

THE  
BRODIE  
CLUB



ROYAL ONTARIO  
MUSEUM OF ZOOLOGY

THE 1006<sup>TH</sup> MEETING OF THE BRODIE CLUB

The 1006<sup>th</sup> meeting of The Brodie Club was held on Nov. 21, 2006 at the Ramsay Wright Zoology Laboratories of the University of Toronto.

Chairman: Hugh Currie  
Secretary: Oliver Bertin

There were 23 members and four guests.  
Jeremy Hussell and James Turland, guest of Rose Addison  
Sharon Hick, guest of Jock McAndrews  
Brenda Gibson, guest of John Sparling

The minutes of the October meeting were approved with minor changes.

NEW BUSINESS:

Bruce Falls said a few words in memory of Charlotte Lennox, wife of corresponding member Charlie Lennox, who died Oct. 19 at the age of 74. "She was a lovely person and a friend of many of us."

Bruce Falls was one of several Brodie Club members who attended the 75<sup>th</sup> anniversary gala the previous week of the Federation of Ontario Naturalists, now Ontario Nature. Falls was one of 14 people who were invited to cut the FON's birthday cake. The Brodie Club was honored with a plaque for the role it played in the creation of the FON about 1930. Several Brodie Club members decided on the need for such a federation and sat on a committee that led to its creation.

Bob Currie and Glenda Slessor have been nominated for membership in The Brodie Club. Their membership will take effect at the next meeting.

The next meeting will be held **one week earlier than usual, on Dec. 12**, to accommodate Christmas. Member Marc Johnson of UofT's botany department will talk on insect-plant interactions. Members are invited to bring Christmas cheer.

SPEAKER:

The speaker was Prof. Robert Reisz, chair of biology at UofT's Erindale College, a McGill graduate and "a real-life palaeontologist" who has been at UTM since 1975.

## THE EARLIEST DINOSAUR EMBRYOS AND THEIR SIGNIFICANCE FOR EVOLUTIONARY THEORY

Reisz's story starts in the Golden Gates Highlands National Park, a beautiful part of South Africa that borders on Lesotho. Road crews were blasting their way through the dry grasslands of the area at a height of 2,200 metres when they exposed a collection of small round objects that turned out to be dinosaur eggs.

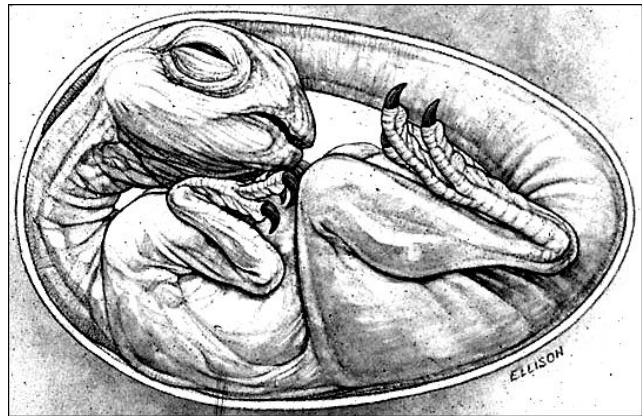
The eggs were first identified in 1970 by James Kitching, a South African who almost single-handedly made his country a centre of palaeontological research. He started looking for fossils as a child, earning the equivalent of 25 cents for each fossil he turned over to a local collector. That hobby eventually took him to a PhD and a position as palaeontologist at the museum in Witwatersrand.

Hitching aged the road-cuttings at 183 to 189 million years ago, in the Lower Jurassic, making them relatively young for dinosaurs but the oldest embryos to be found so far.

Further investigation showed they were Prosauropods, a group of dinosaurs that includes the familiar Brontosaurus. These animals tend to be large, vegetarian runners, often bipedal with short front legs, a long horizontal neck and a tiny head.

Identifying the embryos was a lengthy task that could only be done after the stone was cut away to expose the eggs and the embryos inside. Reisz started with a 400-pound lump of stone about one foot across that contain a clutch of 12 eggs, 6.5 centimetres long, an empty shell, ribs, skulls and a scapula.

