

THE
BRODIE
CLUB



ROYAL ONTARIO
MUSEUM OF ZOOLOGY

THE 1,050th MEETING OF THE BRODIE CLUB

The 1,050th meeting of the Brodie Club was held at 7:30 pm on Tuesday, October 18, 2011 in Room 432 of the Ramsay Wright Laboratories of the University of Toronto.

Chair: Ed Addison

Secretary: Rose Addison

The meeting was attended by 20; 19 members and 1 guest.

Roll Call:

Present: E. Addison, R. Addison, Aird, Bryant, Dunn, A. Falls, B. Falls, D. Hussell, J. Hussell, Iron, A. Juhola, H. Juhola, Larsen, McAndrews, Pittaway, Reading, T. Rising, Speakman, Tasker.

Regrets: Abraham, J. Bendell, Y. Bendell, Bodsworth, Bousfield, Crins, Currie, Curry, Eadie, Gray, Lumsden, Machin, Norm Martin, Norma Martin, Rapley, Riley, J. Rising, Seymour, Slessor, Sutherland, Strickland, Thorpe, Tomlinson, Young.

Guests: Sharon Hick, guest of McAndrews.

Minutes:

Minutes for September were accepted with no changes.

Elections:

Annual elections were held and the following slate was approved:

Secretary: Rose Addison will continue as coordinator of volunteer recording secretaries who will each take minutes for one or two meetings during the year. These are Ed Addison, Paul Aird, George Bryant, Ricky Dunn, Trudy Rising and Kevin Seymour. More volunteers would be very welcome.

Treasurer: Aarne Juhola.

Membership: Bill Crins, Ann Falls, Kevin Seymour and Trudy Rising.

Program: Bruce Falls, Ed Addison, George Bryant, Hugh Currie, Jim Rising.

FON representative: Ed and Rose Addison.

Archives: Alexandra Eadie and Kevin Seymour.

Field trip: A new committee was formed last year to give some advance thought to the annual picnic and field trip and bring proposals to the club. George Bryant, Jean Iron, and Trudy Rising agreed to form this group. We did not discuss this committee at the October meeting.

Announcements and New Business:

- The membership committee moved that members who had been unable to attend any of the BRODIE Club meetings during the previous year be moved from Active membership to Corresponding membership. If, and when, any of these members is able to attend meetings, their Corresponding membership will be reinstated as an Active membership. Carried. Rose Addison to contact these members.
- Bruce Falls would like to form a small group of Club members to meet with Lock Rowe to discuss some sort of connection of the BRODIE Club with the Department of Ecology and Evolutionary Biology (E.B.B.), U of T.
- Ricky Dunn reported that she has gathered some mini-bios from past minutes but that they have not been easy to access and that there is a great deal of variation in style and content. She has made a template and it will be sent out for members to complete. This template could be provided to potential new members.
- Bruce Falls announced that the programme committee has a list of potential speakers for Jan-May, 2012. Speakers will be announced when finalized. Suggestions for speakers are always welcome. Dates and speakers for the remaining fall meetings:

Nov. 15	Jack Imhof, Trout Unlimited Canada	Navigating the Biodiversity of Canada's River Corridors: An Exploration
Dec. 13	Brock Fenton, UWO	Bats

- Sharon Hick had found a book titled Art in the Wild at the University College Book Sale and made it available to any member for a donation to the Club.
- Ron Tasker informed members of the memorial service held on Cape Breton Island for long-time BRODIE Club member, Charlie Lennox. (See minutes 1043, Dec. 2010) Ron circulated photos.
- Fred Bodsworth is still in hospital...His daughter Barbara sent the following information "...he is now in the rehab section.... lots of space as he is in his own private room and it is gorgeous. There is a lovely terraced common room with many plants and lots of space for him to welcome visitors. He would love to see some of his birding friends. It is indefinite how long he may be there. There is a maximum of 30 days and he has been there about one week. So perhaps you could spread the word that he would welcome visitors now that he is feeling so much better." His room number is J 502 of the Toronto East General Hospital.

