DENDROBEANIAMINE A, A NEW ALKALOID FROM THE ARCTIC MARINE BRYOZOAN *DENDROBEANIA MURRAYANA*

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STUDY BACKGROUND:

Bryozoans are filter feeding, sessile and colony forming aqautic invertebrates which are producing structurally diverse bioactive secondary metabolites including the flustramine, the eusynstyelamides, the bryostatins and the securamines [1-2]. As part our ongoing search for new secondary metabolites from Arctic invertebrates [3], we are reporting a new secondary metabolite from the Arctic marine bryozoan ***Dendrobeania murrayana*** **(Figure 1)**.

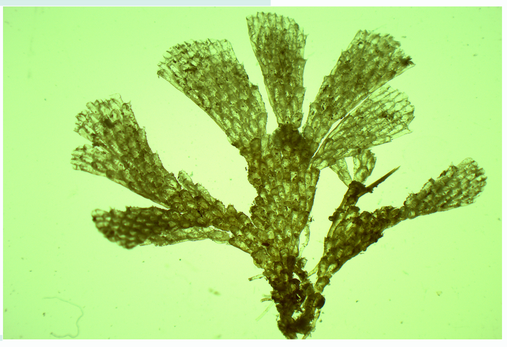

Figure 1: An image of *D.murrayana*

CHEMICAL ANALYSIS OF ORGANIC CRUDE EXTRACT OF ARCTIC BRYOZOAN *D. MURRAYANA:*

The animal material was collected from the North Sea, freeze dried and extracted into organic extract. An aliquot of organic crude extract was analyzed by ultra performance liquid chromatography and high resolution of mass spectrometry (UPLC-HR-MS) with positive electrospray ionization (ESI^+). Target compound **1** was selected based on the base peak intensity cheromatograms of ***D.murrayana*** and other related bryozoans. An unique and prominent peak was observed in ***D.murrayana*** at the rention time (R_t) of 5.7 min with *m/z* 369.2861 **(Figure 2)**, it was not found in other related bryozoans.

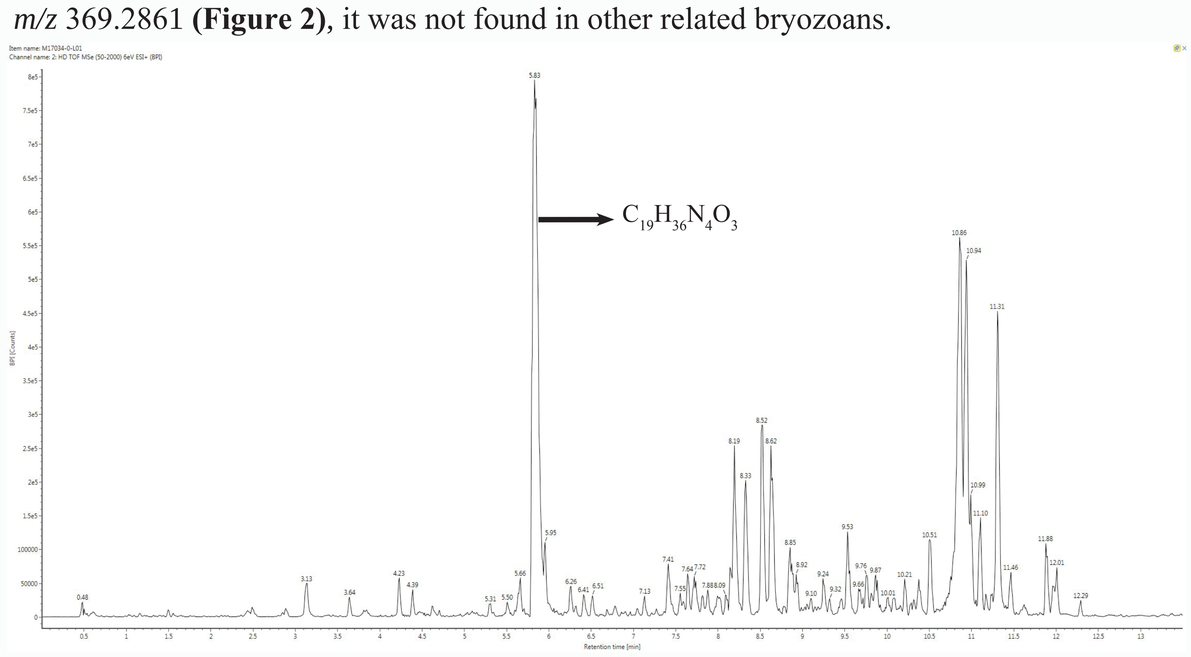

Figure 2: Positive electrospray base peak intensity (ESI^+BPI) chromatogram from the analysis of the organic crude extract of* D. murrayana*. The target peak was selected (marked with black arrow) based on the intensity and compound 1 eluted at the retention time (Rt) of 5.7 min.

