

THE BRODIE CLUB



Established 1921

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

THE 1,105th MEETING OF THE BRODIE CLUB

The 1,105th meeting of the Brodie Club was held on Tuesday, 21 November, 2017 in Room 432 of the Ramsay Wright Laboratories of the University of Toronto.

Chair: Bob Curry

Secretary: Anne Bell

The meeting was called to order at 19:34 pm and was attended by 27; 23 members and 4 guests.

Roll Call:

Present: E. Addison, R. Addison, Aird, Bell, Bertin, Bryant, Coady, Currie, Curry, DeMarco, A. Falls, B. Falls, Hussell, Iron, King, Kotanen, LaForest, Machin, Moldowan, Pittaway, Reading, Rising, Slessor

Guests: John Bacher, Mary Lou Bacher (guests of Juhola), Roz Holeton (Rising), Peggy Haist (Bertin)

Regrets: Abraham, Beadle, Carley, Crins, Daniels, Dengler, Dunlop, Dunn, Eadie, A. Juhola, H. Juhola, Kortright, Lindsay, Martyn, McAndrews, Obbard, Peter, Rapley, Riley, Seymour, Sutherland

Minutes:

Trudy Rising will ask speaker whether date is correct, but moved to approve minutes.

Jeremy Hussell seconded motion; motion approved.

Committee Reports:

Treasurer: Bryant noted that some membership dues are still owing.

Program:

Ed Addison announced next month's meeting: Lesley Campbell (from Ryerson) will talk about distribution of plants. He reminded members that meeting will be held on December 12th (a week earlier than usual), and that members are invited to bring homemade treats for post-meeting enjoyment.

SPEAKER:

Ed Addison introduced speaker Kenneth Welch, associate professor at U of T Scarborough campus.

“Hummingbirds, nectar, and the interface of metabolic physiology and natural history”

Dr. Welch explained that size matters with respect to metabolism. Smaller animals have higher metabolic rates in general, but





hummingbirds are outliers with the highest rates of all, with oxygen consumption per gram of muscle about 10 times that of human athletes.

Mammals burn a complex mixture of fuels, including lipids, muscular glycogen and circulatory glucose. The type of fuel burned relates, in part, to exercise intensity, with a switch from lipids to carbohydrates as intensity increases. To learn what hummingbirds do, Dr. Welch collected breath exhaled by hovering hummingbirds and analyzed it with respirometry.

Early in the day hummingbirds burn previously-stored fat, but within about 10 minutes they change rapidly to burning carbohydrates--the sugar from nectar--without first converting it to fat. They have numerous physiological adaptations that allow far more rapid fuel processing than is found in mammals, and within about a half hour of feeding can already use the energy from that meal to power flight. Sugar moves rapidly into the blood stream, and kidneys are adapted to processing a huge intake of liquids while also retaining electrolytes. Unlike mammals, these birds are equally good at metabolizing all the sugars (sucrose, glucose and fructose) found in nectar.

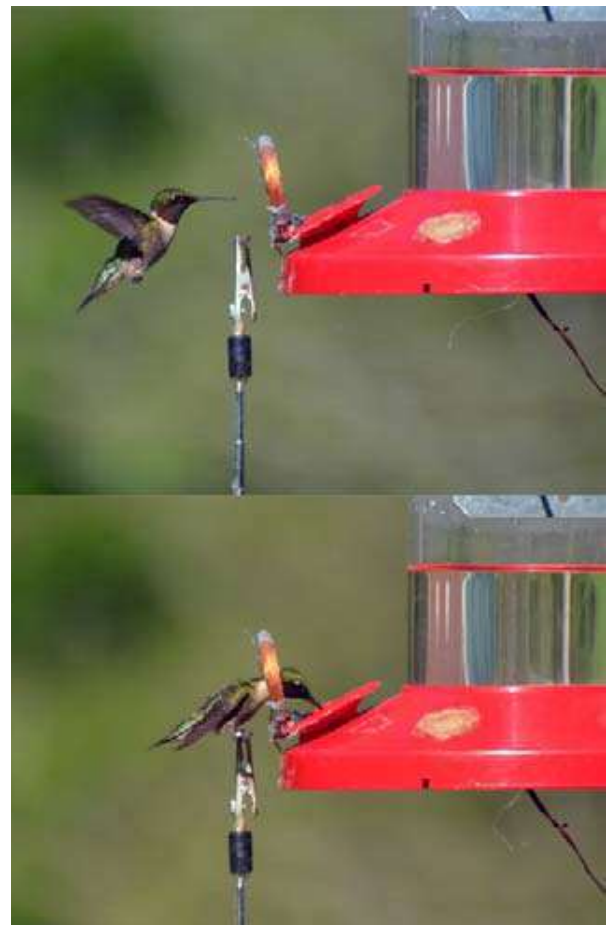
Hummingbirds may also adaptively partition their use of sugars, with glucose going to flight muscles and fructose to the heart, or glucose perhaps being used for immediate foraging and fructose being converted to fats for later use. Hummers may concentrate on fructose-rich nectar when preparing for migration.

To study rates of feeding and weight gain, hummingbirds were fitted with subcutaneous RFID tags, identifying individuals. When a bird put its head through an antenna hoop in order to feed (see photos), its identity was automatically recorded along with the time. As well, the bird's perch was actually a scale which recorded the weight. Results showed that body mass may increase by as much as 20% in a single visit to a feeder.

Hummingbirds usually feed only enough to keep their weight stable during the middle of the day, using the rest of that time to defend their territory. In the evening they feed continuously to prepare for the overnight fast.

Adult Ruby-throated hummingbirds spike in weight prior to migration, feeding voraciously all day long and achieving up to 35-40% weight gain in the form of fat in 4-5 days. Fat is the fuel used during long migratory flights when foraging is not possible. However, juveniles do not show such pre-migratory fattening, possibly due to lack of experience. During migration they tend to fly shorter distances and make longer stopovers.

Following discussion, Jean Iron thanked the speaker.



OBSERVATIONS

Oliver Bertin saw 500 robins on his street this morning.
Trudy Rising reported a flock of Snow Buntings at Sam Smith Park.

NEXT MEETING

The next meeting will be on 12 December, featuring Lesley Campbell on a topic related to distribution of plants. Don't forget to bring some goodies!

The meeting was adjourned at 21:05.

