

THE BRODIE CLUB



ROYAL ONTARIO
MUSEUM OF ZOOLOGY

THE 1017TH MEETING OF THE BRODIE CLUB

The 1017th Meeting of the Brodie Club was held at 7:30 pm on January 15, 2008 in the Ramsay Wright Laboratories of the University of Toronto.

Chairman: Jean Iron

Secretary: Ed Addison

There were 28 members and two guests.

Guests: Charles MacInnes, guest of Ed Addison

Erica Dunn, guest of David Hussell

Regrets: Ken Abraham, Oliver Bertin, Bill Rapley

NEW BUSINESS:

- Minutes approval: Glenn Coady moved, Bruce Falls seconded, approved
- Jeremy Hussell was welcomed as a new member
- Bruce Falls said the February speaker would be Gerry DeMarco, a lawyer and graduate student of Jim Rising. The presentation will be about endangered species legislation and problems with proposed solutions.
- The February meeting will be in the middle of Reading Week. We will post somebody at the main doors on Harbord Ave. from 7:15 to 7:35 pm to make sure the doors aren't locked and members can enter the building.
- Member Jim Bendell will talk in March on his research in the Ottawa Valley.
- David Tomlinson noted the availability of information on storm water pond management.
- Ellen Larsen wrote subsequent to the meeting that The Carden Nature Festival web site is available for registrations. She asked members to encourage friends and co-workers to take a look and sign up with www.CardenGuide.com/Festival. The contact is Lou Probst, 2642 Kirkfield Rd., RR 3, Kirkfield, Ont. K0M 2B0.

SPEAKER:

Ed Addison introduced our speaker, Dr. Roly R. Tinline, emeritus professor in geography, Queen's University. Dr. Tinline is a graduate of Queen's who completed his Ph.D. dealing with the 1967-68 foot and mouth disease outbreak in the United Kingdom at the University of Bristol. Dr. Tinline has been director of the Queen's Geographic Information System Lab since 1990. He has had many cooperative disease and social service studies with municipal, provincial and federal governments in Canada. He has worked very extensively with the Rabies Research program of the Ontario Ministry of Natural Resources under the leadership of his colleague, Dr. Charles MacInnes. The title of Dr. Tinline's talk was Rabies in Ontario: Past, Present and Future.

Rabies Research in Ontario: Past, Present and Future

Summary

Positive

- Almost eliminated fox rabies
- Stopped incursion of raccoon rabies from south
- Developed an aerial vaccine baiting system
- Increased knowledge of biology of mammalian vectors
- Innovative research in genetics, ecology, new vaccines
- A focus for Canadian research and development

Negative

- Skunk rabies is persisting in small pockets in southern Ontario
- Practical success but poor underlying understanding
- Missed opportunities for commercial success
- The traditional density dependent theories on rabies are suspect
- Because of success, the rabies research team is being disbanded
- Lack of adaptive management, i.e. designing some of the work as experiments
- Only reluctant federal involvement

World Distribution

The rabies virus or very closely related forms are found throughout much of the world. Exceptions include Australia, New Zealand, perhaps part of New Guinea, Fennoscandia, U.K., Iceland, Spain, Italy and Greece.

History in Ontario

Based on a description of symptoms, the first reported case may have occurred in 1819 in Richmond, Ontario [near Ottawa]. Nothing further was recorded until a case reported in a dog in 1905 in London. Cases were occasionally reported in domestic and wild dogs between 1906 and 1945.

Epizootics of rabies in arctic foxes erupted in the arctic in 1945 and reached Ontario in 1954. There were also cases in Europe and on the eastern seaboard of North America. It entered Ontario by progressing southward down both the eastern and western shores of Hudson Bay moving from arctic to red foxes. In Alberta, rabies spilled over into coyotes. Strychnine was used as a control mechanism in Alberta. In the late 1950s, rabies spread northwest from the United States into Saskatchewan. The original invasion patterns have remained and continue to dominate.

In 1980, a strain of rabies known for decades in raccoons in Florida and southerly parts of adjacent states, appeared suddenly far to the north in West Virginia. It is believed to have been transported out of Florida in an infected raccoon taken north for training raccoon hunting dogs. This initial case spread throughout most of the northeastern United States and reached Ontario in 2000. It is now well established that raccoons cross the border on our international bridges. The raccoon rabies is presently restricted to Leeds and Grenville counties with isolated cases in the islands of the Kingston area.

