THE BRODIE CLUB

ROYAL ONTARIO MUSEUM OF ZOOLOGY

THE 1015TH MEETING OF THE BRODIE CLUB

The 1015th Meeting of the Brodie Club was held at 7:30 pm on November 20, 2007 in the Ramsay Wright Laboratories of the University of Toronto.

Chairman: Jennifer Young
Secretary: Trudy Rising

There were 26 members and 5 guests.
Guests:
Ed Addison: Jeremy Hussell, Fred Bodsworth, Richard Joos; Ken Abraham: Andrew Jano; Bill Rapley, Paul Harpley and Tom Mason
Regrets
Bendells, David Hussell, Rosemary Addison, Mary Boswell, Oliver Bertin, James Rising

NEW BUSINESS:

- Minutes approval: Ellie Larson moved, Enid Machin seconded, approved
- Ann Falls welcomed new member Ed Bousfield. Ed's biography is repeated below, for your interest.

Ed Bousfield was born in Penticton, B.C. in 1926. He attended Riverdale C. I., the University of Toronto (B. A., 1948; M. A., 1949), and Harvard University (PhD., 1954). He married Barbara Joyce Schwartz in 1953 (deceased 1983) and has four children and twelve grandchildren. He is now married to Joyce Burton of Ottawa

He became an authority on amphipod crustaceans, serving at the National Museum of Natural Sciences, Ottawa as Invertebrate Zoologist (1950-1963), as Chief Zoologist (1964-1974), as Senior Scientist (until retirement in 1984), and after retirement as Research Associate and Curator Emeritus.

Dr. Bousfield described several hundred new crustacean taxa, developed a modern classification of amphipods and contributed to our knowledge of the aquatic fauna of Canada. During his career, he has travelled widely on collecting expeditions all over Canada, in Alaska, on southern U.S. and Caribbean coasts, in Australia, and in southern South America. His work contributed to an illustrated guide to "North Pacific Amphipods" sponsored for web presentation by the Royal Ontario Museum. More recent interests include the Burgess Shale arthropods and the biology of marine and freshwater mega-serpents, including formal description of Cadborosaurus willsi, Bousfield& LeBlond, 1995 (a subject on which he has spoken to the Brodie Club).

Dr. Bousfield has been President (1979-80) of the Canadian Society of Zoologists and is currently an Honorary Member. He is a member of several scientific societies and is an Honorary Member of the Ottawa Field-Naturalists' Club. He has been associated with several universities, museums and laboratories in Canada and the United States. In 1978 Dr. Bousfield was elected Fellow of the Royal Society of Canada, and in 1985, he received the Government of Canada's Outstanding Achievement Award. Besides biology and natural history, his interests include curling, lawn bowling, musical instruments, and steam locomotives. He has been active in musical groups in Ottawa and in Victoria B.C. He and Joyce now reside at the Amica Swan Lake residence in Markham, Ont.

- Ann Falls, Membership Committee, writes:

We have an application for membership from Jeremy Hussell. I have run it by the membership committee and naturally they are quite enthusiastic.

- Bruce Falls reminded members that the **Christmas meeting is the 2nd week of December, Tuesday Dec. 11, not the 17th.** Ann Fall reminded members to bring goodies for the meeting

- Bruce Falls announced that *A Pocketful of Gulls*, a book about William Brodie, is available for members to borrow. [Bill Crins now has the book, fyi]

- Jennifer read information about Marshall Field, who recently died, from Dave Hussell. Please see it below:

Members who knew him will be saddened to learn that Marshall Field died on 10 November. He was 88 years old. Marsh was a founding member of the St. Thomas Field Naturalists in 1950. Marsh was also a bird bander for many, many years. He was involved in the banding at Point Pelee in the 1950s and was a founding member of the Ontario Bird Banding Association in 1956. He took part in the early development of the Long Point Bird Observatory in the 1960s, banding both passerines and ducks and assisting with construction of buildings and traps. In the early 1970s he founded the Hawk Cliff Raptor Banding Station, which is still going strong today. Later he took part in the restoration of Bald Eagles along the north shore of Lake Erie.

OLD BUSINESS:

Jennifer stated the need for a new FON representative. Ed Addison volunteered; he and Rosemary will serve in this capacity.

