THE BRODIE CLUB

Established 1921

Website: http://thebrodieclub.eeb.utoronto.ca/

THE 1,078th MEETING OF THE BRODIE CLUB

The 1,078th meeting of the Brodie Club was held on Tuesday, 18 November, 2014 in Room 432 of the Ramsay Wright Laboratories of the University of Toronto.

Chair: Kristin Martyn
Secretary: E. Addison

The meeting was called to order at 7:40 pm and was attended by 35; 28 members and 7 guests.

Roll Call:

Present: E. Addison, R. Addison, Aird, Bertin, Bryant, Carley, Crins, Currie, Daniels, Dunn, A. Falls, B. Falls, D. Hussell, J. Hussell, Iron, A. Juhola, H. Juhola, Kotanen, Machin, Martyn, McAndrews, Pittaway, Rapley, J. Rising, T. Rising, Speakman, Sutherland, Zoladeski

Guests: Steve Rone and Wendy Dey, guests of Risings; Janet Bertin and Peggy Haist, guests of Bertin; Terence Chang, guest of E. Addison; Cylitia Guy, guest of Kotanen; Sharon Hick, guest of McAndrews.

Regrets: Abraham, Beadle, Bousfield, Curry, Dunham, Larsen, Obbard, Seymour, Slessor, Strickland.

Minutes:

Minutes of the previous meeting were accepted as circulated (T. Rising/R. Addison).

Several errors in the distributed version of the October minutes have been corrected in the archived document. Names of some of the animals mentioned were fixed (White-collared Manakin, Black-bellied Wren, Coatimundi, Bertin). The Clay-colored Thrush is the national bird of Costa Rica, not the Resplendent Quetzal. Iron and Pittaway sent regrets. The Secretaries apologize for errors, and appreciate the sharp eyes of members in correcting the record!

Committee Reports:

Program:

B. Falls reminded members that the speaker at the next meeting, which takes place December 16, will be Brent Patterson of the Ontario Ministry of Natural Resources and Forests. Brent will speak on "Towards science-based management of wolves and coyotes in Ontario". Spencer Barrett of the Ecology and Evolutionary Biology Department at U of T will speak at the January 2015 meeting on "Plants, Sex and the Wild".

Website:

Ricky Dunn mentioned a diversity of opinion among about 20 club members as to what items on the website should be open to the public. She presented 3 options: all pages public (excepting member list and bios), all private, or a middle ground. Following discussion, members approved the first option.

New Business:

Ricky Dunn reported availability of portable microphones (about $65) that could be used by speakers. Members approved purchase of a microphone.

Rose Addison received from Bev Scott's son a card of appreciation and a biography of Bev Scott's life that will be lodged in the club archives.

SPEAKER:

E. Addison introduced Chris Guglielmo. Chris received his undergraduate degree at New York University, studied interactions between ruffed grouse and their food during M.Sc. research at University of Wisconsin, Madison and became interested in migration while studying shorebirds during his Ph.D. work at Simon Fraser University. Chris is presently a professor in biology at the University of Western Ontario, London.

"The Physiological Ecology of Migration in Birds and Bats"

Chris opened his talk with a video clip of close-up views of a wood thrush flying within a unique research tool at Western. The video clips were made by Songbird SOS Production which has based their movie on Bridget Stutchbury's book on bird declines. "Songbird SOS" is scheduled for future release.

Chris' research is directed towards understanding the physiology of migration with a focus on energy, fuel and water balance. In some birds migration can consume 50% or more of annual energy consumed. The energy demands are intense and instantaneous, and basal metabolic rates can be elevated eight times for as much as a week.

Refueling is energetically very expensive and varies among species and sites. Understanding refueling costs/opportunities is important in management of refueling sites.

Bar-tailed Godwit provide an extreme example of the demands of long distance migration. A tagged individual travelled 6300 miles from New Zealand to Korea (17-25 Mar), refueled for a month, flew 4500 miles from Korea to Alaska (1-6 May), and then spent up to 9 days flying 7200 miles back to New Zealand (30 Aug-7 Sep).

Energy

Chris identified contrasts in production and use of energy between land mammals and migrating birds. In mammals, fat can be an efficient source of energy for activities with low demand activities such as walking. Fat can provide 60% of energy needs for low demand activities in mammals but the more intense the form of exercise the lower the contribution of fats. Mammals use carbohydrates to fuel intense activities. However, carbohydrates get used up quickly.