The raccoon rabies virus is very different from the arctic fox strain that is in red foxes in Ontario.

Control of Rabies

Alternatives:

- Do nothing
- Change the environment or
- Reduce susceptibility through
 - De-population of vectors
 - Vaccination
 - Introduce competing diseases [e.g. mange, distemper] or
 - Combinations of the above.

It is legitimate to question the need to try for control. There are very few human deaths and most deaths are associated with bat rabies; not fox, skunk or raccoon rabies. For example, whereas Asia may have greater than 50,000 rabies deaths in humans/year and Africa about 30,000/year, there are only 1-3/year in North America.

The cost of domestic animal vaccination is about \$1 U.S./person/year. In Ontario, livestock compensation peaked at approximately \$2 million/year. Post-exposure treatment of humans costs about \$500-\$1000/ exposed human.

Roly noted that the number of post-exposure vaccinations closely followed the number of rabies cases in wildlife from 1955 to 1965. Thereafter, he noted a drop in the number of vaccinations and speculated that perhaps this was because humans were realizing that rabies wasn't quite the threat that we used to think it was. By 1980, the number of post-exposure vaccinations and cases of rabies in wildlife were again in synchrony. There are suggestions that the replacement of the duck embryo vaccine with a more efficient human-based vaccine may partially explain this pattern. Despite the recent major drop in rabies cases in wildlife, post-exposure treatments remain fairly high. Roly wonders if this reflects an inherent "fear factor," particularly as it relates to the severity of bat rabies in humans.

The rabies research group tested a wide variety of bait types and delivery systems. The exceptional techniques developed and used in Ontario have been exported to the United States. There has been the need to adapt a few of the techniques. For example, the baits needed a different covering [a dog food polymer] in Texas where the heat would lead to melting of the baits as used in Ontario.

Developments in bait design continue. Ontario's most recent bait is smaller and uses live adenovirus.

Ontario has dropped 66 million baits at a cost of \$1.50/bait. This includes the research, development and delivery costs. Baits are dropped from DeHavilland Twin Otter aircraft flying at low levels. The cost was \$950/hr excluding the cost of baiting crew. About 6000-7000 baits/hr were dropped. The research team developed a system of delivery that

allowed them to know the density of baits delivered within a 2-3% error. This allowed for much increased understanding of the efficiency of various delivery practices. The baits included tetracycline, which upon consumption gets laid down in bony tissue within the body. Obtaining carcasses from trappers and grinding thin sections of the teeth allowed identification as to the proportion of targeted potential rabies vectors that did indeed consume baits. Blood samples from trapped animals allowed evaluation as to how many of the potential vectors had been successfully vaccinated and hence eliminated as sources for spread of the disease.

To test their ability to eradicate rabies, the group chose an area near Ottawa in eastern Ontario because it was an area where reintroduction of the disease would be impaired by the Ottawa and St. Lawrence Rivers and there was an area north of Kingston that had few rabies cases and could be used to build a wall against ingress of the disease from the west. They also chose to vaccinate areas when the disease was low in its cycle. It is generally expected that 60-70% of susceptible individuals have to be vaccinated to achieve control. However, the group could only achieve vaccination rates of about 50%. Rabies was effectively eliminated when baiting was conducted when the disease was low in its cycling occurrence. Almost all fox rabies is now gone from eastern Ontario. The group had identified about 13 separate geographic cells somewhat isolated from one another and within which they could direct specific control efforts. Fox rabies is now uncommon throughout southern Ontario.

However, bat rabies persists and there are pockets where skunk rabies remains endemic despite control efforts. Interestingly, one of these pockets of persisting rabies in skunks is in Perth County, an area now known to have a great diversity of genetic sub-types of the virus. Has the virus evolved in a distinct manner in this area?

Eastern Ontario has a different genetic sub-type of rabies from the rabies south of Georgian Bay. At present there are four distinct subtypes of the disease recognized in southern Ontario.

The Future

Control of bat and skunk rabies remains a challenge. Should vaccination be attempted or perhaps de-population?

