Water fleas, big data and 21st century technology:

Case studies in Muskoka and Sudbury point the way to saving the world

John Kenneth Colbourne joined the University of Birmingham in August 2012 and holds its inaugural Chair of Environmental Genomics. He is also an Adjunct Professor at the Mount Desert Island Biological Laboratory, a founding member of the Daphnia Genomics Consortium (DGC), of the Consortium for Environmental Omics and Toxicology (CEOT) and is co-Director of the Joint Centre for Environmental Omics (JCEO) in partnership with the China National GeneBank.

Freshwater ecosystems. Our lives, and certainly in Muskoka, our livelihood, depend on them.

Embark on this journey with us as we learn the details of how research that started in the Sudbury region, and which we will be refining in Muskoka, is rapidly becoming a global research enterprise to transform environment and health protection, including our freshwater ecosystems.

Monday, October 26th at 4pm, Muskoka Boat & Heritage Centre, Gravenhurst

We invite you to come listen to a fascinating talk given by the leading mind and creator of new advanced analytical methods, Professor John Colbourne, as he provides an inspiring view on what is possible and how a focused effort in Muskoka may contribute to saving the world.

Our journey begins with tiny inhabitants of our lakes, water fleas called Daphnia, our sentinels of these freshwater ecosystems. Water fleas have fascinating ways of coping with environmental change and hardship. This includes adapting to the many tens of thousands of human made chemicals that are poisoning our waters. It turns out that the ways these fleas cope offer us the prospect of vital insight that far exceeds the timeliness of our current capabilities.

Scientists are discovering how the application of "big data" and leading-edge technologies can make these animals into miniature detectives of the quality of our environment. By combining studies on Daphnia with toxicological and evolutionary studies using other useful species in biomedical research, we will soon be able to accurately understand, in a much more immediate way, how chemicals adversely impact normal biological processes in most animals, including humans.

This research will contribute to solving two existing challenges which inhibit our capacity to effectively assess environmental risk – comprehensiveness and timeliness – and will allow us to make better science-based decisions on how to best manage potential chemical health risks.

Currently, our methods limit us to testing only a few chemicals at a time.

Daphnia

This testing, inadequate in scope as it is, takes years to complete and often results in our awareness of risk coming too late to solve or mitigate the issue.

Our new approach will be much more useful and much more immediate for the risk assessment of chemicals, a fact that has drawn the attention and interest of the pharmaceutical industry, for example

As an additional bonus outcome of this research, we will be provided with fantastic new tools for water quality assessment, catapulting us way beyond our present methods, methods which now limit us to measuring a few water quality parameters, hoping we have included the correct problematic chemicals in our analysis.

Using Daphnia as our sentinel, we will expose them to the waters of our target lakes and then measure the thousands of resulting metabolites in their blood. The responses of these sentinel fleas will tell us much more about environmental threats, far beyond the current methods.

Yes, thousands of metabolites in a few microliters of Daphnia blood. Using big data and other advanced processing technologies enables us to achieve such extensive and accurate analysis.

The potential is astounding.

Presented by:

Muskoka Boat & Heritage Centre – Grace & Speed

Muskoka Watershed Council

Friends of the Muskoka Watershed

Monday, October 26th, 2015
4pm

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Proceeds towards the Muskoka Watershed Council environmental programs

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