfide production is confined to a few classes of marine phytoplankton, mainly the Dinophyceae (dinoflagellates) and the Prymnesiophyceae, including the coccolitnophores (Keller et al. 1989). In the fungi kingdom, truffles are reported to emit dimethyl sulfide (Splivallo et al. 2011). This is the key odourant that trained truffle dogs and pigs detect when harvesting black truffles, *Tuber melanosporum* (Talou et al. 1990). Previously, dimethyl sulphide has rarely been identified from terrestrial plants. A notable exception is with fly-attracting pollination of corpse flowers, like the dead-horse arum, *Helicodiceros muscivorus* (Stensmyr et al. 2002).

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