DEREPLICATION:

The mass spectrum of compound **1** indicated that compound **1** had a protonated ion $[M+H]^+$ with *m/z* 369.2861 (**Figure 3**) and the elemental composition was calculated as $C_{19}H_{36}N_4O_3$ (*m/z* 369.2865). The elemental composition of compound **1** was not found in relavent databases (Dictionary of Marine Natural Products and ChemSpider).

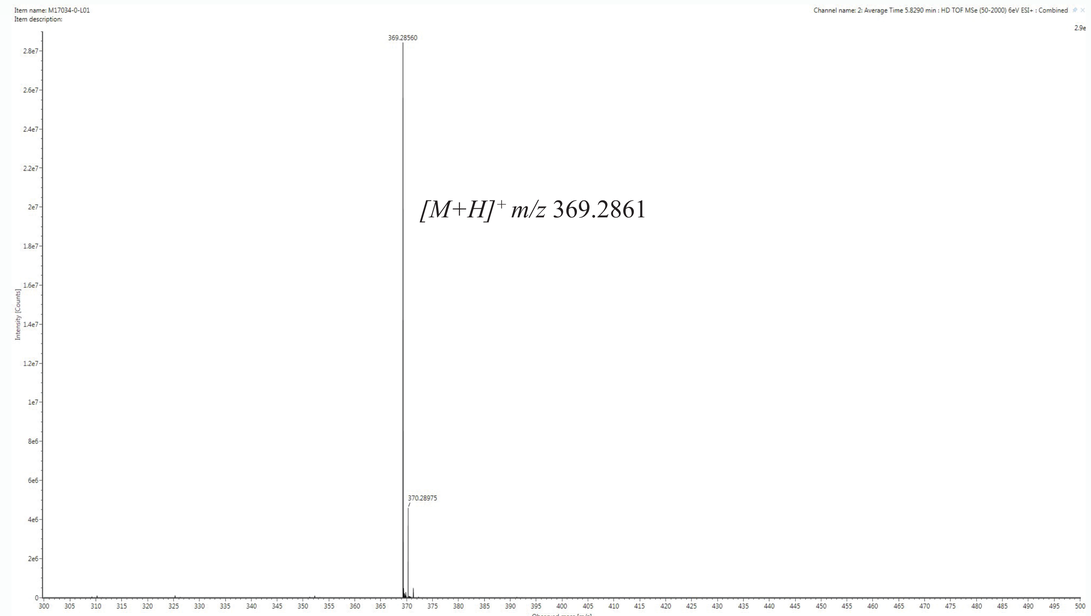

Figure 3: The mass spectrum of target compound 1 from HR-MS data, obtained in positive electrospray ionization (ESI^+) mode.

ISOLATION OF COMPOUND 1 BY USING PREP HPLC-MS:

Mass guided prep HPLC was used for the isolation of compound **1**. Aliquots of organic crude extract were injected repeadly onto a prep C_{18} HPLC column for first round of isolation. The mass of the compound *m/z* 369.28 was used as collection trigger. Fluorophenyl prep HPLC column was used for second round of purification **(Figure 4)**. The yield of pure compound was 2.5 mg out of 0.75 g of organic crude extract.

