

Antibacterial and Antifungal Compounds from *Empetrum nigrum*

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Empetrum nigrum L. (Empetraceae) is a species of ethnopharmacological significance to native North Americans. The Haida people of coastal British Columbia used a decoction of the branches of this shrub to treat tuberculosis and other ailments (Turner, personal communication).

Samples of the branches were collected from the peat bog around Pure Lake, British Columbia in July, 1993. A voucher specimen was deposited in the herbarium of the University of British Columbia (accession No. 208202). The present paper describes the isolation and characterization of three bibenzyls (**1**–**3**) and a 9,10-phenanthrene derivative (**4**) from this material: 3,3'-dihydroxy-5-methoxybibenzyl (**1**: batatasin III), 3,3'-dihydroxy-4',5-dimethoxybibenzyl (**2**), 3'-*O*-methylbatatasin III (**3**), and 7-hydroxy-2,4-dimethoxy-9,10-dihydrophenanthrene (**4**).

A dried and powdered branch (500 g) was extracted with MeOH. The syrupy liquid remaining after rotary evaporation was partitioned between CHCl₃ and H₂O. The CHCl₃ layer was chromatographed on silica gel and Sephadex LH-20 column chromatography to afford **1** (159 mg), **2** (16 mg), **3** (30 mg), and **4** (35 mg), using a bacterial thin layer overlay chromatography technique (**1**) for monitoring of antibiotic activities. Identification of the isolated compounds was made by direct comparison of physical and spectroscopic data (IR, EI-mass, EI-HR-mass, and ¹H-NMR) (2–8). In order to examine their growth inhibitory property against microorganisms, a disk assay was carried out, using gentamicin as a control (32 µg/disk). The results are shown in Table 1. Although these compounds were isolated from several plant species (2–5), they have not, to our best knowledge, been reported previously from *Empetrum nigrum* L.

Information in detail on the work-up procedure and copies of the original spectra are obtainable from the author of correspondence.

Table 1 Antimicrobial activity of compounds **1**–**4**, using a disk assay method.

Micro-organisms tested	zone diameter (mm) ^a				GM
	1	2	3	4	
<i>Pseudomonas aeruginosa</i> H187	–	–	–	–	18
<i>Pseudomonas aeruginosa</i> H188	8	–	–	–	34
<i>Escherichia coli</i> UB1005	–	–	–	–	25
<i>Escherichia coli</i> DC2	15	11	9	10	27
<i>Staphylococcus aureus</i> K147	12	9	11	11	31
<i>Staphylococcus aureus</i> SAP0017	12	9	10	10	10
<i>Bacillus subtilis</i> verson	13	9	10	10	23
<i>Candida albicans</i> 105	8	8	9	11	–

^aZone diameter of clearance (disk diameter: 7 mm). Concentrations of 200 µg/disk were utilized for these assays. GM = gentamicin, 32 µg/disk.

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