Reisz and other palaeontologists submitted the whole, uncut eggs to experts on egg morphology, but they could find no identifying features. Months of work later, he exposed a lower jaw, leg bones, skull and vertebrae, enough to identify the embryo as a young *Massospondylus*, a prosauropod dinosaur that is common in the area.



The identification was not hard to do because this species has two key characteristics, including a unique ridge on the lower jaw.

Reisz's research assistant, Diane Scott prepared the fossils using delicate grinders, often under a microscope, painstaking work that took about a year. They produced a beautifully detailed and complete skeleton 15-18 centimetres long that included such microscopic bones as the ear stapes and the sclerotic plates that protect the eyes. The embryos were fully formed and ready to hatch. One embryo even appeared to have died while trying to break out of the egg, although that may have been an artefact.

There was only one thing missing from the embryos — the teeth. The lower jaws were completely toothless, a fact that has puzzled Reisz ever since.

Reisz continued with his study and came across similar egg fossils, without embryos, at several areas north and west of Lesotho, and a large number of adults of different sizes. Putting them in order, he now has access to 10 *Massospondylus* skeletons ranging in size from the 15-centimetre embryo to the five-metre adult. That is a huge range in size. As he said, the egg of the species is smaller than the eyeball of the adult.

Comparative measurements show that the cervical vertebrae grow faster than the head. The same goes for the legs. The rear legs grow faster than do the front. That means the baby had a huge head, a short neck and equal-sized legs. It was an animal that walked on all fours. But the adult was bipedal, with short forelegs, a long neck and a tiny head.

#### QUESTIONS:

- The embryos can be analyzed to show many other interesting traits. Reisz speculated that the parents provided a degree of care to the young. The embryos had no teeth and therefore could not masticate their food. Perhaps the parents regurgitated their own food in the same way as many modern reptiles and birds.
- The mother apparently took great care over the design of the nest. One clutch had 22 eggs, all carefully arranged. Others had seven, 11 or 18. Some clutches had overlapping eggs, or eggs that had been placed in pairs or in a circle. The eggs were not dropped randomly into place, implying that the parent rearranged the eggs after birth and perhaps maintained the nest. Several members noted that even large animals are capable of delicate motor movements. One example is an elephant that can pick up peanuts with its trunk.
- Other palaeontologists have found what appears to be evidence of parental care. At one unrelated site, adult dinosaur skeletons are found close to the young, suggesting they returned to the nest or consorted with their young. Also, there are many nests in Reisz's road-cutting, implying that the adults kept coming back to the same place to lay their eggs.
- These eggs had a soft leathery shell, closer to that of a turtle than a bird. They are very different from crocodile shells.
- The absence of teeth in such well-developed embryos is intriguing. They might have had a different diet, perhaps insects or worms, in the same manner as the platypus which is also toothless. There is no evidence of plant material in the area.
- Studying the embryos is a long, painstaking and expensive task. Embryos skeletons take a year to expose and prepare, a process that costs \$50,000 in labour alone.
- The eggs are covered in dust so fine that Reisz convinced the local fire department to blast away the overburden using their fire hoses. That suggests the eggs were originally covered by windblown or water-borne dust. The area appears to have been dry, perhaps a sand-dune, but there is evidence of a fairly wet aquatic environment in earlier ages.
- Reisz was intrigued by the size variation between embryos and adults. The ratio of about 500-to-one is surpassed only by a giant frog. He suspects that the dinosaurs grew as much as they physically could in a giant arms race where bigger is safer and therefore better.
- Great size leads to difficult problems and complex solutions. A giraffe, let alone a giant dinosaur, has difficulty getting blood to its brain. Perhaps, Reisz suggested, the dinosaurs had auxiliary pumps at stages along its neck. That problem, and others like it, surely limited the ultimate size of the dinosaur.
- Reisz had a little difficulty taking the eggs out of South Africa. but he was helped by local palaeontologists who had offered him their fossils for study.

The speaker was thanked by Kevin Seymour.

