

# Research at the Tyrrell Museum of Palaeontology

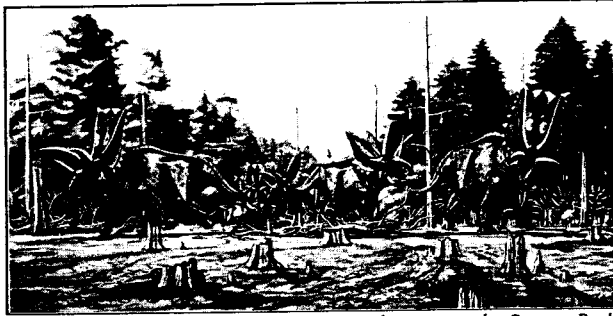
A Multidisciplinary Team at Work

Philip J. Currie, Tyrrell Museum, Drumheller, Alberta

Dinosaurs are more popular today than at any time since their discovery in 1826. And one of the reasons for this popularity is the Tyrrell Museum of Palaeontology in Drumheller, Alberta. When the museum opened in 1985, it was impossible to predict how popular it would be. There were already superb dinosaur displays in Toronto (the Royal Ontario Museum) and Ottawa (the National Museum of Natural Sciences), and the Tyrrell Museum was being created from a small palaeontology program at the Provincial Museum of Alberta in Edmonton. However, since the museum opened, it has managed to attract more than half a million visitors per annum. That is a pretty significant figure for a museum with virtually no advertising budget located in a town of only 7,000 people!

A good part of the success of the Tyrrell Museum can be linked to the research programs at the museum, which have attracted media attention from around the world. A public relations expert once said that the international publicity on the research of the museum is equivalent to more than a million dollars a year in advertising. Media articles and interviews let people outside of Alberta know of the existence of the Tyrrell Museum, and tell them something is going on there that might be interesting to see. Tourism is a major industry in Alberta, and visitors spend millions of dollars in the province when they come to visit facilities like the Tyrrell Museum. In that way, museum research provides a direct economic benefit in addition to all of the less tangible, but intellectually more stimulating, results.

When the museum was created in 1981, I was inspired by



*Chasmosaurus Herd in Dry Cypress Swamp, oil on canvas, by Gregory Paul, 1977 and 1985. Photo courtesy Royal Ontario Museum, Toronto, Ontario.*

the strengths of the palaeobiology programs at the National Museum of Natural Sciences, where the dinosaurian research of Dale Russell was enriched by the complementary research of Pierre Beland and other co-workers at the museum. With the idea of taking a good thing and making it better, we hired researchers who appeared to be good team players to cover sedimentology, palaeobotany (including palynology), invertebrate palaeontology and other aspects of vertebrate palaeontology. As it turned out, both the sedimentologist (David Eberth) and invertebrate palaeontologist (Paul Johnston) had taken their MSc's in vertebrate palaeontology, and their PhD's in their areas of specialization. Scientists do most of the research at the museum, but even technicians, collections managers and administrators are making contributions to the data base through their own research projects. Beyond the walls of the Tyrrell Museum, the team has been extended to include graduate students from the University of Calgary, volunteers from around the world, and adjunct research scientists like Dr. Loris Russell of

the Royal Ontario Museum.

*"The whole is much greater than the sum of the parts"* is an oft-used statement that is applicable to the Tyrrell Museum. Each research component produces publications that stand on their own merit. Within each discipline there is only one scientist, which is too small a program to give the museum a good research profile. However, all of our scientists invest much of their research effort working on the palaeontological and geological resources of the Upper Cretaceous rocks of southern Alberta. Because they work on different aspects of the same subject, they are able to do collaborative research on palaeoecology, palaeoenvironments and other complex subjects. The interaction within the multidisciplinary team will inevitably produce larger scale syntheses and a much better understanding of the biology of dinosaurs and the world within which they lived. It is this team approach that has given the museum widespread attention within the scientific community.

