THE BRODIE CLUB

Established 1921

THE 1,071st MEETING OF THE BRODIE CLUB

The 1,071st meeting of the Brodie Club was held on Tuesday, 21 January, 2014 in Room 432 of the Ramsay Wright Laboratories of the University of Toronto.

Chair: Marc Johnson
Secretary: Trudy Rising

The meeting was called to order at 7:35 pm and was attended by 25; 23 members and 2 guests.

Roll Call:

Present: Addison, Addison, Bertin, Bryant, Carley, Crins, Daniels, Dunham, B. Falls, A. Falls, J. Hussell, Iron, Johnson, A. Juhola, H. Juhola, Pittaway, Rapley, Riley, J. Rising, T. Rising, Seymour, Speakman, Tomlinson.

Guests: Spencer Barrett and Chris Darling, guests of Marc Johnson

Regrets: Abraham, Boswell, Curry, Dunn, Eadie, D. Hussell, Larsen, Lumsden, Machin, Martyn, McAndrews, Slessor, Sutherland, Zoladeski.

Minutes: Minutes of the December meeting will be posted as revised by Rose Addison, following this meeting; unseen, the minutes were unanimously approved.

Committee Reports:

- George Bryant, chair of the new field trip committee (comprised of George, Bob Curry, and Hugh Curry) suggested Carden Plain (Alvar) as a possible field trip destination in June; others mentioned that we've been to Carden Alvar twice. Members should provide George with other suggestions which can be discussed by the committee, then as appropriate at forthcoming meetings.
- Bertin offered to take club members over to Toronto Island or the Lesley Spit in his boat. He said it was a very good way to see waterfowl, herons, ospreys, mink, otters, and other species that can be hard to see from the land. Just telephone him after May 1 and he'll take members out.
- Bruce Falls announced speakers and topics of upcoming meeting.

  18 February: A presentation on ***Bhutan***, by Slessor and Curry

SPEAKER:

Bruce Falls introduced our speaker, Professor Darryl Gwynne. Gwynne graduated from the U of T, then did his PhD at Colorado State University, working on sexual selection in wasps. He completed two post-docs, one at University of New Mexico and the other in Australia. Gwynne then came back to the U of T, Mississauga campus, to embark on his teaching and research career.

Gwynne mentioned in his opening comments that he had been influenced as an undergraduate by a course in behavioural ecology taught by Profs. Falls and Dunham, and that he'd presented at Brodie once before, about 13 years ago.

Prof. Gwynne's talk, entitled **Six-legged Sex: Mating Meals and Sex Differences**, began with superb artwork by Janice Ting, and a reference to an important work, *Insect Mating Systems,* 1983, by R. Thornhill and J. Alcock. A 30th anniversary symposium was held, September, 2013, to celebrate its publication. All papers presented there were model lab system- or theory- based, however, and valuable as they are, Gwynne was disappointed there were no papers based on field studies.

Gwynnel feels that natural history provides essential data for comparative studies that can eventually lead to conceptual advances. His own methods are studies in nature, e.g., field experiments and "selection analysis."

His intent was to outline why males take the competitive and risky approach to getting mates. Most of his tales were from work he's done in the Credit River valley near his home.

He first showed the most typical mating approach among flying insects, that of pale burrower May flies (an *Ephoron* species). They emerge in August in huge numbers and mate soon after emergence.

Gwynne compared the sexual section theories of Darwin and Wallace:

- Darwin felt that male ornamentation, while advantageous in sexual selection, also came with a cost.
- Wallace came to a different conclusion. He felt that displays of grandeur (as seen in peacocks, Irish elk, etc.) provide males attraction for mates and also give them a competitive advantage, but said nothing about such displays having a cost.

So what does drive sexual selection?

Gwynne started by describing a new paper about a guinea pig, “Sooty,” who escaped from his cage one night and mated with 24 different females, which eventually produced 43 offspring. This story exemplifies that evolutionary fitness can be very inexpensive for males, with their tiny gametes. This sort of reproductive output is impossible for females.

In role reversed species such as sea horses and pipe fish, the males have a female-like expense of brooding the eggs. In these species, the females compete aggressively and have the ornamentation.

Several Credit River insect species were used as examples of males using investment in the female or the young as a means of increasing sexual attractiveness. In burying beetles (Silphidae*; Nicrophorus* spp.), males help in offspring care, teaming up with a female to bury a mammal (such as a mouse) for the larvae to feed on. These beetles are a good system for studying conflict between the sexes over reproduction (MSc thesis by Ian Roberston).

In other species, males can invest in mate and offspring by courtship feeding; scorpion fly males, for example, attract females with carrion, etc., and also feed them a salivary gland secretion. And in the fireflies *Photinus* and *Photuris* spp. (Lanpyridae), the male ejaculates protein along with sperm to serve as a nutrient to the young.

Gwynne has made particular study of little ground crickets, *Allonemobius* and *Eunemobius*, the common musical crickets we hear in late summer. He and his B.Sc. student, Edy Piascik, found that the female sucks the male's blood as it mates. In fact, all North American species do this, though European relatives do not.