#### NOTES & OBSERVATIONS:

- Jim Bendell noticed a great many monarch butterflies near his Ottawa valley home this summer. Purple Loosestrife is less common than in the past, possibly because of the introduction of predatory beetles. But he hasn't seen any beetles. He saw two black-phase Rough-legged Hawks and a Red-tailed Hawk on the way down to the meeting.
- He noted that the Blue Grouse has now been split into two species, as it was originally.
- Enid Machin displayed photographs from her expedition to the High Arctic last summer.
- Jean Iron had recently returned from Massey, Ont., west of Sudbury, where she saw a rare Black Guillemot, a pelagic Auk related to the Murre that is found along the Gulf of St. Lawrence, north to Ellesmere Island. It was only the sixth sighting of the species in southern Ontario. The Guillemot was seen on the Spanish River for about a week before it disappeared. It may have been captured by a Bald Eagle that was hanging around.
- Iron and Seymour both reported another rarely seen Auk, a Razorbill, at the mouth of the Niagara River. It was probably a juvenile.
- Jock McAndrews managed to get free admission to the Toronto Zoo using his Korean War dogtags. While there, he put his time to good use. He had a long chat with the elephant keeper about elephants and mastodons. The elephant, he found, could pick up bits of straw. While at the zoo, he observed two moose, a musk-ox, two grizzlies and 12 Arctic wolves that howled at a passing train. "It was just wonderful," he said.
- Ed Addison noted that wolves will howl at the sound of a boy scout trumpet, while Bruce Falls said wolves in Algonquin Park would howl at the sound of an approaching truck but would ignore the howls of the passengers.

The meeting adjourned at 9:10 pm.

#### NEXT MEETING:

Member Marc Johnson of UofT's botany department will talk on insect plant interactions — *The long reach of the gene: How plant genetic variation shapes insect communities* — at the next meeting, in Room 432 of the Ramsay Wright Zoological Laboratories at 7:30 pm on Dec. 12, 2006. The meeting will be held **one week earlier than usual** because of the Christmas celebrations. Members are invited to bring Christmas cheer.



## Moose Heaven

By Yorke Edwards

Our Western Correspondent

An adult moose is bigger than a horse and can weigh up to 1,700 pounds. By June, the males begin to have large flat antlers that point sideways, and by fall, the antlers are used for winning females from other males. The antlers drop off in early winter.

Through the summer, moose in British Columbia's large Wells Gray Park live in the forests, by quiet rivers, ponds, and shallow lakes. Sometimes, they go into open forests as well.

In early winter, they wander down from their summer places, going miles along a huge, open and gentle slope. Each moose is alone but is usually not far from others that can be seen in the forests. As the snow deepens, they move further down to places with less snow, and most go out of the park.

In spring, they return to Wells Gray Park, going up the slope, slowly in the melting snow, eating willows that seem to be everywhere.

Some years ago, that huge and dense forest burned for miles down a long slope that later became moose heaven. There was a lightning fire that burned all the trees, leaving many scattered poles, all tall and very black. That fire was a sad destruction, but it was heaven for the moose because small willows soon crowded everywhere on

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that long wide slope that is twenty miles long. Willows are first-class moose food, and there was food for many winters.

Through summer, the moose have many places to live. They don't climb up mountains or live in dark forests. A moose doesn't like dense forests. They want open forests, often by the shallow edges of lakes or quiet rivers where they have plants to eat in the shallow waters. Sometimes they go into the forests to eat leaves or lichens from the trees, and sometimes they swim for food or to get away from danger.

Until about 1900, all B.C. moose were living in the northern half of the province. But soon, they were beginning to wander south, as people began opening the forests. Then they spread into B.C.'s southern forests, with a few even wandering into the United States.

Often with my government friend of the region, Ralph Ritcey, we thought about how many moose live in the park. We began to think there were hundreds.

Twenty years ago, he told me that there were about 10 in each square mile of the huge lowland forest park, an area of about 250 square miles. I thought 2,500 might be too many to live in such an area. But twenty years later, Ralph told me that the number is now about 4,000, and maybe more. Y