Migrating birds, on the other hand, cannot rely on carbohydrates because the intense exercise of migration is sustained over long periods. Alternatively, metabolism of fat contributes as a source of energy. This can lead result in up to 50% weight loss of birds during migration. Migrating birds also metabolize protein. In garden warblers that must cross the Sahara, the muscles of the body shrink about 25% and the alimentary tract tissues (e.g. gizzard and intestines) may lose 50% of their mass. There are two benefits of metabolizing protein. Firstly, it produces some glucose that offsets the

loss of glucose to migratory exercise, hence preventing hypoglycemia. Equally important, a bi-product of metabolism of protein is the production of water. Without this source of water, migrating birds would become dehydrated and would have to make many more refueling stops to drink.

Thus protein metabolism during migration has advantages for birds. However, there are consequences that require a delicate balance among metabolism of various tissues for energy. Saving protein is essential in order to avoid weak muscles that would impair exercise. Additionally, absorption of parts of the alimentary tract increasingly limits the efficiency to refuel at stopovers. The gut must be re-established to its efficient form before the bird can regain general body mass.

Chris introduced us to some stunning equipment and techniques that are present at Western and that can identify these physiological strategies used during migration. Chris is one of a group at Western working in an "Advanced Facility for Avian Research". The group has built a hyperbaric wind tunnel into which birds can be placed and their migration can be studied under a wide variety of conditions by changing air pressure (="altitude," up to 7000m), relative humidity (mimicking migrations over deserts/oceans, etc.), temperatures (-15C to +30C) and wind speeds. This equipment is complemented by use of quantitative magnetic resonance (QMR). This technique can measure within a 2 minute period the lean mass, fat and water composition of a bird. In the wind tunnel studies, the QMR measures can be made immediately before and immediately following an experimentally prescribed set of migration conditions.


Wood Thrush flying in AFAR wind tunnel

The researchers have found, for example, that a Swainson's Thrush experiencing changes in relative humidity did not alter fat metabolism, but used up more lean mass (muscle and organs) in dry conditions than in higher humidity. Due to the water being produced as a metabolite there was no loss of the physiological balance of water required in the blood.

Refuelling

In blood, trigycerides increase after feeding and ketones increase after fasting. Researchers are measuring these compounds to detect changes in mass at refueling sites and the speed with which birds can refuel. Generally the faster refueling the less prolonged migration.

In one study they established that urban park environments in New York provided as or more efficient opportunities for refueling as did more rural seemingly more 'natural' sites in rural Westchester County, New York.

Birds refueled faster in the spring than in autumn possibly in order to arrive at the breeding grounds sooner in spring. Male birds refueled faster than females in spring. Perhaps this is so that males can arrive and secure breeding territories before the females arrive.

With the tan vs. white stripe morphs of the White-throated Sparrow, the white stripes refueled faster than the tan stripes, perhaps giving the white stripes an advantage in arriving at the breeding grounds.

Bats


Silver-haired bat with tracking device

The group has begun studying stopovers by bats and birds at Long Point. Silver-haired bats usually stop over for 0-1 days, leaving immediately unless it is raining. They cannot forage in a cost efficient manner in wet weather. However, bats can enter torpor which few birds can do. Bats can reduce their energy consumed by 50% for every 10C drop in temperature. The colder it is the greater the energy saved, up to a 90% saving by being in torpor. Perhaps bats migrate alternating between flying and torpor back and forth throughout their migration.

Because the amount of energy saved in torpor is predictable, bats, unlike birds should be able to know how much fat or other tissues they will use in migration.

S. Ontario Migratory Tracking Study


Setting up a tracking tower

Over the decades much has been learned about arrival and departure of birds from places like Long Point. However little is known of the movements of the birds after heading north from Long Point. As a result we do not know what specific habitats are especially relevant to the success of migratory birds in the area. The Western group working in concert with Bird Studies Canada and people from other academic institutions are building a network of solar powered tracking towers throughout SW Ontario. By spring 2014, more than 30 towers were erected and the plan is for a system of 75 towers with generally overlapping ranges. Chris mentioned some very preliminary results that demonstrated the vast scope of what can be learned about important niches as birds move away from Long Point. For example, Black-throated Blue Warblers did not move towards the Bruce Peninsula whereas Magnolia and Yellow-rumped Warblers did.

<u>QUESTIONS:</u>

B. Falls: Does capture affect bat behaviour?
Chris: Not enough data to date to answer that question but the weather effect is pronounced. Chris posed the question as to whether or not pregnant bats will use torpor less than non-pregnant bats in order to protect the foetus during migration. Female bats are leaner than males in the autumn and appear to stay longer thus giving the impression that bats carry on at their own pace independent of capture.

Bertin: With fish, some fish like getting caught in order to eat the bait.
Chris: Female birds in migration do not to lay down yolk, suggesting that energy for egg development is acquired once on the breeding territory.