Tree cricket female feeding from male's gland (photo by Luc Bussiere)

In the black-horned tree cricket (*Oecanthus nigricornis*), females feed on secretions from a gland on the male's thorax as mating occurs. This has been shown to increase the number of eggs she can produce.

Gwynne's PhD student, Kyla Ercit, has examined both natural and sexual selection on tree crickets that are parasitized by a solitary wasp. The wasp lays an egg, and paralyzes a few crickets to place around it. As the wasp larva develops, it has fresh, paralyzed prey to feed on. Kyla's selection analysis showed a Darwinian result. The big-headed male crickets had the best mating success (positive sexual selection), but were preyed on more often by wasps than were males with smaller heads (selective disadvantage to large heads). The mechanism involved is not yet known, but males of other cricket species fight with mandibles, so male head size in tree crickets may be related to male competition. Another mechanism may be related to wing width. Wider winged males have a better singing apparatus and therefore mate more often, but they are then more easily preyed upon, possibly during mating.

The female black-sided meadow katydid (*Conocephalus nigropleurum*) chews on a mass of nutritious proteinaceous material produced by the male and attached to the spermatophore. In another katydid, the male gift is so nutritious that role-reversal occurs. In field enclosures with experimentally decreased food, hungry females competed for access to mates. The female mates with the male, and another female may mount that first female in competition for the male. Radio labelling of proteins shows that male investment is relatively greater in the eggs when food resources are restricted.

Female long-tailed dance fly, with inflated abdomen

In another role-reversed species, the long-tailed dance fly *(Rhamphomyia longicauda*), the females are ornamented. Females have black legs with hair-like projections, and when they swarm in June, females of the species take air into their body cavities, swelling their abdomens to produce an enormous orange sac-like abdomen. The females form swarms for about half-an hour around dusk and dawn. Males carry prey to the swarms as gifts for females. Approaching from beneath, each one selects the female with the largest silhouette he can find. There is strong sexual selection on female ornaments, in that the ones with less extended abdomens don't attract a mate. Moreover, many females are caught in spider webs as they swarm (largely by two species of spider), and smaller females with the smaller ornaments are less able to escape from the webs. In this example, then, it appears that the Wallace hypothesis holds. That is, the females with large ornaments are both attractive to males (positive sexual selection) are better at escaping from spider webs (a natural selection advantage).

In this talk, the male wasp story shows support for the Darwin hypothesis, whereas this female dancing fly story supports Wallace. Gwynne noted that other work on many other animal species show more support for Wallace: sexually-selected traits often do not appear to have any natural selective disadvantage.

Questions following the presentation:

Does the female dance-fly stay inflated after attracting a male? No, she deflates after the swarm. I should mention that the females can't hunt; they get all their food from the males.

Is the black horned tree cricket fairly common? Yes, very common.

How are the data on the long-tailed dance flies quantified? Some are just counted and we also quickly freeze others so we can tell if they had been inflated.

How common is this role reversal? Dance flies are very common, 100s of species, and about 25% show female swarms and ornamentation.

How do you do your work? We observe new systems in nature and then investigate further. It may be seasonal so we have different studies going on at different times.

Chris Darling thanked the speaker.

OBSERVATIONS

Oliver Bertin mentioned that the lake is more iced up than he's ever seen it. It's solid between the shore and the islands, for example.

Rapley commented on his San Diego trip. Attendees at this conference devoted to panda conservation were from many institutions, including the Smithsonian. There are now 65 reserves, telemetry is being used, much restoration work is being done and corridors established; research on bamboo is in progress. 70% of the area where pandas are found is now under protection, which is excellent for all the other species needing that protection, as well. Parks Canada is now also involved with these efforts.

Bill also mentioned whale watching and seeing 12 Grey Whales at once, along with 3 species of cormorants, and lots of gulls, harbor seals, brown peicans, etc.

Question from Marc Johnson: Where are the pandas at the zoo now being kept? Inside as needed, but they are found at high elevations so can take some cold temperatures. Rapley said there are 8 cubs at the San Diego Zoo now.

Daniels asked about flies he's seen at a warm period this winter, hovering low over vegetation (temp about 39C). Unclear what they were.

Daniels mentioned the vernacular additions of the day – “polar vortex,” “frostquake,” “arctic cyclone.” It appears “polar vortex” and “arctic cyclone” are synonymous. Mixed responses about exactly what causes frostquakes.

Dunham asked where Snowy Owls can be seen. Tommy Thompson Park has 3 right now, and a hospital parking lot near St. Catherine's has some.

Johnson mentioned that poplars and willows have been largely hit by the ice storm, but also Norway maples. He predicts huge outbreaks of insect predators in the spring. Others commented that Chinese elms were also hit badly.

Seymour says that most birds coming to his heated bird bath take about 3 sips to drink, but a mockingbird that frequents the bath always takes 10-12 sips.

Rapley commented on the recent huge seizure of ivory by the Chinese, and also mentioned getting 5 million hits on a photo of a polar bear cub.

NEXT MEETING

The next meeting will be held Tuesday, February 18, 2014. The speakers will be Glenda Slessor and Bob Curry, presenting on Bhutan (title TBA).

The meeting was adjourned at 9:00 pm.

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