SPEAKER



The speaker, Dr. Jeremy McNeil, was introduced by Ed. Addison. Jeremy completed an undergrad program at the University of Western Ontario, moved to Carolina for a PhD., was a professor at Laval for 30 years and is now the Helen Battle Visiting Professor in the Department of Biology at UWO. His awards and distinctions are varied and global; he sits on many committees and editorial boards. He was honoured as the 2006 Governor General Lecturer of the Royal Society of Canada and with The Fry Medal by the Canadian Society of Zoologists in 2008. He lectures to all ages and is acknowledged for his contributions to increasing public awareness.

Before his presentation, Dr. McNeil advised club members of the First Annual Quimby F. Hess Lecture, *Sentinels on the Wing*, to be held in Lecture Hall 110, Ramsay Wright Laboratories on Saturday, November 19, 2011 at 1:00 pm. Brodie members are welcome.

“Peter Hall, Research Associate at the Canadian National Collection of Insects, Ottawa, and co-author of *The Butterflies of Canada*, will present an assessment of the health of Canada’s butterfly populations, focusing mainly on Ontario butterfly species. Peter is author of a recent report published by NatureServe Canada called *Sentinels on the Wing: the Status and Conservation of Butterflies in Canada*. Based on this report, his talk explores which species are declining, which species are increasing and the many factors affecting the status and trends of butterfly populations. To end the presentation, Peter will outline what can be done to better encourage and protect our butterflies.

This is the inaugural event of the annual Quimby F. Hess lecture series. The public is to be invited, and so the event is being held in a large, 150-seat lecture hall. Quimby’s children Robert Hess and Jane Hess will attend and one of them will say a few words about his life. After the talk, there will be a reception for the lecturer, TEA members and guests.”

In plant/insect interaction, natural compounds can provide information for both plants and animals. A common example is a bee gathering nectar by using both visual and olfactory clues. The plants send signals which the bee can interpret and use to locate a source of food and the plant is pollinated.

In insect/insect interaction, chemicals again can be involved. McNeil studied an example of this with the Tomato Hornworm as his PhD topic. A parasitoid wasp uses odour to find the Tomato Hornworm, in which it lays its eggs. The tomato plant can change its odour which will “hide” it from the Hornworm.

McNeil presented aspects of the life cycle on the Monarch butterfly, *Danaus plexippus*, with connections to chemical compounds. The female Monarch is very selective in choice of location of oviposition. She lays single eggs on various species of milkweed plants. She may be able to detect the milkweed chemically through smell and some chemical sense (similar to our tongue) and perhaps also with the ovipositor.

The larval instars are striking in appearance – multi bands of black, white and yellow. This aposematic colouration is a strong signal to predators to take care ... ‘I’m not good to eat’. This signal is beneficial to both caterpillar and potential predators. The larvae feed only on milkweed. Milkweed sap is a very sticky, milky substance which gums up the mouthparts of insects. The instars use a technique termed “trenching” by making a cut in the central leaf vein on the proximal part of the milkweed leaf. Trenching blocks the flow of latex and reduces the amount of latex consumed when larvae eat the more distal part of the leaf. The sap contains a type of cardiac glycoside, a substance that affects heart function. As the larvae feed on the leaf, they store glycosides in their body. The instars have a very high tolerance for this chemical and it is this stored compound that makes them so unpalatable to predators. The latex is a form of physical defense for the milkweed plant and the glycosides a chemical defense... both of which the Monarch caterpillar copes with beautifully. McNeil noted that all other insects which feed on milkweed are also very colourful... again, examples of aposematic colouration.

After feeding to full size, the J-shaped larvae metamorphose into pupae and emerge as adults to complete one full generation. It is the adults of the second generation here which migrate south in the late summer and fall- they are biologically and behaviourally different

from those emerging in early summer. McNeil has been observing a pupa which had been parasitized by a late parasitic wasp. As of the meeting, the butterfly had not emerged although the wings were getting darker suggesting development was still occurring.

