THE BRODIE CLUB

Established 1921

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

THE 1,088th MEETING OF THE BRODIE CLUB

The 1,088th meeting of the Brodie Club was held on Tuesday, 15 December, 2015 in Room 432 of the Ramsay Wright Laboratories of the University of Toronto.

Chair: Hugh Currie
Secretary: Ken Abraham

The meeting was called to order at 7:35 pm and was attended by 36; 25 members and 12 guests.

Roll Call:

Present: Abraham, E. Addison, R. Addison, Aird, Bertin, Bryant, Carley, Coady, Currie, Daniels, Dunn, A. Falls, B. Falls, Hussell, Iron, A. Juhola, H. Juhola, Lumsden, Martyn, McAndrews, Pittaway, Riley, Seymour, Tomlinson, Zoladeski

Guests: Kathy Lindsay (guest of Riley); Katie Thomas (Currie); Justin Peter, Carolyn King and Steve LaForest (Bruce and Ann Falls); and students from EEB (guests of club): James Boyko, David Benoit, Colin Bonner, Abby Daigle, Danielle deCarle and Felix Beaudy.

Regrets: Beadle, J. and Y. Bendell, Crins, Curry, Eadie, Kotanen, Obbard, J. and T. Rising, Slessor, Sutherland

Minutes: Accepted after correction of meeting number, spelling of "Bertin," and number of pandas in the wild (1864).

Committee Reports:

Program: Bruce Falls announced that the program was full up to May. January speaker will be Bridget Stutchbury on new methods of studying bird migration.

F.O.N. Rose Addison relayed a "heads up" from Glenda Slessor that she will speak in January about potential sponsorship of a student for the FON program (see Correspondence).

Announcements: An international juried Wildlife Photography show is on at the ROM until March.

SPEAKER: Kevin Seymour introduced David Evans, Royal Ontario Museum and University of Toronto (Endowed Chair in Vertebrate Paleontology), who spoke on: "*Wendiceratops* and a New Golden Age of Dinosaur Discovery in Canada."

Dr. Evans began by noting that Canada is globally recognized for its rich history of dinosaur discoveries from coast to coast, with the highest density of fossils found in the badlands of southeastern Alberta and southwestern Saskatchewan. This area, which includes Drumheller, AB and Dinosaur Provincial Park, has produced some of the most complete

dinosaur skeletons ever found dating to 70-75 M years ago. It is a crossroads of the most famous dinosaur hunters. J. B. Tyrell discovered *Albertosauras* near Drumheller in 1884 while assessing the commercial potential of coal deposits in the Red Deer River valley. Although the discovery of a large skull was serendipitous, Tyrell immediately knew its significance and he shipped it back east, where it was then sent to Henry Fairfield Osborne at the American Museum of Natural History (AMNH). Expeditions to the area between the 1880s and 1909 found mostly bits and pieces. Barnum Brown (AMNH) brought search crews between 1909 and 1915 and found the first full skeletons including *Tyrannosaurus rex.*

Dr. Evans told a story about an Alberta rancher from Wegner who laughed after hearing one of the dinosaur hunters give a lecture, saying that he (the rancher) had buckets of bones. Osborne sent Brown to investigate and Brown immediately started finding things; consequently a full expedition was mounted in 1910.

One of the first finds was a duck-billed dinosaur, complete from the tip of the nose to the tip of the tail including fossilized skin. Brown used techniques still used today, making burlap and plaster casts in the field. He also was innovative in getting to the remote site; he accessed it by river from Red Deer using a custom-built barge which became his center of operations.

During this period, trainloads of fossils were sent to the US museums, and this did not go unnoticed by the Canadian government. The government's response was to hire its own Geological Survey of Canada dinosaur hunter, Charles H. Sternberg, a freelance collector from Kansas who sold his finds all over the world. He had 3 sons who went on to illustrious careers in their own right (Charles M. Sternberg at GSC, Levi at ROM who, with William Parks, set up the ROM collection from 1918-1954).

The first ROM specimen was a duck-billed dinosaur that is still on display. It gained such acclaim that Toronto "fell in love" with dinosaurs and the ROM sent more expeditions to the area than any other institution. The period from 1910 to the early 1930s became known as the great Canadian Dinosaur Rush when the rate of new valid species named every year was at its highest. Over 400 articulated complete skeletons were collected from Canadian sites. The University of Alberta and the Field Museum of Natural History were also active and dinosaurs were traded all over the world.