SPEAKER:

Bruce Falls introduced our speaker, Dr. W. D. McIlveen, mentioning that they first met at a Field Botanist of Ontario function. McIlveen was with the Ontario Ministry of the Environment for 25 years, attaining the position of Senior Terrestrial Toxicologist. He is currently an environmental consultant and has been involved, over the years, in many projects to monitor the state of the environment.

EXTINCTION AMONG INSECTS

What is known and suspected about their disappearance.

Dr. McIlveen's presentation summarized the information that is available regarding the known and suspected disappearance of insects. He stressed the fact that the work summarized was from a large number of works.

McIlveen's presentation began with an overview of the evolution of insects. Approximately 1.7 to 1.8 million species of all types have been named and recorded. The total number that exist is uncertain: 5-15 million is estimated with likely actual figure being about 13.6.

Insects form the largest group of organisms on earth (64%). The number of species is between 4 and 9 million, far greater than any other group of organisms. Just over 1 million species have been described.

What are the extinctions rates? Only estimates exist but it is estimated that 5-10% of those that ever existed, are still alive. Average lifespan of a species is a few million years. Human activities are presently causing species to be lost at rates of 100 to 1000 times former rates.

The emergence of major groups of insects is as follows: springtails in the Devonian, cockroaches in the Carboniferous, dragonflies, crickets, mayflies, true bugs in the Permian, caddis flies, beetles, true flies in the Triassic, earwigs and sawflies in the Jurassic, and Lepidoptera and ants in the Miocene.

Extinction and Rates of Extinction

Mass extinctions have occurred at various times. For examples, at end of the Ordovician, 50% families had become extinct and by the end of the Permian, 75% families. At present, an estimated 30,000 species per year are becoming extinct.

Among groups of extinct organisms, Molluscs have lost the greatest number of species, by far. Amphibia are the most endangered of species alive today.

The previous extinction data come from the 2004 ICUN Red Book, as does the following insect-specific information. McIlveen showed a graph of the number of insect species currently at risk, endangered, and extinct. The number of extinct species of various groups are as follows: Lepidoptera has far more (about 28 species extinct). Coleoptera second. Noctuidae is the family with the greatest number of extinct Lepidopteran species.

The German list is quite different from the ICUN Red Book, showing more Noctuidae extinct, and two other families at high levels of extinction, as well. It has few extinct beetle species.

Examples of Extinct Species

Following this general overview, the McIlveen then presented specific information on extinct and probably extinct species in North America.

For example:

- Antioch Dunes Shieldback Katydid -- discovered in California in the 1960s in a collection made in the 1930s was never found again.
- Pecatonica River Mayfly -- known only from a few rivers in Mississippi and Wisconsin. River area; and known only from nymphs.
- Stevens Island Carib Beetle—New Zealand. Not seen since 1931. Lived under large logs. No longer any large logs in the area.

- Spurwing Long-legged Fly from Mt. Tanalou, O'ahu, Hawaii -- discovered in 1902 but not found in later searches.
- Brown Satyr Butterfly -- last specimen collected in 1870s on Lone Mountain, site of present U of San Francisco.
- Nine-spotted Lady Beetle. Was the NY state insect. The most common lady beetle in the mid-1980s in northeastern US, but numbers diminished , due to competition from introduced lady bugs.

Some subspecies that are extinct (note: other subspecies in other localities continue to exist):

- Lake Huron Locust, Knobel Riffle Beetle, and Red-tailed Leafhopper are endangered.

Strohbeen's Parnassian --a subspecies now extinct from Santa Cruz Mountains due to logging, etc.

- Nokomis Fritillary -- subspecies no longer in the US, but still in Mexico.
- Unsilvered Fritillary -- last seen in 1990 near Mt. Pinos, southern CA. Severe late drought in late 1950s perhaps led to final disappearance.
- Thorne's Hairstreak – still a small population in San Diego County, CA. It has a small range that is susceptible to fire.
- Rocky Mountain Locust (*Melanoplus spetus*) McIlveen recommends reading *Locust* by Jeffery Lockwood.

Population estimates in 1874 were 12.5 trillion insects. The species was extinct only 30 years later. When abundant, the infestations were worse than any infestation we've read about in Africa, etc.

To reduce the numbers, destroying egg capsules or trapping nymphs in ditches gave the best results although these had limited control effect. Some specimens can still be found in glacier ice.

