

**Canadian Association for Underwater Science
Association canadienne des sciences subaquatiques**



Diver Dave Caswell carries diver Mike Caswell during a rescue training workshop.

Never stop learning...

September, for most of us this means back to school. For those of us who are finished our studies, the learning does not end in the classroom. Information is key to our critical thinking so that we can make informed choices. Training and skills acquisition is an on going process for underwater research. By keeping up with the latest technology, methods and procedures we can get the most out of our time underwater and achieve our objective in the safest manner.

Last month I gathered up a group of students, divers and scientists and went to the premier of the movie The Cove. This

documentary exposed the slaughter of over 23,000 dolphins, whales and other porpoises in Japan each year with 2,500 of these kills happening in Taiji Japan. As if this was not enough to make you cringe, the dolphin meat was being distributed as either tuna or whale meat to school children in Japan and making its way into the supermarkets with these false labels. The problem with this is the mercury level is way above the level acceptable for human consumption. This lead me to think more about other species that are either contaminated with high levels of mercury or PCB's or under threat of extinction. Here on the west coast we have had the worst sockeye salmon

run in history, are we headed in the direction of the east coast cod fisheries? What can we do? To start we can learn from the information we have thanks to many of our researchers here in Canada. I have included the website for Seachoice who produce a guide for responsible seafood choices. You can see more information and download the complete card at www.seachoice.org and if you are interested in the movie go to www.thecovemovie.com .Make every day a school day, keep learning and training!

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Science partners with divers to save the lakes from infestation.

Myiophyllum spicatum , commonly known as Eurasian Milfoil is an aggressive aquatic invasive plant has been successfully controlled by S.C.U.B.A divers in Christina Lake for over 20 years. Administrated by the Regional District of Kootenay Boundary and funded entirely by the local tax base, the Christina Lake Milfoil Control Program strives to serve the public interest by providing a program with strong environmental ethics. Christina Lake is known as ‘the warmest tree lined lake in North America’, and boasts over 40km of rich shoreline habitat including sandy beaches, towering cliffs, and tranquil hidden coves. Each summer when the water is at its warmest, a team of Commercial Divers survey the entire littoral area of the lake looking for Eurasian milfoil, then removes, documents, and disposes of each and every plant found.

Removal of Eurasian Milfoil is a very specific and demanding job that requires a great deal of skill, care, and physical stamina. Divers must dig up and remove the entire plant root, and must not to break the plant into fragments. Eurasian Milfoil is a perennial plant and stores carbohydrates in its roots, making it effective at overwintering. If any roots are left in tact in the sediment, the milfoil will continue to grow the following spring. After flowering, Mature plants will become fragile near the growing tips, undergoing autofragmentation, which can be encouraged by wave or wind action. These small fragments will float on the surface water and take root in a new location. Divers who work to control Eurasian Milfoil by hand removal must develop perfect buoyancy control to avoid disturbing sediment and limiting visibility.

This season has been an exciting season for the Christina Lake Program. After over 20 years of hard work and effective control programs, the RDKB has engaged in a cooperative research initiative with the

University of British Columbia. The goal of this partnership is to learn more about the lifecycle, infestation success, and patterns of infestation of Eurasian Milfoil in Christina Lake. This partnership with C.A.U.S allowed the program to employ Scientific Divers to assist with underwater surveys and the collection of milfoil stem samples. This information will help us to create a more effective integrated plant management plan, to predict the progress of milfoil infestations, and to work according to the most effective strategy possible. Initial work for 2009 included a review of biological control options and a sampling program to determine the presence or absence of the Milfoil Weevil, (*Euhrychiopsis lecontei*), a potential bio-control agent for Eurasian Milfoil.

The team was asked to investigate alternative methods of controlling this nuisance plant and after much discussion decided to focus on *E. lecontei*, and specifically to determine if the weevil was present in the lake. Milfoil stem samples were collected from the lake along specific transects, and with a dissecting microscope they were carefully inspected for evidence of *E. Lecontei*. Evidence of larval ‘stem mining’ was discovered in varying degrees at many existing Eurasian Milfoil sites, and weevils in the pupae stage were also discovered and documented at many sites.

This small aquatic weevil lives out its life cycle almost entirely in the lake, and has a preference for Eurasian Milfoil. Eggs are deposited on the flowing tips of the Milfoil plant and upon hatching, the larvae migrates down the stem, consuming vascular tissue. The plant then loses buoyancy and sinks to the lake bottom. The weevils metamorphose into a pupae stage inside the Milfoil stem, and emerge as adults in 5 to 15 days. In the warm water of Christina Lake, the insect could go through up to three life cycles in a summer season. It is believed that the adult weevils over winter in leaf litter and other organic matter close to the shore line. On July 27th 2009, UBC Okanagan Biology student Catherine Lund found and collected the first confirmed ‘Milfoil Weevil’ (*Euhrychiopsis lecontei*) specimen in the adult life stage, living on a Eurasian Milfoil plant in Christina Lake. Confirming the presence of this species in the lake is an important step and allows the Milfoil Control Program to begin assessing the viability of using these native insects as a method of Milfoil control. Data collection, stem sampling, and testing of alternative methods of Eurasian Milfoil control will continue in Christina Lake in future years. Currently planned projects include further research into the viability of *E. Lecontei* as a bio-control agent, and investigation into the new concept of ‘native aquatic plant seed impregnated bottom barriers’ as well as other ideas.

