

Changes in fungal diversity in Ward Hunt Lake, Canadian High Arctic

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Ward Hunt Lake is located on Ward Hunt Island, off the northern coast of Ellesmere Island at the northern limit of North America (83°05.226'N; 74°08.721'W). The lake is 0.37 km², of which the majority is shallow (i.e., <2 m), with a maximum depth of 9.7 m. Ward Hunt Lake is perennially ice-covered. However, the ice cover of Ward Hunt lake thinned from 2008 onward, and the lake became ice-free in 2011^(1,2).

As part of a microbial survey in the lake, 3.3m depth of lake sediments were collected and were transferred aseptically to sterile 5-mL sample tubes. Within one hour of sampling, the tubes were transferred to a -20°C freezer at the field laboratory and then stored at that temperature until subsequent analysis.

Subsamples (0.1 g) of the lake sediment were directly placed on potato dextrose agar (PDA; Difco, Becton Dickinson Japan, Tokyo, Japan) containing 50 µg/mL chloramphenicol and incubated at 10°C for a period of up to 3 weeks. We isolated fungi growing on the PDA based on colony morphology. Each colony with a different morphology was purified by repeated streaking on fresh PDA. DNA was extracted from fungal colonies using an ISOPLANT II kit (Wako Pure Chemical Industries, Osaka, Japan) according to the manufacturer's protocols. The extracted DNA was amplified by polymerase chain reaction (PCR) using KOD-plus DNA polymerase (Toyobo, Osaka, Japan). After that, the DNA was purified using Sephacryl S-400HR (Sigma-Aldrich Japan, Tokyo). Sequences were determined using an ABI Prism 3130xl Sequencer (Applied Biosystems, Life Technologies Japan, Tokyo). The species were identified by BLAST analysis based on sequence homology of > 99%.

A total of 91 fungal strains were isolated from 2016 sediment samples collected from Ward Hunt Lake in the Canadian high Arctic. Based on the internal transcribed spacer (ITS) region and 26S rDNA D1/D2 domain sequence similarity, these strains were classified into 13 genera and 13 species. The dominant fungi belonged to the genera *Vishniacozyma* (27.5%), *Talaromyces* (26.4%), and *Chaetomium* (12.1%).

On the other hand, a total of 102 fungal strains were isolated from the 2018 sediment samples. Based on the internal transcribed spacer (ITS) region and 26S rDNA D1/D2 domain sequence similarity, these strains were classified into 19 genera and 28 species. The dominant fungi belonged to the genera *Mrakia* (32.7%), *Vishniacozyma* (13.1%), and *Pseudogymnoascus* (9.3%).

These results suggest that the fungi inhabiting Ward Hunt Lake have changed significantly in recent years. We want to continue to survey changes in fungal diversity in Ward Hunt Lake.

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