Secondary Metabolite Profiles of Cyanobacteria from Guam

S. Matthew (UF, Medicinal Chemistry); P.J. Schupp (University of Guam Marine Laboratory); H. Luesch (UF, Medicinal Chemistry)

Introduction

Marine cyanobacteria are a potential source of novel bioactive compounds. Particularly Lyngbya species are prolific producers of interesting secondary metabolites. Guam is an area of high marine biodiversity in Micronesia and cyanobacteria from surrounding waters have previously yielded novel pharmaceutically relevant secondary metabolites. One particular variety of Lyngbya bouillonii from Guam has emerged as a “superproducer” of intriguing secondary metabolites, yielding the cytotoxins apratoxins A and B, lyngbyastatin 2, lyngbyabellin A and B, as well as lyngbyapeptin A, and apramides A–G. These compounds were relatively major metabolites. Using the NHMFL’s 1-mm HTS probe, the secondary metabolite profile of this Lyngbya bouillonii variety is further investigated to potentially allow the structure elucidation of even minor components.

Experimental

1H, 13C, and 2D NMR spectra for Guamanian Lyngbya metabolites were recorded on a Bruker Avance II 600 MHz NMR spectrometer equipped with NHMF Lab’s 1 mm triple-resonance high-temperature superconducting (HTS) cryogenic probe.

Results and Discussion

The marine cyanobacterium Lyngbya bouillonii was collected at Apra Harbor, Guam. The collections were freeze-dried, extracted with organic solvents and fractionated by solvent partition, silica gel chromatography and reversed-phase HPLC. All fractions were analyzed by NMR and major known metabolites identified and thus previously results reproduced. Apratoxin A (Fig. 1) was the major cytotoxic component. Re-isolation is in progress to continue mechanistic studies. We also compared extracts of the morphologically identical cyanobacterium collected at different depths and locations to establish potential differences in metabolite production. Several minor metabolites have been isolated in microgram quantities and are currently being analyzed by NMR using the 1-mm HTS cryogenic probe.

Fig. 1. Structure of apratoxin A.

Conclusions

Known major secondary metabolites of Lyngbya bouillonii have been re-isolated. The 1-mm HTS cryogenic probe may prove useful for elucidating the structures of very minor components.

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References