WEEVIL



Anyone looking for more information on the Regional District of Kootenay Boundary Christina Lake Milfoil Control Program, our research initiatives, or to find out how you can become a part of the team, please contact the Program Supervisor, Dave Caswell at dave_caswell@hotmail.com

BIOPROSPECTORS IN SEARCH OF THE LAST FRONTIER

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The ocean has always been a frontier of discovery, a place filled with unknown and elusive creatures. The biodiversity encountered in the world's oceans dwarves what has ever been recorded on land. To put this into perspective, all species on earth have been organized into 39 phyla, a taxonomic grouping based on general body plans, 28 of those phyla have representatives in the marine environment and of those 28 phyla the majority are endemic to the marine environment. Marine biodiversity is not only expressed through physical adaptations but through a web of interdependence between species where chemistry plays a necessary role for survival. Chemical cues allow organisms to communicate and mate but some chemicals are also used to wage a veritable chemical warfare to fend off predators and invaders. One could not think of better settings to allure the chemical bioprospector.

Since the invention of Scuba, natural products chemists have encountered novel molecules as mesmerizing as the creatures that produce them. But on top of keeping chemists entertained with their interesting chemical features, these molecules have found their place as therapeutic agents to treat many ailments. The first drug derived from a marine natural product to enter the market was ziconotide an analgesic molecule isolated from the cone snail *Conus magus*. What's more, many marine natural products have proven useful in the treatment of cancer. Trabectedin, was the first marine derived cancer treatment to reach market but many others are now in clinical trials.

Bioprospectors are no strangers to Canadian waters where many invertebrates have been studied for their chemical potential. Most of the chemical

investigations undertaken in British Columbia were performed on nudibranchs and sponges by Raymond Andersen's laboratory. Many of the critters that keep us diving were shown to defend themselves chemically; *Melibe leonia*, the hooded nudibranch was found to produce a fragrant aldehyde which was repugnant to its potential predators. Other invertebrates were less fortunate and were outwitted by their predators, *Ptilosarcus gurneyi*, the orange sea pen produces ptilosarcenone as a defence chemical but the orange peel nudibranch is able to eat the sea pen, sequester ptilosarcenone and use it for its own protection along with the rest of its chemical weaponry.

Local chemical investigations do not stop at answering chemical ecology questions; a number of natural products isolated from local organisms are now serving in biochemical research to develop new approaches to treat cancer. Just this year, *Plectosphaerella cucumerina*, a fungus isolated from marine sediments in Barkley Sound yielded a compound able to slow metastasis in cancer cells. But despite successes with local organisms, the search for new chemistry has taken graduate students from Andersen's team across the world pushing the ever-expanding limits of our chemical imagination.

The search for novel marine natural products is currently taking place in every ocean and chemists need to be inventive to isolate molecules that have not been previously described. Collection trips are organized to isolated islands and to deep ocean trenches in order to find new molecules. The focus of bioprospectors has also shifted from invertebrates such as sponges and tunicates to the bacteria that inhabit them. In many cases, the compounds isolated from invertebrates are in fact produced by their symbionts. With emerging microbiology techniques many of these microorganisms can be cultured in the

laboratory solving supply issues that came with extracting milligrams of a molecule from kilograms of sponges.

Despite the latest changes in the way bioprospecting is done one thing remains the same; isolating a new molecule that only you have seen is a bit like discovering uncharted territory, it is the last frontier (albeit a bit less sexy but we're chemist after all!).

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MARK YOUR CALENDAR

Oct 9 & 10 2009 Undersea Hyperbaric Medical Society Pacific Chapter conference. Seattle WA. Virginia Mason Medical Centre see www.uhms.org chapter meetings for details.

Oct 24th 2009 Undersea Hyperbaric Medical Society Great Lakes Chapter conference. Toronto Ont. Conference centre at Toronto General Hospital. See www.uhms.org chapter meetings for details

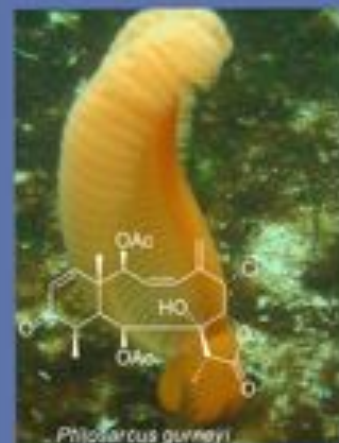
Nov 4-7 2009 DEMA (Diving Equipment and Marketing Association) Orlando FLA Orange County Convention Centre see www.demashow.com

March 25-27 2010 AAUS (American Academy of Underwater Science) Symposium Waikiki at the Ala Moana Hotel see www.aaus.org

May 27 & 28 2010 CAUS Symposium Vancouver B.C. watch for details at www.caus.ca

June 3-5 2010 UHMS Annual Scientific Meeting. Tradewinds Island Grand Resort. St. Pete's Beach Florida see www.uhms.org

Have an event you would like to promote please let us know.



MORE INFO ABOUT CAUS...

Statement of Purpose

Underwater Science Report is published by the Canadian Association for Underwater Science and distributed to Canadian researchers who study or use diving in scientific applications. Authors' views are their own and do not necessarily reflect those of the CAUS. Any portion of this newsletter may be reprinted with credit to the source. Suggestions for and contributions to Underwater Science Report are welcomed. Please address correspondence to the CAUS editor, Sherri Ferguson at sferguson@sfu.ca

About CAUS

The Canadian Association for Underwater Science is a non-profit organization with a mandate for promoting safe diving practices and developing peer reviewed standards of practice for scientific diving by its members.

Founded in 1983, the Association provides a national forum for information exchange and policy making via a programme of annual meetings, symposia, and published proceedings.

All institutions or organizations that utilize diving in scientific applications are invited to join us.

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New Membership Cards Are In!

New membership cards are available now, get yours today for a fee of \$25. Application forms are available online at www.caus.ca and need to be verified by your DSO. These cards will replace the need to carry a letter from your DSO to prove current status at the dive site. A sticker showing your active member status will be available in subsequent years for a fee of \$10.