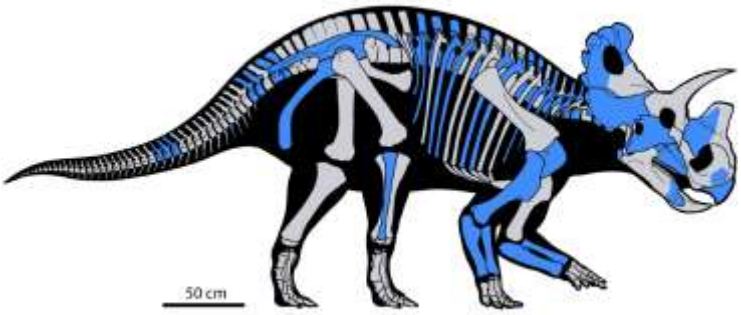
After World War II, things really slowed down. So many dinosaurs were found that they lost popularity and additionally gained a reputation of being slow, dim-witted lizards; mammals were deemed more interesting in science circles. Then in 1969, Ostrom discovered *Dionychus*, a small agile, bird-like creature, in southern Montana. Dinosaur popularity was revived when comparative studies with *Archaeopteryx* indicated that modern birds had descended from dinosaurs. The 1970s are considered the Dinosaur Renaissance and there has been increasing attention ever since. Dr. Philip J. Currie was a principal in that renaissance. He was from southern Ontario and was a U of Toronto undergraduate who dreamed of being a dinosaur scientist. He went to McGill and was trained by Bob Carroll and was then hired by the Provincial Museum of Alberta, the first dinosaur scientist for any province. Currie outlined a plan to have a museum in Alberta to house the finds rather than shipping the fossils to distant locations. The result is the Royal Tyrrell Museum in Drumheller, Alberta, opened in the 1980s. It is a major tourist destination and has helped create a huge increase in Canadian interest in dinosaurs. Recently, Grand Prairie, Alberta, opened the Philip J. Currie Dinosaur Museum in honour of Currie's career contributions.

In the last 10 years, the rate of new species discovery and naming is as high as during the first Dinosaur Rush of nearly 100 years earlier. The difference in this rush is that the study of evolution,

behaviour and ecology of dinosaurs have all been increasing. Dr. Evans has taken part in the discovery and naming of 7 new species in 10 years. He has worked with Dr. Michael Ryan of the Cleveland Museum of Natural History in the Southern Alberta Dinosaur Project from 2004-2014. Their major research site is in the Milk River Valley and the fossils are coming from the lower Belly River Group, which is considerably older than the intensely worked Drumheller and Dinosaur Provincial Park areas. Rocks from this time period are poorly known around the world, so it yields lots of fossils of certain groups including duck-billed dinosaurs, horned dinosaurs and *Tyrannosaurus.*

The Milk River Valley contains very rough badlands. Depths can reach 100 meters. Dr. Evans' interest was drawn to the area because it was poorly worked historically. Several people came through the Milk River and noted their searches, but collectively they didn't think much of it. Whole skeletons weren't just lying around as in the Drumheller area. These early visitors included Loris Russell (1935-1957), Charlie Starkey (1937) and Warren Langston (1954-1962). However, over the last 10 years, over 3000 fossils have been recovered from the area.

In this area in 2010, Wendy Sloboda found very interesting frilled fossils bones from the horned dinosaur group (Ceratopsidae). Sloboda is one of the world's top dinosaur hunters who, at the age of 16, found her first significant fossils and the first nesting sites in Canada. The finds included unhatched dinosaurs in eggs, the first ever found in North America. She was hired by the Royal Tyrrell Museum and has been working with Dr. Evans and others.



The frilled fossil bones she had found were from the 79-80 M year old Old Man formation and Dr. Evans knew these were amongst the oldest Ceratopsida, at 80 M years. (The first ones of this group found were from 81 M years.) The team started a dig, and recovered most of the frill in the first year of excavation. The ornamentation on the skull is the key to identification of the species in the group, which is quite diverse.