Causes of Rocky Mountain Locust Decline:

Switch to undesirable crops such as alfalfa, bison extermination and land use change, climate change, fire, inbreeding; however, probably destruction of habitats in mountain river valleys that are key to the insect's survival between outbreaks is the main cause.

Interestingly, the Eskimo Curlew consumed large numbers of Rocky Mountain Locust nymphs during their northward migration. Decline in Curlew numbers appears linked to extinction of Rocky Mountain Locust;; however, the curlews were already declining before the locust numbers started going down due to market hunting and habitat destruction.

Species thought to be extinct, but that persist

- Northeastern Beach Tiger Beetle is endangered due to habitat destruction. Also, the Puritan Tiger Beetle – both are east coast beach species.
- Palos Verdes Blue was thought to be extinct, but does still exist, though endangered.
- Large Copper Butterfly in UK went extinct in UK in 1851 due largely to loss of open fenland habitat. It was brought back using captive stocks.
- American Burying Beetle. Was widespread across eastern US and Canada. Now just present in the US Midwest. Causes are habitat loss, changes in land use, pesticide use, installation of lights in rural areas, etc.

- Karner Blue is endangered.

McIlveen gave a definition of extinction – when there is no reasonable doubt that it is any longer alive.

- Karner Blue -- one of five subspecies of Melissa Blue. Was most common in six oak savanna habitats in southern Ont.; no confirmed sightings in ON since 1989.
- Xerces Blue Butterfly – by 1875 was rare.
- Lord Howe Island Phasmid (walking stick). Rats brought onto the island about 1918, thought extinct by 1920; in 2001 confirmed that it's still alive on Balls Pyramid, a small rock island nearby.
- Fabulous Green Sphinx Moth -- only 15 specimens from Western Kauai, Hawaii over 110 years; 4 individuals found since 1998 although 80 collecting trips previously failed to find it. Diminished numbers due to habitat loss and aliens.
- Passenger Pigeon Lice – The last of 4 billion Passenger Pigeons died in the Cincinnati Zoo in 1914. So presumably 15 metric tons of lice also went extinct.

30 years after extinction of the Passenger Pigeons, Malcomson identified Columbicola extinctus in museum specimens. In 1999, studies found it was really a fairly common louse.

Evidence that another louse (described as *Campanulotes defecates*) from Passenger Pigeons but in reality was a misidentified *Campanulotes flavens* that still exists on Bronzewing Doves in Australia. This reported extinction is probably due to poor collection maintenance, not a reality.

American Chestnut Insects -- Fungus wiped out chestnuts by 1914. The Large Chestnut Weevil larvae fed on developing fruit, over wintered in soil, with adults emerging in August. Small colonies survived in scattered plantings of Asian and hybrid chestnuts. Still around in small numbers.

Three other species are probably extinct; not found since the chestnuts went – all are Chestnut moths

Comparative Rarity of Insects

Rarity of species in Europe is higher than in the U.S. and Canada

In Ontario, about 2.7% are extremely rare – many fewer species than in Germany, UK.

In Hawaii, 77 total species of insects are extinct; many by late 1800s, early 1900s; for example, Hawaii Leafrollers

Causes of extinction -- Habitat destruction, alien species, over-collecting, etc. In the US, commercial development is at the top, then agriculture. Logging is only about 5%

Protecting At-Risk Insect Species

The main means of protecting species at risk include: protecting habitat, federal and local laws and legislation, research, reintroduction, insects as commodities (e.g., butterfly ranching, etc.), education of public and land managers

Factors Affecting Species Rarity

Size of original populations, geographical range, habitat requirements, specificity to hosts, susceptibility to human and natural disturbance, genetic diversity within

population, competition from other species, introduced parasites and disease, abundance of hosts, frequency of catastrophic events, natural resistance to change

QUESTIONS AND DISCUSSION:

A number of interesting questions arose from the presentation, such as: haven't we probably noted more about Lepidoptera decline because more people are interested in the group? (Probably charisma of the group is a major factor.) With pollination decline that we know, are insects declining in numbers? (Yes, another factor.) Why the introduction of 185+ species of lady bugs? (To eliminate aphids, but the wrong species introduced.) Why dragonfly loss? (For some, water quality.) Other interesting questions and answers, as well.

