

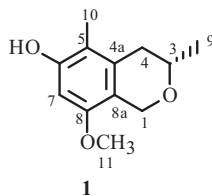
## ISOCHROMENE METABOLITE FROM THE FACULTATIVE MARINE FUNGUS *Penicillium citrinum*

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Facultative and obligative marine microscopic fungi are known to be promising sources of various types of biologically active compounds [1, 2]. Under the auspices of a program for discovery of biologically active compounds in extracts of isolates of marine microscopic fungi, we isolated the strain *Penicillium citrinum* Thom. from sediment collected during core drilling of methane gas hydrates at a depth of 645 m in the Okhotsk Sea. The fungus was cultivated for 21 d at 22°C in a 1-L flask containing medium of composition sodium tartrate, 0.005 g; yeast extract, 0.01 g; rice, 10 g; KH<sub>2</sub>PO<sub>4</sub>, 0.005 g; and seawater, 20 mL.

Fungal mycelium with medium was extracted twice with EtOAc. The extract was evaporated. The solid was dissolved in EtOH:H<sub>2</sub>O (1:4). The resulting solution was extracted successively by hexane, EtOAc, and BuOH. The EtOAc extract was evaporated in vacuo. The dry solid (300 mg) was chromatographed over a column (25 × 2 cm) of silica gel with elution by hexane:EtOAc (95:5) to afford a compound (8 mg). The compound was identified by MS and 2D NMR spectroscopy (Table 1) and comparison with the literature [3] as (3*S*)-3,5-dimethyl-8-methoxy-3,4-dihydro-1*H*-isochromen-6-ol (**1**).



Compound **1**, mp 122–123°C (hexane:EtOAc),  $[\alpha]_{\text{D}}^{20} +118^\circ$  (*c* 0.05, MeOH). Mass spectrum (*m/z*, %): 208 (100) [M]<sup>+</sup>, 193 (30) [M – CH<sub>3</sub>]<sup>+</sup>, 177 (13) [M – CH<sub>3</sub>O]<sup>+</sup>, 164 (77), 149 (14), 134 (19), 119 (6), 91 (15), 77 (8).

Compound **1** was isolated previously from the terrestrial fungi *Penicillium expansum* (grain) [4], *P. sp.* (freshwater isolate) [3], and *Penicillium* hybrid strains [5]. It is known to exhibit cytotoxic and anticoccidial activity [3]. It was isolated for the first time from a marine fungus.

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TABLE 1. NMR Spectral Data for **1** (500 MHz, CDCl<sub>3</sub>,  $\delta$ , ppm, J/Hz)<sup>a</sup>

C atom	$\delta_C$	$\delta_H$	HMBC	NOE
1	64.6 (CH <sub>2</sub> )	$\beta$ 4.88 (d, J = 15.1) $\alpha$ 4.56 (d, J = 15.1)	8, 7, 8a, 4a, 3 8, 7, 8a, 4a, 3, 6, 5	11
3	70.4 (CH)	$\beta$ 3.72 m	1, 4a, 9	9, 4 $\alpha$ , 4 $\beta$ , 10
4	34.1 (CH <sub>2</sub> )	$\beta$ 2.61 (ddd, J = 16.5, 2.3, 1.4) $\alpha$ 2.43 (dd, J = 16.5, 10.6)	3, 4a, 5, 6, 8a 3, 4a, 5, 6, 8, 8a, 9	9, 10, 3 9, 10
4a	134.2 (C)			
5	112.5 (C)			
6	152.4 (C)			
7	96.1 (CH)	6.25 s	1, 5, 6, 8, 8a, 10	OH, 11
8	154.0 (C)			
8a	115.2 (C)			
9	21.8 (CH <sub>3</sub> )	1.37 (d, J = 6.2)	3, 4, 4a	3, 4 $\alpha$ , 4 $\beta$ , 10
10	10.0 (CH <sub>3</sub> )	2.05 s	4a, 5, 6	3, 4 $\beta$ , 4 $\alpha$ , OH
11	55.2 (CH <sub>3</sub> )	3.73 s	4a, 7, 8	1 $\alpha$ , OH
OH		4.70 s	5, 6, 7	7, 10, 11

PMR and <sup>13</sup>C NMR spectra were recorded at 500 and 125.8 MHz, respectively.

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