They spent two seasons removing overburden from the steep slopes above the bone bed. Between 2011 and 2014, 250 bones were excavated from the bed and the density was about 5-6 bones per meter. Preparation of the bones took place at the ROM. Two technicians worked full time for 2 years to clean bones of sediment. At least 3 individuals of the species were found at the site indicating multiple simultaneous deaths. The bone bed appears to have resulted from mass mortality due to a flooding event. About 40% of a skeleton has been recovered (see figure above), making it the most complete look at an early Ceratopsid "horned" dinosaur. The species was named *Wendiceratops pinhornensis* in honour of its finder, Wendy Sloboda (pictured at right with "her" species tattooed on her arm).

Dr. Evans described the taxonomy and significance arising from the analysis of the find. There are two branches in the Ceratopsid group, the short-frilled (Centrosaurine) and long-frilled. Phylogenetic analysis of 23 species within the group, using 2 species in an outgroup and 101 morphological characters, indicated that this is a sister taxon to *Sinoceratops*. The "tall" nose horn is considered transitional and is the oldest tall horn found, the oldest record of a nasal horn in Certopsidae. The finding overturns conventional wisdom that nasal horns are diagnostic of a group, as it confirmed that nasal horns evolved at least twice, once in the this group and once, independently, in the Casmosaurs, which includes *Triceratops*.

The ROM participated with the History Channel to produce 4 one-hour TV documentaries that were released to coincide with the naming and display of the skeleton. As part of the project, they built a website that live-streamed preparation of the bones by the technicians in the ROM lab, produced a weekly podcast that posted answers to questions from around the world on Skype, and had the mounted skeleton prepared by Research Casting International (based in southern Ontario). The mounted skeleton was revealed to the public on the day the documentary debuted on the History Channel. The skeleton is on special exhibition for the next year at the ROM gallery.

Dr, Evans told us that it isn't only paleontologists who find dinosaur fossils. For example, *Regaliceratops peterhewsi* was found by a geologist and *Pachyrhinosaurus lakustai* was named in 2008 by Philip Currie in honour of school teacher Al Lakusta who found more than 10,000 bones leading to identification of that species.

Dr. Evans concluded his presentation with the prediction that this new Dinosaur Discovery Golden Age will continue to produce new species at the current high rate, noting that Wendy Sloboda alone found 4 of 5 new skeletons discovered in 2015. Another new skull of the Lost River Centrosaurine was also found. He thanked the many people involved in the work of the last 10 years.

Questions following the presentation:

Bruce Falls noted that Levi Sternberg had been to the Brodie Club and that he (Bruce) met him. His question was about the behaviour or ecological role of *Wendiceratops.*

Ecologically, they were large herbivores with parrot like beaks and built like Rhinoceros. They sheared vegetation low to the ground and sliced their food rather than chewing it. Evidence of their behaviour comes from the bone beds that are the size of a football field. These contained thousands of animals that died at the same time, suggestive of social group living. Elaborate head gear is also suggestive of group living, as it is not optimized for defense and probably functioned in display. Examples of animals at many stages of development show that the head gear doesn't develop until late age: a classic sign of social hierarchy or sexual selection. Evidence of sexual dimorphism would nail down sexual selection as the driver of the trait, but there is no bimodal variation in the skeletons indicative of such dimorphism.

Felix Beaudy asked about the use of the gear in species recognition?

Definitely.

Glen Coady asked how, with incomplete bone series (e.g., multiple vertebrae) you know you've got them correct?

You compare with other material you have from related species, and with enough material you can piece together how things must fit.

Oliver Bertin noted the amazing finds near Drumheller in the 1970s. Dr. Evans said that 10% of all known named dinosaurs in the world are from Alberta, Canada.

Is the Arctic a good place for dinosaur fossils?

There is huge potential for more finds in the Arctic, as most of it has never been prospected.

Erica Dunn noted that fossils to date have come from open badlands, and that there must be other bone-rich areas hidden by vegetation, etc.

Probably true. For good finds you need rocks of the correct age that are reasonably close to surface, which might occur elsewhere, but you also need a lot of rock to be exposed over a wide area to increase the chances of finding anything.

Chris Zoladeski asked whether the technology exists that would allow scanning of the rocks (like in the movies)?

No, the scanning machines are too large and need to be horizontal, but most bone bes are exposed along steep slopes. There also has to be density difference between the rock and the fossil (and he implied there was not).

Are mixed species groups of Ceratopsids found?