NOTES AND OBSERVATIONS:

- Paul Harpley – Snow geese at Steeles and other locations. Also 3 canvasback at 1 coot, and 1 merganser.
- John Riley --Arial altercation between Great Horned Owl, Crow, and Raven; he also saw an all white Red-tailed Hawk.
- Norma Martin – Pied billed Grebe. Black Squirrel interaction. Squirrel swam out to see the grebe. Grebe dived. The squirrel then swam out beyond it. Norma asked if others had seen a squirrel swim. Bruce remembered in waterfowl traps – sometimes have a dog run along and eventually a squirrel will get caught.
- Norm Martin – has box of blank labels for specimens if anyone wants them.
- Ken Abraham – Ken Abraham and Jeff Bowman are supervising a graduate student, Heidi Scherr, on a cormorant tracking project. Fourteen cormorants were implanted with transmitters at colonies in Georgian Bay. In early September, they were scattered from Michigan to the St. Lawrence River. As of last week, most had moved to the southeastern U.S. and were distributed from Tennessee to Georgia and Gulf of Mexico. and 5 were in Lake Erie.
- Some of Ken Abraham's colleagues are conducting beached bird surveys in the Presqu'ile Park - Sandbanks Park area. Bird deaths were reported to Ken in the area in late October by a former Trent student, Michael Butler, who documented 154 birds, including 61 Long-tailed Ducks, 48 White-winged Scoters, 24 Common Loons and other species including Red-necked and Horned Grebes, American Black Duck, Red-breasted Merganser, Herring and Great Black-baked Gull. Some specimens from the area were confirmed to have died from botulims type E. Biologist Rod Brook, technician Sarah Hagey, and students Stacy Gan and Michael Butler have been monitoring beaches weekly throughout November, collecting samples for DNA and isotope studies of population origins, and submitting data to the Canadian Cooperative Wildlife Health Network. Ken says that CCWHC is happy to get blood from sick birds for the analysis, as confirming botulism from dead bird samples is more difficult. They rescued one sick loon and one long-tailed duck and Ken took them to the Toronto Wildlife Centre at Downsview Park. The loon was released about 2 weeks later at the original location of capture, having recovered well enough to fly

away immediately on release. Fortunately, the numbers of dead birds has been declining weekly, at least on their patrolled beaches.

- Glen Coady says botulism is close to extirpating Great Black Backed Gulls from Lake Ontario. Ed Addison commented that Type E was first reported in the Great Lakes in loons by a chap [Dale Fay] in Michigan in the late 1950s or the 1960s and that it was not reported again until this recent period. Botulism was common in water birds of the lower Great Lakes in the 1970s, 1980s and 1990s but it was always Type C botulism that was identified as the culprit. Ed finds the variation in appearance of the different types of organisms interesting and without easy explanation. Craig Hebert of CWS is studying the possible dietary pathways, as are others; it appears invasive species including the quagga mussels and round gobies are implicated somehow.
- Jock McAndrews – told us about some very exciting findings on mastodon extinction. The information he read is provided below, along with references, fyi. Mastodon: did a comet fry and freeze them to extinction?
- J.H. (Jock) McAndrews (November 20, 2007):

"It is widely accepted that 65 million years ago an asteroid impact caused the extinction of the dinosaurs and many other species. Now there is evidence that a comet, which hit the Laurentide ice cap 13,000 years ago, did much the same thing to mastodon and other large North American mammals (Firestone et al. 2007). The event also marked the abrupt end of the paleoindian Clovis culture. Further, it marked the beginning of the Younger Dryas, a cold period that lasted for a millennium before our present interglacial, the Holocene.

The soil evidence of the exploding comet at >50 sites is:

Magnetic grains with iridium of 1-500 µm diameter (star dust).

Magnetic microspherules of 10-250 µm diameter and ≤2,100 per kg that contain titanomagentite, charcoal, soot. Glass-like carbon containing nanodiamonds. Fullerenes with extraterrestrial helium. The frying came from the penetration of magnetic grains into flesh and the heat from burning vegetation ignited by the impact.

The freezing followed when the sun was dimmed by all the soot and water vapor in the atmosphere. Further, the impact destabilized the ice cap causing outburst floods and the draining of proglacial lakes into the North Atlantic, where the fresh water shut down of the thermohaline circulation to produce the Younger Dryas. This subglacial flooding formed drumlins. The comet supplied radioactive carbon to produce the "radiocarbon plateau".

