

# THE BRODIE CLUB



*Established 1921*

## THE 1,061th MEETING OF THE BRODIE CLUB

The 1,061th meeting of the Brodie Club was held at 7:30 pm on Tuesday, December 11, 2012 in Room 432 of the Ramsay Wright Laboratories of the University of Toronto.

Chair: Hugh Currie  
Secretary: George Bryant

The meeting was attended by 30; 26 members and 4 guests.

### **Roll Call:**

**Present:** Aird, Bertin, Boswell, Bryant, Currie, Dunham, Dunn, Eadie, A. Falls, B. Falls, D. Hussell, J. Hussell, Iron, Johnson, A. Juhola, H. Juhola, Larsen, Kotanan, Machin, McAndrews, Pittaway, Reading, J. Rising, T. Rising, Tasker and Zoladeski.

**Regrets:** Abraham, E. Addison, R. Addison, Beadle, Curry, Obbard, Slessor, Martyn.

**Guests:** Eric Davis, Barb Welch, Nancy Hannan, guests of B. Falls, and Daniel Anstett, guest of Ellie Larsen.

**Minutes:** Minutes of the November meeting were approved subject to these changes:

1. Omissions... regrets were received from Mary Boswell and Ron Pittaway.
2. Pittaway sent the following by E-mail: "Correction to the identification of flying squirrels in the second paragraph of Jeff's talk which reads..."The northern species is bigger and more robust. It has a pure white belly. The southern is smaller and has a buffy-grayish belly." This should be corrected to "*The colour of the belly should be reversed. Northern is buffy-grayish and Southern is pure white.*"

There was no business arising from the minutes or new business.

### **Reports of Committees**

- **Program:** Bruce Falls reported that we have a full slate of speakers for this winter / spring.
- **Web Site:** Ricky Dunn advised the committee met Bill Cole of the EEB earlier that day. The initial Web site will be straightforward and should be up early in 2013. The Brodie Club retrospective talk given by B. Falls at the 1,000<sup>th</sup> meeting in 2006 will be included.

- **Archives:** Sandra Eadie observed that Brodie archives contain a card file of old memberships, something of historic interest. She had a supply of old Brodie Club letterhead and minutes from the 1940s which members were welcome to take.

Ricky Dunn visited the Archives at the ROM and searched through some of the boxes of Brodie material. She located the 1937 minutes and found the actual bookplate from which the silhouette of Brodie used in our masthead has been taken. The editorial of the 1936-37 Proceedings includes the following information:

”The vignette on the cover of our Proceedings is a silhouette study of Dr. Wm. Brodie by Roy Fisher (who joined the club in 1923).” At the November meeting, R. Addison had suggested that it may have been created by Terry Shortt, another Brodie Club member, so it is good to have this bit of Brodie history brought to light.

- **Membership:** New members John Carley and Peter Kotanan were warmly welcomed to the club. This brings our active membership to 51.

### **SPEAKER:**



Bruce Falls introduced member **Ellen Larsen**. Dr. Larsen received her PhD from the University of Michigan and recently retired from the Cell and Systems Biology Department, University of Toronto. Her subject was **Lichens**.

Dr. Larsen indicated for most of her academic career she was a “developmental biologist” and that lichens are a recent study. Her goal was to acquaint us with some aspects of lichens and thereby increase our enjoyment of them. The title page included a photo of common foliose lichen along with White birch bark. On examination, the birch lenticels were actually the sexual fruiting bodies of a lichen. Foliose lichens are more familiar to us with obvious sexual fruiting bodies, but lichens also have asexual propagules.

Although we develop from one cell, lichens are an ‘amalgam’ of an alga and a fungus so two very different cells collaborate to make a different form—really quite magical.

Dr. Larsen discussed the development, dispersal, evolutionary properties and adaptations of her favourite subject. She suggested that when you think of lichens, you could think of the KGB—the CIA has wonderful gadgets, MI5 wonderful minds but the KGB is everywhere! So with lichens—they can be found in deserts, the Arctic, and Antarctic, on pebbles, rocks, trees, leaves (not in temperate zones), sometimes even in water. They are also found on many man-made materials—stained glass, gravestones, roofs, roofs and even metal flashing. Even when the snow is on the ground, lichens are visible on trees and rock faces—they are varied and everywhere. On a birding trip to Brazil, Dr. Larsen stopped to admire the lichens. So lichenology is a portable hobby.



*Parmelia sulcata*

Diagrams illustrated the sexual fruiting bodies, apothecia,—little “jam cups” and asexual propagules, soredia, with algae and fungi together.