Sometimes, but the bone beds are usually dominated by one species.

Sid Daniels asked about the photos showing stepped excavation above the *Wendiceratops* dig.

To expose the bed, the team had to dig 4-5 meters horizontally into the mound, which required a 25 meter vertical step down for the stability of the soil to prevent slumping and for the safety of the crew.

Who owns the fossils?

Fossil laws are provincial. The province of Alberta owns all that are found there, and they ultimately have to go back to Alberta. Those currently in Ontario are on loan to the ROM. This is not a problem, as ROM gets all of the "fun".

Glen Coady thanked the speaker.

FIELD OBSERVATIONS

Numerous observations highlighted the particularly warm early winter weather:

- David Tomlinson reported hearing and seeing a towhee in Aurora on 3 December.
- Sid Daniels reported chipmunks on his patio on 11 December, the latest he's see on his property.
- Hugh Currie reported a number of good birds on 13 December at Sedgwick Park in Oakville, including Blue-headed Vireo, Palm Warbler, Orange-crowned Warbler and Ruby-crowned Kinglet, as well as big flocks of Dark-eyed Junco and Black-capped Chickadee. These were presumably attracted by gnats produced near the sewage plants.
- Helen Juhola reported *Forsythia* and *Japonica* flowering downtown.
- Glen Coady reported that while awaiting a night-time delivery on 13 December he had his outdoor porch lights turned on and attracted 2 moths.
- Hugh Currie reported canker worm moths.

Harry Lumsden reported that summer surveys by CWS and the Ontario Trumpeter Swan Restoration Group had resulted in estimates of 1000 Trumpeter swans in northwestern Ontario and

1000 Trumpeter swans in southeastern Ontario. There is distributional gap north of Lake Superior. He also reported Trumpeter Swan nesting northeast of Lake Abitibi in Quebec.

Ed Addison reported that 8 weeks ago he saw a small Red Fox with lesions on the side of its face, loping through the edge of a burned area. A minute later he saw a Fisher loping along on the same path. He deduced that the Fisher had injured the fox and was continuing to pursue it at a pace designed to wear down the prey rather than to attempt a sprint.

George Bryant noted that we should look out for the Christmas Comet – Comet Catalina – which will be easy to see with binoculars.

Glen Coady noted that Wayne Kent's surveys with trail cameras in the area of the extension of Highway 407 found quite a few Fisher.

John Carley noted that there is a series of Biodiversity publications by the City of Toronto including the Mushrooms of Toronto, the Bees of Toronto and the reprinted Butterflies of Toronto.

Rose Addison noted that she had received Christmas greetings to the Club from member Jim and Yvonne Bendell and Ed Bousfield.

BOOK REVIEWS

Chris Zoladeski gave a review of "Global Crisis – War, Climate Change, and Catastrophe in the 17th Century" by Geoffrey Parker published by Yale University Press.

NEXT MEETING

The next meeting will be Bridget Stutchbury, on new means of tracking bird migration.

The meeting was adjourned at 9:25 pm.

CORRESPONDENCE

FON reps from our club, Curry and Slessor, submitted a letter from Ontario Nature (excerpts below), inviting us to again sponsor a participant in the *Youth Summit for Biodiversity & Environmental Leadership.* Bob and Glenda will speak to this invitation at our next meeting.

"We truly value our relationship with Brodie Club and would love to include you in this unique event that enables young people from across the province to develop the confidence, knowledge and tools to create lasting positive environmental change in their home communities.

As in past years, the Ontario Nature Youth Council will host the Youth Summit for Biodiversity. Your support will help them bring together 100 of their peers from across Ontario to meet, share and learn about issues of importance to us all. Conversations that are frequently overheard at the summit include "Wow, I have never met another birder my age before!" and "Next year can you please make the summit a week long?" Your support can help us connect like-minded youth with one another and create deep and lasting impact in their lives.

Please consider becoming a sponsor with a commitment starting at $350 per youth participant. This is an increase of $50 per youth from the past rate of $300 in order to cover an increase in venue costs, and our intent was to get you this information as soon as possible.

This is our seventh Youth Summit for Biodiversity and we are thrilled with the support we have received from our Nature Network members. In 2015, 33 member groups sponsored 48 youth to attend and we encourage our member groups to help make 2016 another fantastic year."