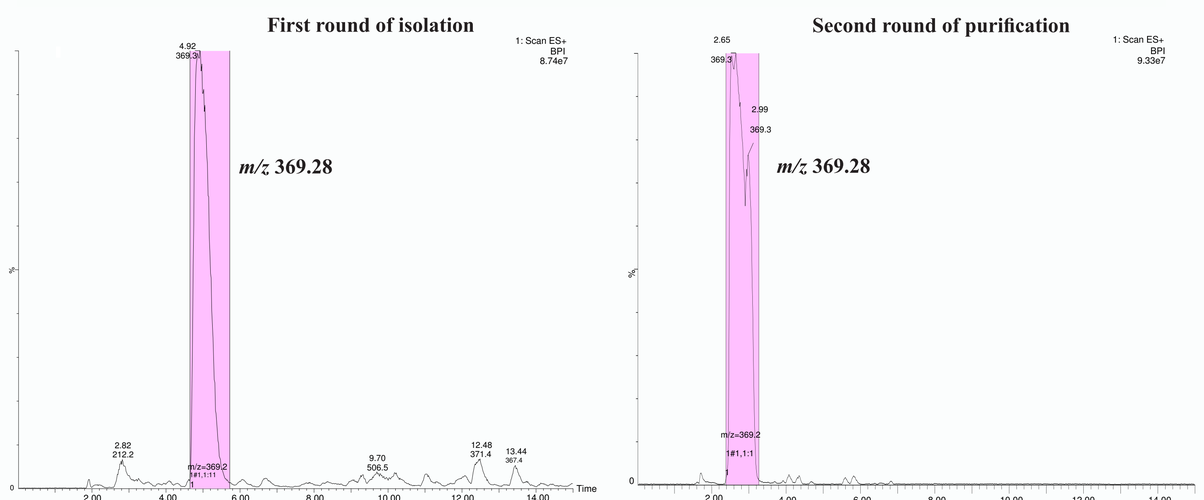

Figure 4: BPI chromatograms showed the stepwise purification of compound 1 (marked in pink colour) by using prep C_{18} HPLC column (left) and fluorophenyl HPLC column (right).

STRUCTURE ELUCIDATION OF COMPOUND 1 BY USING 1D & 2D NMR:

The chemical structure of compound **1** was determined by various ^1H, and ^{13}C and NMR experiments including HSQC+HMBC, H2BC, DQCOSY, TOCSY, NOSEY, 15N HSQC and 15N HMBC. The structure of compound **1** was new and named "Dendrobeaniamine A". The chemical structure can be seen in **Figure 5**.

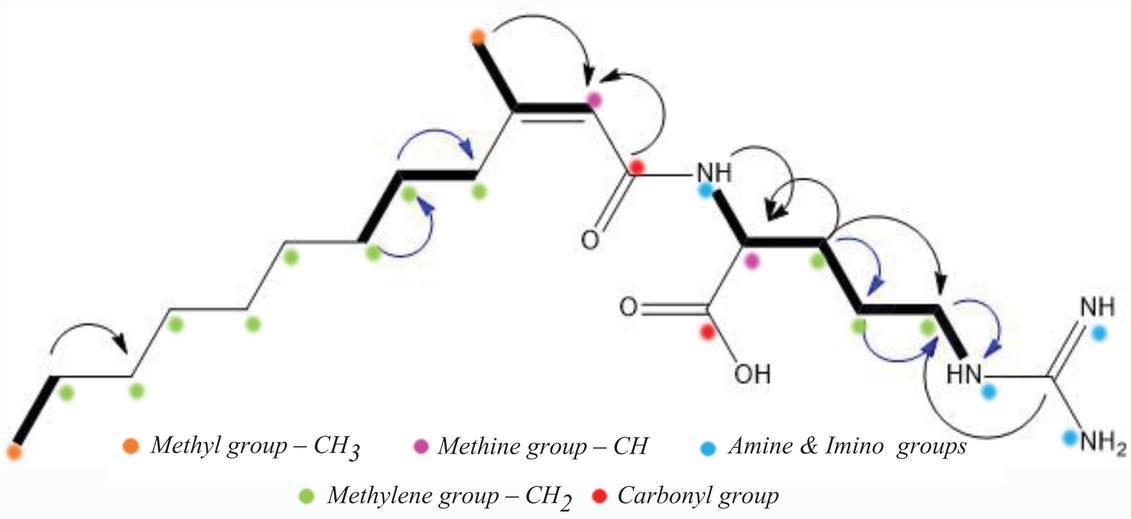

Figure 5: The chemical structure of the new compound Dendrobeaniamine A. Highlighted are key COSY (bold), HMBC (black arrows) and H2BC (blue arrows) correlations.

BIOACTIVITY PROFILING OF COMPOUND 1:

Dendrobeaniamine A was evaluated for potential biological activities based on cellular and biochemical bioassays, but the compound did not show any significant cytotoxic anti-inflammatory, antimicrobial and antioxidant activities.

SUMMARY:

Chemistry guided purification of the organic extract of the Arctic marine bryozoan ***Dendrobeania murrayana*** yielded one new compound, Dendrobeaniamine A, and it was present in abundant amounts in the organic extract. Dendrobeaniamine A is a fusion of long chain aliphatic fatty acid and the cationic amino acid residue arginine.The bioactivity and natural function of this compound thus remain to be elucidated.

ACKNOWLEDGEMENT:

This study was funded by UiT-The Arctic University of Norway. We would like to thank Marbank for marine bryozoan collection, identification and extraction. We also would like to acknowledge the department engineers Marte Albrigtsen and Kirsti Helland for bioactivity experiments.

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