Firestone et al. (2006) use simple tests for magnetic grains that allegedly mark the impact: big magnets on soil profiles and little magnets on museum tusks. To try out these tests, I bought some rare earth magnets, a big one for the Hiscock Site in New York and little ones for tusks at the Buffalo Museum of Science and the ROM. At the Hiscock Site there is a charcoal layer at the predicted horizon in at least one soil profile.

The easily-read and well-illustrated book goes on about how there is oral tradition about the impact and how a supernova started it all. Despite weaknesses and "howlers", in the end they may be right.

Firestone, R., West, A. and S. Warwick-Smith. 2006. The cycle of cosmic catastrophes. Fire, flood and famine in the history of civilization. Bear and Co., Rochester VT. 392 pages. $17.12 at Chapters-Indigo.

Firestone, R. B. and 25 additional authors. 2007. Evidence for an extraterrestrial impact 12,900 years ago that contributed to the megafaunal extinctions and the Younger Dryas cooling. Proceedings of the National Academy of Sciences 104:16016-16021.

http://www.pnas.org/cgi/content/full/104/41/16016 free download

http://www.pnas.org/cgi/content/full/0706977104/DC1#F5 free supporting information

- Bill Rapley – Jock asked about the Tundra exhibit at the zoo, and about how it is coming along. Bill answered that question and gave the following information, as well:

"New Tundra Exhibit at Toronto Zoo is under construction to hopefully open in early 2009. Polar bears will have 5 times the space and a new holding with a green tundra roof. Other species in the Tundra will include new exhibits for Arctic wolves, Arctic fox, snowy owl, snow geese and education themes regarding climate change including a weather station with interactives for kid's. This is the first phase of reworking the Canadian exhibits.

Paul Harpley and I assisted the Town of Cochrane, Ontario with their new quite large polar bear exhibits.

Members and friends are invited to attend the annual Christmas bird count held at Toronto Zoo on Saturday Dec 22nd. The count is organized by Paul Harpley and myself . Meet in the Zoo staff cafeteria at Old Finch at 9:00AM . Lunch

available at the zoo restaurants. A walk of the Rouge valley and along the old monorail site will be available. Should see a good mixture of species including waterfowl. Last year we had an adult Bald Eagle which is the first seen in 25years. Some TFN members also participate. Contact me by phone or E-mail if you want to attend.
Uxbridge Christmas count scheduled for Saturday 29th December by new bird club in town.
If interested in the bird group or the count please contact Derek 905 852-5432 or <dconn50@powergate.ca.
After the count the group will gather at the home in Uxbridge of Caroline Schultz of Ontario Nature..

- Sandra Eadie – Told us about an excellent new book for children, *The Turtle who ate a Balloon.* Written by Andrew Stevenson (www.awstevenson.com),Illustrated by Peter Woolcock, Audio Book CD included, Published by Bermuda Zoological Society, 2007, $28 or $29 (U.S.) (not sure, 2 sources are different). The book is 65 pages long, beautifully illustrated, and is a great adventure. The story is woven around the creatures of the Bermuda Aquarium, Museum and Zoo plus some ocean denizens--including the turtle and a whale. Although written primarily for young children, even adults enjoy the secret night-time adventures at the Bermuda Aquarium complex. There are subtle but important environmental messages woven into the story. I think if people are interested they should contact the author andrews@logic.bm or me.
- Sandra also mentioned that the comet that exploded to be seen on Earth in late October can still be seen in the northeastern skey just below Casseopia. The comet is called Comet Holmes. It was first discovered in November, 1892 by E. Holmes. It also had an explosion at that time.
- Bill McIlveen -- announced that he'd like data from Rattray Marsh for anything people have seen that has not been previously published.
- David Tomlinson – in TO, Peregrine Flacon charged a window, then another; presumably it was after its reflection.

ADJOURNMENT:
Ed Addison moved to adjourn at 9:20 p.m. and all enjoyed refreshments and discussion over them.

Jeremy Hussell's Application for membership in the Brodie Club
As part of the requirements for joining the Brodie Club, I am to inform you of my qualifications as an amateur naturalist. Not having read any previous examples of this genre, I have no idea what subjects prospective members customarily write about, nor in what style, so I'll proceed in my own way.

Since both my parents are ornithologists, it was inevitable that I too would become interested in birds. From a very young age, I accompanied my parents on the annual Baillie Birdathon (named after an founding member of the Brodie Club), where I learned to identify all the birds that can be found in southern Ontario in May. On my first Birdathon, at age two, I identified 12 species, including "robin", "duck", and "woodpecker". As of 2007, I have participated in 27 Birdathons in a row, and regularly identify ~120 species.

