Virginia Walker's Lab

molecular genetics/ environmental microbiology/ stress tolerance/ low temperature resistance/ model systems from microbes to fish to insects to plants to mammals and beyond!

Nice and warm in front of the fire-place channel: left to right, Pranab, Melissa, Geraint, Kristy, Michelle, Heather, Virginia, Erin, Karly and Irena

Our research interests concern stress genes and the molecular basis of resistance. This is a central question for scientific goals as diverse as predicting the impact of nanoparticle-containing food on our gut microbiota, the consequence of climate change on Arctic organisms, or the production of ice-binding proteins in environmentally-stressed overwintering plants, insects, fish or microbes.

*Check out: http://www.arcticfishery.ca/ for the large-scale Genome Canada research project, "Towards a sustainable fishery for Nunavummiut" and the twitter feed.

Recent Journal Articles

1. *Bredow M, *Vanderbeld B, Walker VK. (2016). Ice-binding proteins confer freezing tolerance in transgenic *Arabidopsis thaliana*. Plant Biotechnology Journal. : 10.1111/pbi.12592.

2. *Bredow M, *Tomalty H, Walker VK. (2016). Identification of plant ice-binding proteins through the assessment of ice-recrystallization inhibition activity and isolation using ice-affinity purification. Journal of Visual Experiments. *in press*

3. Dudefoi W, Moniz K, Allen-Vercoe E, Ropers M-H, Walker VK. (2016). Impact of food grade and nanoTiO2 particles on a human intestinal community. Food and Chemical Toxicology. *Submitted*

4. Shah V, Luxton T, Walker VK, Brumfield T, Yost J, Shah S, Wilkinson J E, Kambhampati M. (2016). Fate and impact of zero-valent copper nanoparticles on geographically-distinct soils. Science of the Total Environment. 573: 661-670.

5. *Tomalty, H, *Hamilton EF, Hamilton A, Kukal O, Allen T, Walker VK. (2016). Kidney preservation at subzero temperatures using a novel storage solution and insect ice-binding proteins. CryoLetters. *in press*

6. *Das P, *Saulnier E, Carlucci C, Allen-Vercoe E, Shah V, Walker VK. (2016). Interactions between a broad-spectrum antibiotic and silver nanoparticles in a human gut ecosystem. Nanomedicine and Nanotechnology.7:408

7. *Bredow M, *Tomalty H, *Smith, L, Walker VK. (2016). Ice and anti-nucleating activities of an ice-binding protein from the annual grass, *Brachypodium distachyon*. Plant, Cell and Environment. *in press*

8. *Inglese C., Christiansen CT, Lamhonwah D, *Moniz K, *Montross S, Lamoureux S, Lafrenière M, Grogan P, Walker VK (2016). Examination of soil microbial communities after permafrost thaw subsequent to an active layer detachment in the High Arctic. Arctic, Antarctic and Alpine Research. *Submitted*

9. *Bredow M, *Vanderbeld B, Walker VK. (2016). Knockdown of ice-binding proteins in *Brachypodium distachyon* demonstrates their role in freeze protection. PLoS ONE 11(12):e0167941

10. *Das P, Petrof EO, Walker VK. (2015). Perturbation of a human gut ecosystem by silver chloride colloids. Journal of Environmental & Analytical Toxicology. 5: 294.

11. *Sun T, Davies PL, Walker VK. (2015). Structural basis for the inhibition of gas hydrates by α-helical antifreeze proteins. Biophysical Journal. 109(8): 1698-1705.

12. Walker VK, *Zeng H,*Ohno H, *Daraboina N,*Sharifi H, Bagherzadeh SA, Alavi S, Englezos P. (2015). Antifreeze proteins as gas hydrate inhibitors. Canadian Journal of Chemistry. 93: 839-849.

13. Shi Y, Xiang X, Shen C, *Chu H, Neufeld JD, Walker VK, Grogan P. (2015). Vegetation-associated impacts on Arctic tundra bacterial and micro-eukaryotic communities. Applied and Environmental Microbiology. 81(2): 492-501.

14. *Sharifi H, Ripmeester J, Walker VK, Englezos P. (2014). Kinetic inhibition of natural gas hydrates in saline solutions and heptane. Fuel. 117: 109-117.

15. *Middleton AJ, *Vanderbeld B, *Bredow M, *Tomalty H, Davies PL, Walker VK. (2014). Isolation and characterization of ice-binding proteins from higher plants. Methods in Molecular Biology. 1166: 255-77.

16. *Sharif H, Walker VK, Ripmeester J, Englezos P. (2014). Inhibition activity of antifreeze

proteins with natural gas hydrates in saline and the light crude oil mimic, heptane. Energy and Fuels. (28): 3712-3717.

17. *Sharifi H, Walker VK, Ripmeester J, Englezos P. (2014). Insights into the behavior of biological clathrate hydrate inhibitors in aqueous saline solutions. Crystal Growth and Design. 14(6): 2923-2930.

18. *Wilson SL, Voordouw G, Walker VK. (2014). Towards the selection of a produced water enrichment for biological gas hydrate inhibitors. Environmental Science and Pollution Research International. 21(17):10254-61.

19. Guo W , Wu Z , Song J , Jiang F , Wang Z , Deng S , Walker VK , *Zhou S. (2014). Juvenile hormone- receptor complex acts on mcm4 and mcm7 to promote polyploidy and vitellogenesis in the migratory locust. PLoS Genetics. 10(10): e1004702.

20. *Tomalty HE, Walker VK. (2014). Perturbation of bacterial ice nucleation activity by a grass antifreeze protein. Biochemical & Biophysical Research Communications. 452: 636-41.

21. *Han X, *Geller B, *Moniz K, *Das P, Chippindale AK, Walker VK. (2014). Monitoring the developmental impact of copper and silver nanoparticle exposure in *Drosophila* and their microbiomes. The Science of the Total Environment. 487: 822-9.

22. Shah V, Collins D, Walker VK, Shah S. (2014). The impact of engineered cobalt, iron, nickel and silver nanoparticles on soil bacterial diversity under field conditions. Environmental Research Letters. 9(2): http:// iopscience.io.

23. *Kumar N, Palmer GR, Shah V, Walker VK. (2014). The effect of silver nanoparticles on seasonal change in Arctic tundra bacterial and fungal assemblages. PloS ONE. 9(6): e99953.

24. *Vanderveer TL, *Choi J, *Miao D, Walker VK. (2014). Expression and localization of an ice nucleating protein from a soil bacterium, *Pseudomonas borealis*. Cryobiology. 69: 110-8.

25. *Das P, *McDonald JAK, Petrof EO, Allen-Vercoe E, Walker VK. (2014). Nanosilver-mediated change in human intestinal microbiota. Journal of Nanomedicine and Nanotechnology. 5(235): doi:10.4172/2157-.