As the days shorten and temperature drops, Monarchs from Canada and the United States east of the Rockies head south, all to converge on several small areas in the County of Michoacan (about 100 km NW of Mexico City) in Mexico. How do they know when to go? A certain proportion seems to respond to the decrease in temperature while the other responds to the changes in daylight. It will be interesting to see if climate change results in different timing... as the days get shorter but don't get cool as quickly (*Note: a distance of 1500 to 5000 km is covered in about two months, depending on temperature and wind conditions.*)

Before his first trip to Mexico, McNeil went through the government to obtain the required papers to visit the sanctuary and conduct research. Upon arriving near the sanctuary, he learned that the locals of the small villages at the base of the mountains expect (perhaps require is a more accurate word!) all visitors to hire guides and rent horses to visit the overwintering colonies. A thriving economy is developing around tourism to view the roosting areas of the Monarchs. (*The Monarch Butterfly Biosphere Reserve is a UNESCO World Heritage area which protects a mountainous area of more than 139,000 acres with oak, pine-oak, pine, and oyamel fir forests. The Reserve contains three core zones where human productive activities are not permitted and two surrounding buffer zones where sustainable use is authorized. Low altitude areas have been drastically modified by agriculture and the creation of rural and urban population centers. A research facility has been built in the Sierra Chincua. www.worldwildlife.org*)

Jeremy described the experience of first seeing the huge aggregations of butterflies hanging from the branches of the fir trees. As the sun warmed the insects, they fluttered their wings and took flight. Jeremy described the sound of their wings in flight and the sight of countless butterflies filling the air to be ethereal and almost magical.

The roosting Monarchs survive on masses of fat reserves, but require water to avoid desiccation. On sunny days, their bodies warm sufficiently that they can fly and collect water from melting frost, seeps, or streams. If clouds move in quickly, the Monarchs cool down, and may be unable to get back into the trees resulting in death. A serious frost can wipe out large numbers.

There are four or five species of rodents and a couple of species of birds that will feed on Monarchs. They split the abdomen and eat the contents as abdomens contain less of the glycosides. The Black-headed Grosbeak builds up a tolerance to the toxin. (*Over time, overwintering adults become less poisonous, thus making them more vulnerable to predators. In Mexico, about 14% of the overwintering Monarchs are eaten by birds and mice.*)

Monarchs are threatened by some agricultural practices. Sprays used to control pests on crops may impact migrating and/or feeding Monarchs. For some time, it was thought that transgenic corn pollen would cause feeding caterpillars to die. This arose from research by John Lucy at Cornell and the research received a lot of press. McNeil described this as "the

worst case scenario” and that in reality caterpillars move if food is not suitable. A later long-term study by Mark Sears at Guelph found no evidence that transgenic corn pollen is a problem. This paper was published the day that the two World Trade towers collapsed in New York. The collapse of the towers filled the news and the results of the Sears paper did not receive attention.

Another human threat to Monarchs is the degradation of roosting sites. The locals, in their own way, have organized a system of limiting access and requiring visitors to hire guides to visit the monarchs. They do collect wood from the area for cooking and warmth, but it is branches which have fallen. Rather, it is big business, with their large logging machines that do a great deal of destruction by cutting large trees resulting in removing roosts and changes in the microclimate.

The mystery of where the Monarchs went in winter was solved by Fred Urquhart at U of T. He tagged individuals and found that a small proportion marked here in Toronto reappeared the next year. However, the majority go to Mexico, return as far as Texas, reproduce there and it is that generation that returns here.

How do Monarchs know where to go and how do they orient? McNeil described an experiment by Barrie Frost that tracked the direction of flight. Monarchs were attached to a light filament and a fishing swivel. Direction of flight was recorded during control, overcast, and time shift conditions. It was demonstrated that Monarchs appear to use a sun compass, flying SW, compensating for the time of day, and are not affected by magnetic compass. (Experiment described in the Proceedings of the National Academy of Sciences in “Virtual migration in tethered flying monarch butterflies reveals their orientation mechanisms” <http://www.pnas.org/content/99/15/10162.full.pdf>)

McNeil and other researchers have been working on another question relating to migration- ‘How do they know when to stop?’ Visual signs on buildings, vehicles, signs advertise to humans that they are at the location of the Monarch roosts. As Monarchs arrive in the area of the roosting sites, they will circle around a peak, as if sensing for some type of signal. Are there visual cues? Are they searching for a chemical signal riding on thermals up the mountain side? If they are, from where would the chemical signal come? How do the Monarchs detect it?

A paper written in the 1970s on the use of Fenitrothion against Spruce budworm provided an idea. Fenitrothion was a replacement for DDT as it is non-systemic and non-persistent. However, it was found that a detectable build-up accumulates over the years as the pesticide is absorbed into the needles and binds with the waxes.