I also accompanied my parents to various bird observatories, where I learned the basics of migration monitoring, including extracting birds from mist nets and banding them. I've spent the most time at the Long Point, Thunder

Cape, and Innis Point Observatories, although I've visited many more. Oddly, I've never been to Point Pelee.

My interest in the natural world, once begun, didn't stop at birds. In an early phase, I wanted to become a paleontologist, and amassed a modest collection of fossils from southern Ontario. (Mostly brachiopods, crinoids, and the occasional trilobite.)

During high school I was a member of the Macoun Field Club, a naturalist club for 8-18 year olds which met once a week in the basement of the Canadian Museum of Nature and alternated between talks similar to those given to the Brodie Club, and field trips to various interesting locations near Ottawa. My comment after attending my first Brodie Club meeting: "This is just like an older version of the Macoun Club". The Macoun Club was lucky enough to have a permanent room for their collection, which includes bird skins, mineral samples, fossils, insects, lichens and extensive and eclectic library, and too many other things to list here. They also have a permanent study area in Ottawa's green belt, a frequent destination for the field trips.

Since high school my activities have shifted more and more towards computer science. My interests, though, have not shifted, merely expanded. I've continued to hike as often as possible and participate in the Birdathon every year. Recently, I arrived in Toronto to study at the University of Toronto, and my father introduced me to the Brodie Club, (David Hussell is my father, in case you didn't know, and Erica Dunn is my mother.) Ed and Rose Addison, who have known me since I was little, have been kind enough to invite me to Brodie Club meetings as a guest for the past year or so, since my father rarely attends.

Jeremy Hussell
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Raven Tales

By Yorke Edwards
Our Western Correspondent

Early one working day (so named) in early spring, I was told to drive north into a large area of recently burned forest. I had been told to see if deer were still there. We saw many that were easy to see across the flat, dark, burned up country. Late in the evening, we found a dead baby deer and decided to examine it in the morning. The next day when we went to it there was a crowd of 30 ravens that had been eating the small deer. They saw us, then flew away leaving only the fawn's skin and bones. Later, through the rest of that day, we saw no ravens, and I have never again seen ravens in a big crowd.

When we got into our house by the sea, we sometimes saw one or two ravens flying across the narrow Enterprise Channel to the Trial Islands, which are located south of our house by the shore. Their nest was in the city beside a narrow lane between two long rows of peoples' back yards. In one yard, there was a small group of big evergreen fir trees and one had a raven's nest. A few years later, I saw that a new owner had cut down those few trees in order to grow more tulips. The ravens then went a mile or two deeper into the city and made a nest in a large willow tree with its weak branches, close to a lot

of traffic. Twice in that tree, their nests fell down. The ravens then went deeper into the city and made a nest in a high oak tree, close to a fire station that serves miles of houses in all directions. Soon people saw pictures of the nest in their newspapers, then they were shown the young ones on their televisions. Many people went to see the young ones while they were standing on the edge of their nest. Then they flew away to trees by the sea, not far from the city.

Many First People in British Columbia, once called Indians, have many stories about their long past, many living by the sea for thousands of years. They have many old stories about ravens and, on their tall totem poles there is often a raven's face carved into the wood. Some of those people lived for years between the sea and the forest, both giving them good food. They have had wonderful wood from red cedar trees that the people have used to make houses, boxes, bowls, forks, canoes, paddles and their tall and well-carved totem poles. They too have many old stories about ravens, many stories both young and old. They have tales to tell about themselves, as well as about the wild animals, and often too have stories that are quite impossible, but are just said to be so. We Europeans also have many stories, like those about Santa Claus and his reindeers going everywhere on Christmas eve.

NEXT MEETING:

The next meeting will be held at 7:30 pm on December 7, 2007 in Room 432 of the Ramsay Wright Zoological Laboratories of the University of Toronto. The speaker will be Dr. Tim Johnson of the Ministry of Natural Resources. He is director of the Glenora Fisheries Station, in Picton, Prince Edward County, where he succeeded John Casselman. His subject is "Aquatic Invasive Species" with an emphasis on both the dreissenid (zebra and quagga) mussels and round gobies, and how that relates to ecosystem health.

And don't forget to bring Christmas cheer!

-30-