Dinosaur Provincial Park has been a major collecting site since 1912. Yet it was only in the last

10 years that the richness of its resources became more widely apparent. The focus has shifted away from the simple collection of large articulated dinosaur skeletons suitable for display, because palaeontological and geological resources with little inherent exhibition value are capable of providing a much better understanding of dinosaurian palaeoecology. Palynological and palaeobotanical research is providing information on the types of plants that the dinosaurs were eating and living amongst, and gives insight into the climate of the region 75,000,000 years ago. Sedimentological studies are producing a much better idea of what kind of environments the dinosaurs of southern Alberta were living in. Another level of sedimentological study deals with the discovery and analysis of volcanic ashes to develop an absolute time scale that can be used to calculate rates of deposition and evolutionary change, and to make more precise comparisons with other sites in western North America. Fresh water invertebrates tell us something of the environment they were living in, and insects found in amber are surprisingly modern in appearance. Important work is being done on microvertebrate sites, where small teeth and bones are found by the thousands every year. Not that long ago, few vertebrate species other than dinosaurs were known from Dinosaur Provincial Park. Many animals, including small carnivorous dinosaurs and early mammals, are represented only by their teeth, which are found in these microvertebrate sites. By studying microvertebrate remains, we have been able to show that dinosaurs were outnumbered by species of smaller animals (35 species of dinosaurs are currently recognized in Dinosaur Provincial Park, compared with almost a hundred species of fish, amphibians, small reptiles, birds and mammals). The remains of

large dinosaurs are not being ignored either. As many as six articulated skeletons are being found every year, although less than half of these can be excavated. Isolated bones of dinosaurs are being scrutinized as never before, with the result that new species have been recognized. An excavation of a bonebed in progress since 1979 is producing strong evidence that horned dinosaurs were herding animals, and other bonebeds promise to yield good information on the ecology, growth and behaviour of dinosaurs.

Dinosaur Provincial Park has been a focal point for much of the research activities of the museum, but it is not the only site being worked. Good dinosaur skeletons are found in Drumheller within sight of the Tyrrell Museum. A jawbone of *Troodon* found 100 meters from the building was used to resolve a taxonomic problem that had existed since 1856. Three skeletons of *Albertosaurus* were collected within a five kilometer radius of the museum, and a "mummified" *hadrosaur* was discovered recently within site of the building.

Dinosaur bones are found within the City of Edmonton, and a good skeleton of a *hadrosaur* was recovered in 1989. Farther north, near Grande Prairie, a major excavation has been underway on the remnants of a herd of rather bizarre horned dinosaur known as *Pachyrhinosaurus*. Like its close relative *Styracosaurus*, this dinosaur had spikes protruding from the frill over its neck. The horns on the face were converted at maturity into huge lumps of bone that may have been used as battering rams. Alternatively, the boss may have been the base of a much bigger horn made of keratinous material similar to that in the horns of sheep and cattle. One of the most interesting features of *Pachyrhinosaurus* is a horn that protrudes from the middle of the head behind the eyes, which probably made some of these

animals look like clumsy unicorns.

In southern Alberta, the first eggs with embryonic duckbilled dinosaurs inside were found at Devil's Coulee, south of Lethbridge. Devil's Coulee has become a Provincial Historic Site, and some of the nests are being systematically excavated. Volcanic ash used for radiometric dating has shown that the site is very close in age to the rocks at Dinosaur Provincial Park. But there are significant differences in both the rocks and fossils, which indicate differences in the environments of these two sites 75 million years ago. The eggs are being analyzed with CT scan facilities with the assistance of workers at the Foothills Hospital (Calgary), the Royal Ontario Museum and Atomic Energy Canada (see Cab & Crystal, Volume 1, #5). The first skeletons have been prepared, and are giving valuable insight into the growth and variation of duck-billed dinosaurs.

The types of research programs at the Tyrrell Museum of Palaeontology attracted enough international attention in the research community for the museum to be invited to take part in the Dinosaur Project (China, Canada, Alberta, Ex Terra). This project, coordinated by the Ex Terra Foundation of Edmonton, has taken scientists from the Institute of Vertebrate Paleontology and Paleoanthropology (Beijing), the National Museum of Natural Science (Ottawa), and the Tyrrell Museum of Palaeontology to sites in Alberta, Canada's Arctic Islands and China to look at the ancient ties between our two countries. The teamwork within this project is a manifestation of the teamwork needed to study dinosaurs in our modern world. Dinosaurs did not recognize political boundaries, and no single site can provide the clues we need to understand the success and ultimate failure of the mighty dinosaur!

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