Another question posed by Roly is “Can the curse be worse than the bite?” He explained by demonstrating what has occurred with baiting against raccoon rabies in the area of the Cape Cod peninsula and what the result of that might be. The movement of rabies onto the Cape was not stopped by a wall of vaccination near the base of the peninsula. Assumptions were made that a canal would preclude movement of raccoons onto the peninsula but the raccoons at Cape Cod behaved just as they did when as they re-introduced raccoon rabies into Ontario – raccoons crossed the bridges. The models used to predict further outbreaks of rabies are suggesting that the virus will become embedded and difficult to eliminate within the zone of vaccination. Perhaps the vaccination in that area will in the long term lead to maintenance of the disease! In this case the ‘cure’ is potentially worse than having let the disease run its course on Cape Cod.

QUESTIONS:

- Ellen Larson noted that all of the identified geographic cells were based on fox rabies cases and not on bat and skunk rabies cases. The reason for this is that while there was a sufficient abundance of fox cases to do time series analyses, there were too few bat and skunk cases to be able to delineate discrete cells.
- Why did there appear to be an area west of the Niagara Escarpment that was difficult to control? There are no physiographic controls west of the escarpment. For example, there are no constraints such as the Ottawa and St. Lawrence Rivers. More potential vectors can move around more.
- Are there samples of the virus from long ago that can be used for genetic typing of past rabies viruses? Rabies virus survives well in frozen tissue and not in warm and deteriorating tissues. There are no freezers that had fox carcasses stored in them for a number of decades.
- What happens when a vaccinated animal dies? Won't rabies re-infect the area? Life expectancy of a fox in Ontario is about three years. As a result, an area needs to be walled off and the virus eradicated in a hurry. Death of vaccinated individual foxes does lead to increased vulnerability of the area to re-infection. If necessary, the procedure is repeated.
- Why are the results of this study not better known? Some of the principal investigators want to write a book about the study. However, the Canadian Food Inspection Agency [the former Agriculture Canada] has stalled the process because they want to maintain control over what gets said about rabies, one of the federally reportable diseases.
- Once animals are vaccinated do we not end up with a much higher density of foxes due to increased survival and would this not promote more rabies? Many scientists claim that the spread of rabies is dependent on the density of the vector species. However, Charlie MacInnes and Roly Tinline have much evidence to suggest otherwise and are hoping to write a paper on this matter. The low density of vectors in the Dundalk Highlands, yet continuing persistence of rabies there, is evidence that density dependence is not a serious consideration in that area.

The speaker was thanked by Jim Rising.

NOTES AND OBSERVATIONS:

- Ron Tasker noted that in writings about preparation for an early tour to Egypt had some connection to the Brodie Club. [Perhaps this connection was with Dr. Brodie himself –secretary's comment].
- Jock McAndrews noted more acorns in the Beaches area a year ago last fall than last fall when there were none despite the summer weather having been suitable for setting fruit. David Tomlinson noted that a year of massive production does affect the production the subsequent year and that he noted this to be true in Aurora in the same years mentioned by Jock.

- Jock mentioned a comet striking Ontario about 13 thousand years ago and that it may have extinguished mastodons and other large mammals. Magnetite, apparently indicative of comets, has been identified upon a tusk of a mastodon collected in southern Ontario.

- Harry Lumsden noted 17 Pine Grosbeaks in his garden for several weeks and that they were feeding on the seeds of crab apples, discarding the flesh.

- David Tomlinson noted that this was good year for monarch butterflies. He noted a high degree of predation of monarch butterfly eggs on certain plants but that this year there was low predation of eggs on one specific hybrid that also supported a very large density of aphids. He was wondering if the aphids helped conceal the presence of the butterfly eggs, hence reduce predation on that one individual plant.

- Helen Juhola reported House Finches singing in their garden near Eglinton Avenue during the warm period. She also observed two White-throated Sparrows and a Peregrine Falcon.

- Glenn Coady summarized a mid-winter waterfowl survey that has been occurring for years. Mute Swans, Trumpeter

Swans, Pied-billed Grebes and Greater Scaup were at all-time highs.

- Fred Bodsworth noted the rapidity with which hibernating moths appeared with the onset of the January thaw.

- Jim Bendell noted that grey squirrels can be very effective in cleaning up every acorn in an area. Jim and Yvonne saw a Bald Eagle near Kaladar on the way to the Brodie Club meeting. They have Pine Grosbeaks in the Ottawa Valley. Hairy Woodpeckers appear to be storing seeds.