McNeil wondered if a similar thing could be happening in the Oyamel fir forests of Mexico. Could small amounts of glycosides excreted in the urine of roosting Monarchs penetrate into the waxy covering of the Oyamel fir needles? Over many years this chemical could accumulate in the needles and perhaps be detected by Monarchs. McNeil devised “the clothes-line experiment”. Branches of Oyamel were collected; half with waxes from a control tree, half with waxes from a roost tree. Flying butterflies selected the branch with waxes from roosting trees 90 % of the time. Further studies need to be

conducted to determine if glycosides excreted in the urine of roosting Monarchs is concentrating in the waxes of the needles of the Oyamel firs.

Fred Urquhart had put out flat pinned Monarchs and found that open static wings did not visually attract flying butterflies. However, there are UV spots on the wings and on moving wings these spots may be a visual cue which takes over to guide insects to the roosting trees once the olfactory cue has brought them in.

Another question is why do the Monarchs leave Mexico and fly north? Summers in Mexico are too hot and the winds too strong for the monarchs to reside there year round. It is known that hot summers cause sterilization. In fall, the shorter day length causes a delay in reproduction. In spring as the day length increases, there is a hormonal change and the reproductive organs start to develop. The insects become sexually mature in about a week. It may be that they then interpret chemicals differently.

McNeil plans to return to Anganguero this November along with a chemist hoping to further investigate some of the ideas on the role of chemicals in migration.

QUESTIONS:

Q. Dunn: What distance can caterpillars move?

A. From personal observation they will move several hundred metres in search of food.

Is there a certain time of day that they move?

My guess would be during daylight hours as they are meant to be seen- that way they avoid accidental ingestion by a nocturnal animal that couldn't see their aposematic colouration.

Q. McAndrews: Is it correct that the common Milkweed is not a native?

A. Correct... it thrives in disturbed soils.

Bryant: Asclepias syriaca is the common milkweed.

Monarch butterfly populations are affected by disturbance along roads and in cornfields where milkweed prefers to grow. Monarchs will feed on other Milkweeds...there are five others which are not common.

Ed Addison noted Monarchs observed in Northern Ontario and wondered about food.

McAndrews: Monarchs will do well on decorative milkweed species but if given the option of common Milkweed they will select it.

McNeil: proposed that selection could be made by levels of glycosides.

Q. Tasker: Monarchs are often observed along lake shores. Are lake shores preferred routes or are insects blown there?

McNeil: Moths take off in lower jet stream air currents and can get carried well off course. Examples are tropical moths found in unusual locations after strong storms. Monarchs, on the other hand, fly in a fixed direction and do not want to get off course. They will land if they are being blown by strong winds.

Q. Tasker: How did Monarchs get to New Guinea and New Zealand?

McNeil: Those Monarchs are non-migrants, perhaps arriving by freak winds. Those in UK have likely been blown off course by weird wind storms. We have had Monarchs arrive here in April, the result of atypical weather patterns. They are doomed as there is no suitable food source available at that time of year.

Q. Reading: Do you have any information of Monarchs in Cuba?

McNeil: Yes. There is a totally different Milkweed in Cuba.

Q. B. Falls: Is there much variation in glycoside levels in Monarchs and in the different Milkweeds?

McNeil: Yes and also in pathogens. Chemistry controls other aspects.

Q. Bryant: On your map showing migration routes, the line between Florida and Mexico had a question mark. Are there any Lepidoptera that fly over water? Have any been observed from oil rigs?

McNeil: Monarchs have been observed on oil rigs and islands. It is not known yet whether they have been blown there or have selected to fly over water. It is known that Monarchs fly during day; rising up on thermals, then gliding as it is important to save fat reserves. On the other hand, there are records for moths traveling 3000 km in three days, flying over water. They fly during night and do not depend on prevailing winds and thermals.

The speaker was thanked by Paul Aird. Paul commented on the remarkable clarity of the presentation and the breadth of information shared. He recounted an early experience with Milkweed when he collected pods for filling of life jackets during World War 2.