Algae are not known to have sex when in the lichenized state; only fungal spores are produced in the sexual reproduction. With two organisms blending, Dr. Larsen suggested it must be difficult for them to find a partner. Under a microscope, lichen is composed of strings (fungi) and balls (algae). If you cut into lichen, the green algae are right under the cortex.

Historically, lichens were used for dye and significant work was done in the textile industry to find ways to chemically synthesize lichen dyes.

Algae combine carbon dioxide and water to create sugar. They take the carbon dioxide from air pockets within the lichen. This means many lichen cannot be submerged for long as water replaces the air. But those that spend long periods under water must have a strategy because many lichens actually do okay under water—this is something she is pursuing.

Some time in the mid-1800s a Swiss biologist determined that lichens were a combination of algae and fungi. Coincidentally, so did Beatrix Potter whose paper on the subject was read before the Linnaean Society. The then director at Kew Gardens was so dismissive of her ideas Potter was put off science and went on to author children's books, acquire land and raise sheep.

How old are lichens? There are fossil animals that disappeared before the Cambrian explosion (550 MYA) that some suggest are actually lichens. A Precambrian fossil has been found with what is accepted by some, to be a lichen. There are lichenized Devonian fossils (450 MYA). So the question is fairly contentious but clearly lichens are pretty old.

What is the advantage to fungi and algae in getting together and why has lichenization been such a popular route? Simple answers are that the fungi wanted a free meal while algae couldn't fight them off because they were "parasitized" by the fungi. Another view is that there was a time when CO<sub>2</sub> was at lower concentrations than today and it was advantageous for algae to snatch CO<sub>2</sub> from the fungi. Presently more evidence is being sought.

Many lichens look superficially like mosses. Mosses are real plants and use chloroplasts inside their cells for making sugars. They share certain characters with lichens in that they lack a vascular system and have no way of controlling moisture. Under drought conditions, both go into torpor and are often found in extreme environments. However, lichens have survived a trip in Soyuz rockets and mosses probably could not do that. Mosses and lichen-covered rocks are like islands in the forest

Dr. Larsen wondered whether all lichens of the same type in a local region are actually clones. Here she needed to look at the DNA but lacked the expertise. Dr. O'Brien, a world expert on lichen DNA doing a post-doc at UofT came to the rescue. Daniel Anstett helped her to isolate DNA, extract, amplify, purify and send it off to the proper laboratory for sequencing. Her hypothesis was that all contained the same genetic material. They just looked at a small part of one gene and in a small piece of land; they found nine different forms of the same gene in the same "species" of lichen. So her hypothesis was roundly disproved. Now scientists want to know the origins of these different gene forms. This is a very exciting time for Dr. Larsen to get into a whole new field.



An image detailed an isolated rock topped by four lichen species. Another rock was covered with an orange organism which turned out to be algae, not lichen. This was a warning to her that not everything that looks like a lichen is a lichen. Lichens vary—some grow only on granite while some only on limestone. Some lichens have different colours, especially after a rain, when they can be spectacular. Interesting lichens include Reindeer lichens and British soldiers which are fruticose lichens.

Dr. Larsen wonders why some lichens do not have asexual propagules. On the same substrate you can find two lichens, one only asexual, the other sexual; this is an intriguing divergence she is hoping to study. She is interested in the development of lichens and how lichens use two different kinds of cells to produce a morphologically identifiable "species"—a retirement project!

To find lichen suitable for study in the lab she went to Costa Rica in search of a fast-growing lichen living on leaves. There lichens are plentiful, grow fast and propagules rain down—they appear as greenish or whitish spots on old tropical leaves but will also grow on many other substrates including plastic cover slips. At one site in Costa Rica, asexual propagules developed into lichens producing more asexual propagules in two and a half months. Unfortunately, these lichens did not grow when transferred to her laboratory. Larsen has started to work with Ontario lichens hoping to nail down the environmental variables required for growth in a laboratory setting.

She finds the actual existence of lichens somewhat humbling but then, it may have changed her whole conception of just what is an organism. Lichens are communities, not individuals. Looked at that way, even we are a consortium of microorganisms with more gut microbes than brain neurons. We should be looking at organisms differently—there is a huge biodiversity in a small area.