- Charlie MacInnes noted that his Hairy Woodpeckers flick large numbers of sunflower seeds off the feeder until they find a seed without a husk.

- Ed Addison noted that for many years the Hairy Woodpeckers near his brother's home at Kakabeka Falls have wedged sunflower seeds one at a time within a crack in a wood pillar and then pecked at them. As they broadened the crack they kept moving down the post to where the seeds could be wedged.

- Ed offered a photograph taken on 8 January of five lynx crossing Lake Shebandowan [west of Thunder Bay].

- Ed Bousfield couldn't make the meeting, but he commented later by email. Please feel free to mention on my behalf, he wrote, that *Gammarus tigrinus* (mentioned at the last meeting in the paper on the round goby), is an omnivorous amphipod that is:

- (1) native to North America, not introduced by shipping from Eurasia;
- (2) occurs normally in low brackish (tidal fresh water) portions of estuaries of the Atlantic coast of N. America, E. Canada to Florida;
- (3) may be spreading into the upper St. Lawrence system possibly because of recent lower water levels and increasing salt content of the Great Lakes, and an ability to compete with its smaller freshwater counterpart, *Gammarus fasciatus*.



A much more serious threat would be invasion of the Great Lakes system by the large, carnivorous Pontocaspian *Dikerogammarus villosus*. In the fresh waters of Holland and Germany, this voracious amphipod is now in the process of eliminating virtually all other types of stony bottom arthropods.

Jean Iron moved to adjourn and all enjoyed refreshments and discussion.

NEXT MEETING:

The next meeting will be held at 7:30 pm on February 19, 2008 in Room 432 of the Ramsay Wright Zoological Laboratories of the University of Toronto. The speaker will be Dr. Jerry DeMarco, who will talk on Endangered Species Protection in Ontario. DeMarco was recently a graduate student with Jim Rising at UofT, working with endemic species. He is an environmental lawyer, who was involved in drafting the new Endangered Species Act in Ontario. He is a good speaker and is well aware of the issues surrounding such legislation.

The meeting will be held in Reading Week so we will post somebody at the main door on Harbord Ave. from 7:15 pm to 7:35 pm to make sure the doors are not locked and members can get in.

Member Jim Bendell will speak at the March meeting instead.

Window Watching

By Yorke Edwards

Our Western Correspondent

I watch birds daily while sitting by our window in Victoria, B.C., looking east along a seashore of tiny round pebbles. Far to the east, we look across the sea to a long line of flat lands in the United States, which have a long line of big mountains beyond the sea. Looking south, we see another long flat land, also in the United States, much closer, with another long row of mountains behind them, big and high with snow on some of their tops that stay white all summer.

Looking through our windows late in winter, we see the usual birds:

Double-crested Cormorants 4

Pelagic Cormorants 4

Canada Geese 9

Surf Scoter 1

Harlequin Duck 9

Glaucous-winged Gull 10

Thayer's Gull 150 and

Bald Eagle 1.

They are there all winter, sometimes getting cool but seldom freezing.

Birds are often in our garden in winter, the usual Robins, House Sparrows, House Finches, northwestern Crows and Starlings.

Looking seaward in winter, I see dozens of

Thayer's Gulls that come from islands near the North Pole and also Buffleheads, American Wigeons, Mallards, Red-breasted Mergansers, Hooded Mergansers, Surf Scoters and Harlequin Ducks that are most-often seen daily, except through early summer. They go across the strait and up the U.S. rivers.

Through the summer, birds seen near our windows, those most near with eggs and young are Starlings, House Finches, Robins, northwestern Crows, House Sparrows, Barn Swallows, White-crowned Sparrows, Black-capped Chickadees, Fox Sparrows, Bewick's Wrens, Anna's Hummingbirds, Rufous Hummingbirds and Golden-crowned Kinglets.

Mammals we most often see are the northern and California sealions through most winters, harbour seals all year in dozens and, several times, more than a 100 of them on the distant island's shore.

Other mammals seen yearly are otters, minks and, once, a big northern elephant seal rather far beyond the shore. We often see an otter going by, usually swimming and running along the shore. Often seen too are orcas (whales) passing by, probably going to eat fish by a small island where they attract crowds of people who watch them from dozens of boats.