Daniels: Is there a correlation between migration of birds and high vs. low relative humidity events and also barometric pressure events?
Chris: Little is known about this. However, relative humidity is very important in desert flyovers. Birds only fly at night over deserts. During the day, birds can land in the desert and hide under rocks, etc.

D. Hussell: Is diurnal migration of bats and birds different?
Chris: If either birds or bats are doing everything they can to reach their destination, they may migrate at higher elevations to catch favourable winds, even though ignore foods best available at lower altitudes. There may be a time when it is better to fly than to refuel.

Dunn: Does humidity vary with altitude?
Chris: Yes, humidity increases to a height where it reaches the dew point and then decreases with further height.

Dunn: Can you predict at what height a bird will fly if you know the humidity?
Chris: There are compromises here since the birds can be attracted to winds at different heights. For some birds, it makes sense to fly in thicker, more humid lower altitudes.

E. Addison: Is there a preference for metabolism of specific kinds of fat?
Chris: There is some evidence that unsaturated fatty acids may be preferred because there is quicker access of energy to the muscles.

B. Falls: Is there evidence of humidity affecting timing or route of migration?
Chris: Nobody has addressed that question properly.

R. Dunn thanked the speaker.

OBSERVATIONS

K. Martyn saw a Snowy owl along Hwy. 400 on her way to Barrie on 8 November and heard of a second report in Barrie.

Rapley: Nature London is celebrating 150 years of naturalist activity in the area. Rapley went to the Owl Sanctuary last week and regrets to report that Kay McKeever, 90 years of age, is losing her sight and memory.

Zoladeski: A species of snail was declared extinct in the Seychelle Islands in 2007 with the presumed extinction attributed to climate change. On 23 August 2014, the species was rediscovered on the same atoll!

Aldabra banded snail
(*Rhachistia aldabrae*)

Daniels: The unique snowfall in Buffalo from lake effect winds resulted in 8 cm of snow in one area and 120 cm in another area just 3 miles away.

Aird: Paul reported that he and his partner Linda Pim who have lived together for 18 years were recently married on the farm in Hudson, Quebec where Paul was raised. Paul and Linda saw two monarch butterflies.

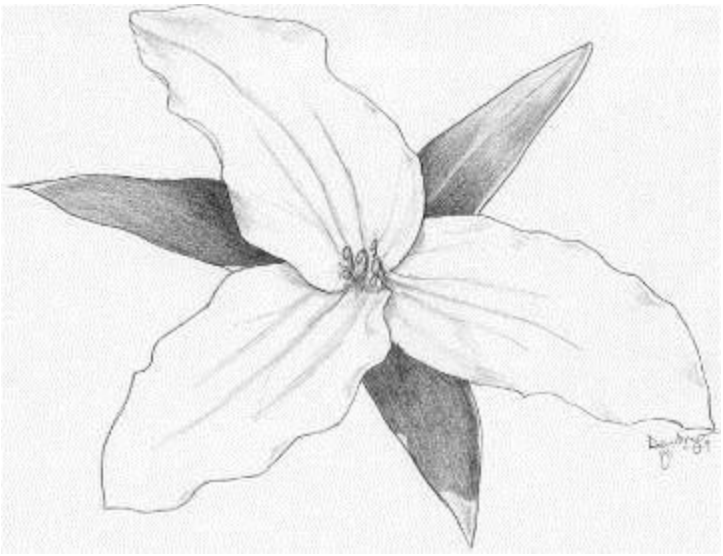
Bryant: Spent time at property on Ottawa River. Canada Geese were calling non-stop, there was a flock of Wild Turkey, they saw many white-tailed deer, and coyotes were calling at 3 A.M. Bryant noted that none of these wild game were around the site when he was young.

ADJOURNMENT:
The meeting was adjourned at 9:25 p.m.

CORRESPONDENCE

Twenty-five years ago: In November 1989, Louise Herzberg spoke to the Brodie Club on her book, 'A Pocketful of Galls,' on the life of William Brodie. The selection below if from minutes of the meeting. (Full minutes can be found here.)

Wm. Brodie married Anna McPherson. Their first child William was referred to as Sweet William (Phlox maculata). Their subsequent daughters all bore botanical Christian names. After graduation from Normal School, Wm. Brodie began his career in teaching in schools of Whitchurch Township. Later, in 1870, Dr. Brodie was the 207th dentist licensed to practise in Ontario. He was the first to use chloroform. Dr. Brodie predicted ahat the use of X-ray photography would "revolutionize everything". Prof. Edmund Walker's advice to Dr. Brodie was to stop this insect nonsense and focus all his efforts on his practice of dentistry.



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