In the Christmas spirit, Dr. Larsen reported that the red and white Christmas lichen was recently voted the most popular lichen at a lichenologists' forum

#### QUESTIONS AND ANSWERS:

*Q. Ron Tasker: How do lichens reproduce?*

Answer: This goes to the question of what is an organism. The organism is named for its fungus. The same problem exists with non-lichenized fungi. In New Zealand, there are some lichens which are half cyanobacteria and half algae. Sometimes you can segregate the two but they don't always form the same shape unless together. Different combinations provide different shapes. Algae have forgone sexual reproduction when lichenized. Dispersal issue with lichens is a big question.

*Q. Mark Johnson: Algae derive CO<sub>2</sub> from fungi, but what is the benefit to fungi?*

Answer: Perhaps fungi obtain sugar and a broader base to obtain airborne minerals.

*Q. Bruce Falls: What is a lichen species?*

Answer: The question of speciation bothers her—sometimes there may be a continuum. There are some recognizable types where you can look at the genetics but some are cryptic species with similar morphologies but quite different genes. So species are generally morphologically identifiable and sometimes genetics settles the question. Like everywhere else, the taxonomy of lichens is changing rapidly.

*Q. Ken Reading: Have they ever found semi-aquatic lichens in the tropics?*

Answer: Not sure. There is one species here that can handle inundation for six months a year.

*Q. Mark Johnson: What do lichens use to erode rock?*

Answer: Hydrochloric acid, probably. You can actually see how lichens are breaking down the rock. Mt. Rushmore needed to be cleaned because lichen was destroying it.

David Dunham thanked the speaker.

### **OBSERVATIONS:**

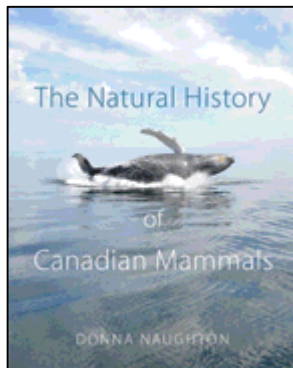
*Paul Aird* has observed a significant decline of American Crows in his area. Had other members noted this? They do move around in the fall, particularly north of Toronto and are crows disappearing? One member commented on the increase of Northern Ravens in recent years.

*John Carley* reported with glee that his yard list now stood at 165; newest addition-an American Woodcock, which deigned to explore his back yard for part of a day.

In conjunction with tonight's presentation, *George Bryant* suggested members view the 2006 movie *Miss Potter*, a lovely story filmed in the beautiful Lake District which includes a scene of her rejection by the Linnaean Society.

### **CORRESPONDENCE**

On 5 December 2012 22:41, Jean Iron <[jeaniron@sympatico.ca](mailto:jeaniron@sympatico.ca)> wrote:



"If you're looking for an outstanding Christmas present for yourself or a fellow Brodie member, we suggest the newly published "**The Natural History of Canadian Mammals**" published by the University of Toronto Press. It's the new Banfield but much better. The author is Donna Naughton of the Canadian Museum of Nature. It is dedicated to the late Stewart (Stu) D. MacDonald.

Its 872 pages are very comprehensive with 600 images including 215 full colour images of all mammal species known in Canada."

Cloth, ISBN 9781442644830, published Oct 2012, \$69.95 at Chapters but cheaper online.

### **NEXT MEETING**

The next meeting will be held Tuesday, January 15 at 7:30 pm in Room 432 of the Ramsay Wright Zoological Laboratories.

**Dr. David M. Rudkin** of the Royal Ontario Museum will discuss **The Life and Times of the Earliest Horseshoe Crabs**

The meeting was adjourned at 9:21 pm and members visited and enjoyed Christmas refreshments together.

## FROM THE ARCHIVES

November 1987: Mike Cadman, Coordinator of the Ontario Breeding Bird Atlas, noted that a desktop computer could handle about half the data. Speakman reported seeing a Great Horned Owl making an extraordinary screaming, to which Bodsworth responded with a fine rendition of a Barred Owl screech.

December 1987: Aird reported that the mild reaction of Queen's Park pigeons to the field gun salute on 11 November last was a result of their being made sick by poisons designed to reduce their numbers.

1936-37 Proceedings: From the editorial in which Dunn found the identity of the artist who created the Brodie silhouette, also comes the following:

"It (referring to the silhouette) reminds us of two verses in Frank Morris' commemorative poem on Dr. Brodie, "Guide, Philosopher and Friend," published in "the Canadian Entomologist" for November 1909. They are as follows:

"A shock of rebel locks upreared  
Above the forehead bold and high  
'Neath shaggy brow the deep-set eye  
Challenged enquiry, grizzled beard

Part hid the lip; a man endued  
With power of thought, you read the face;  
The Maker moulds in some for grace,  
For strength those rugged features hewed'