NOTES & OBSERVATIONS

Jock McAndrews told of how Sharon runs the dogs by an osprey nest and noted that the dog often finds a piece of fish from the nest on the ground and will eat it. Jock mused whether this would be a natural feeding site for scavengers. He surmised that it should be possible to test this idea by mounting a motion-sensitive camera with infra red film on the nest support post and wondered if this was common practice.

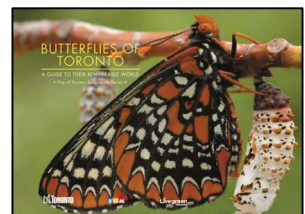
Ed Addison noted that a friend sets out deer carcasses in winter. Using a car battery and a motion-sensitive camera he was able to acquire a photographic catalogue of scavengers.

Jean Iron and Ron Pittaway went to a newly released movie “The Big Year”. It is based on the true story, (told in the book by the same name written by Mark Obmascik), of three competitive birders in North America in 1998. The characters are portrayed by Steve Martin, Jack Black and Owen Wilson. Jean recommended it to club members commenting that it moves well, is lots of fun, takes you to some good scenery and will remind you of birders you may know. Ricky Dunn reported that 48 attendees of a meeting in BC early in the month had gone to see the movie together.

Ed Addison reviewed a book, The Humans who went Extinct: Why Neanderthals died out and we survived written by Clive Finlayson.

George Bryant noted that the convenience store at Foot’s Bay on Hwy 169 is a place to see bears. He has seen ten Black Bears at one time at this location.

Ron Pittaway showed a recently published soft-cover book, Butterflies of Toronto: A Guide to their Remarkable World. It is funded by the ROM, the City of Toronto and Livegreen Toronto and is available free of charge at Toronto libraries. Ron noted that William Brodie is mentioned in this publication.



Helen Juhola moved adjournment. Seconded by Bruce Falls. The meeting was adjourned at 9:20 and all enjoyed refreshments and discussion.

CORRESPONDENCE

Jock McAndrews e-mailed the following information for inclusion in the minutes:

- "Monarch butterfly adults feed on nectar from various plant species, which accounts for live specimens seen in northern Ontario beyond the range of milkweed.
- Larvae successfully feed only on the perennial milkweed. There are three common species in Ontario: butterfly weed (*Asclepias tuberosa*) of sandy soils, swamp milkweed (*A. incarnata*) of wetlands and common milkweed (*A. syriaca*). Eggs deposited on black swallow-wort (*Cynanchum louiseae*) hatch but the larvae die.
- Common milkweed is a widespread and persistent weed of disturbed habitats such as fields, pastures and roadsides. Because it is common on disturbed habitat, it follows that the monarch butterfly population has much increased in the past several centuries of human-caused disturbance.
- Monarch larvae may become poisoned when they eat milkweed leaves laden with pollen of genetically modified corn."

Woodson, R.E. Jr. 1954. The North American species of *Asclepias* L. *Annals of the Missouri Botanical Garden* 41(1):1-211.

George Bryant provided the following "Monarch trivia":

- Monarchs roost in Oyamel Fir (Sacred Fir) *Abies religiosa* at high altitudes in Michoacan state
- "Transgenic" = genetically modified
- Cranberry Fruitworm (*Acrobasis vaccinii*) is a Pyralid moth
- Monarch adults have been found which make a complete round trip
- Monarch caterpillars can travel 100s of metres
- Lower surface of Monarch wings fade from bright to pale orange over several months

Martin McNicholl sterna@shaw.ca sent the following e-mail:

In case Brodie Club members who do not belong to the American Ornithologists' Union are interested in the history of Alberta or B.C. natural history and/or nest record schemes in North America, I am forwarding the attached memorial to Timothy Myres, who introduced nest record schemes to North America. Feel free to file it in the Brodie Club archives or distribute it to members, whichever seems appropriate.

(Memorial is attached to e-mail minutes.)

NEXT MEETING

The next meeting will be held Tues., Nov. 15 at 7:30 pm in Room 432 of the Ramsay Wright Zoological Laboratories. The speaker will be Jack Imhof, Trout Unlimited Canada. Imhof's talk is titled "Navigating the Biodiversity of Canada's River Corridors: An Exploration".

Please note December meeting is Dec. 13 (second rather than third Tuesday.)