Alberta Palæontological Society Bulletin

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ALBERTA PALAEONTOLOGICAL SOCIETY

The Society was incorporated in 1986, as a non-profit organization formed to:

a. Promote the science of palaeontology through study and education.
b. Make contributions to the science by:
   1) discovery
   2) collection
   3) description
   4) education of the general public
   5) preservation of material for study and the future
c. Provide information and expertise to other collectors.
d. Work with professionals at museums and universities to add to the palaeontological collections of the province (preserve Alberta's heritage).

MEMBERSHIP: Any person with a sincere interest in palaeontology is eligible to present their application for membership in the Society. (Please enclose membership dues with your request for application.)

Single membership	$15.00 annually
Family or Institution	$20.00 annually

THE *BULLETIN* WILL BE PUBLISHED QUARTERLY: March, June, September and December.
Deadline for submitting material for publication is the 15th of the month prior to publication.

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UPCOMING APS MEETINGS

Meetings take place at **7:30** p.m., in Room **B108**,
Mount Royal College: 4825 Richard Way SW, Calgary, Alberta

June, July, August, 1998—No meetings: see field trip announcements in March & June *Bulletin*
September, 1998—Annual "Show-and-Tell" session: bring your finds and photos from the summer field season, or anything else you'd like to show off!

ON THE COVER: The design of our fabulous new Society T-shirt! Art by APS member Michael Skrepnick. Copyright © 1998. See ordering information elsewhere in this issue.

President's Message

by Wayne Braunberger

Since my last president's message a number of activities have occurred. The April 9th presentation by **Dr. Phil Currie** was well attended and by all accounts was a huge success. Special thanks to **Kris Vasudevan** and **Vaclav Marsovsky** for doing the bulk of the organizational work. Kris had been working on this since the fall, as considerable lead time is required to arrange for speakers such as Dr. Currie. The presentation could not have taken place without the cooperation of the Department of Geological Sciences at Mount Royal College. **Dr. Wayne Haglund**, chairman of the department, arranged for the lecture hall and the audio-visual equipment.

We have had T-shirts printed with a new design by **Mike Skrepnick**. We ordered a hundred and have sold over half already. In this issue of the *Bulletin* is an order form. Besides doing the artwork, Mike takes care of the ordering of the shirts as well so all we have to do is sell them.

During the month of April a three-evening seminar on vertebrate microsites was held at the Geological Survey of Canada's office in Calgary. A very special thanks to **Dr. Terry Poulton** of the GSC for arranging the use of the boardroom. This is an excellent classroom and we hope to hold more seminars there in the future. The seminar finished off with a field trip to a microsite near Wolf Coulee in southern Alberta.

Field trips are not as well planned as I would like; we are still not sure where and when the August trip will be held. We may have a special field trip to southern Alberta but this remains to be confirmed. Please stay in touch to find out what is happening. The June trip is to Grassy Mountain, near Blairmore (details were published in the March *Bulletin*). The July trip will be to the Manyberries area on July 18 and 19. Further details are include in this issue of the *Bulletin*.

The annual election of the Society's officers and directors was held on May 22. At this meeting **Keith Mychaluk** was elected to the position of events director. Keith will have responsibility for field trips as well as other special events. No other positions were contested.

In the fall we will be evaluating how we go about arranging field trips. I would like to see registration forms in the *Bulletin* as early as December so that we can better plan out the trips. Other things that are being considered are having more than three trips; limits on the number of people on each trip; and special project or educational trips. Any ideas that you have I would like to hear. Have a good summer and I hope to see you on a field trip. ❑

1998 Field Trips

NOTE: Non-members and unaccompanied minors will not be allowed to attend field trips. Read "Participant Responsibilities," below.

Field Trip 98-1: Saturday, June 20, Crowsnest Pass area, Alberta

Meet at the Crowsnest High School, Coleman Alberta, at 10:00 AM. Details of this trip are published in the March *Bulletin* (page 2). Contact **Vaclav Marsovsky (403) 547-0182** or **Wayne Braunberger (403) 278-5154**.

Field Trip 98-2: Saturday and Sunday, July 18–19, Manyberries area, Alberta

Fossil-bearing strata representing a number of Upper Cretaceous marine and non-marine formations are exposed in this area. Contact **Wayne Braunberger (403) 278-5154**.

Meeting Place: Manyberries Hotel, at 11:00 AM, Saturday, July 18. (Consult a road map for directions to Manyberries—south of Medicine Hat, Alberta). **Allow at least 4.5 hours driving time from Calgary.**

Potential hazards: Rattlesnakes

Clothing and equipment: sunblock, hats, rainwear, mosquito repellent, **LOTS** of water, sturdy hiking shoes or boots, food.

Field Trip 98-3: August (date and location to be announced)

Please keep in touch with:
Wayne Braunberger (403) 278-5154 or
Kris Vasudevan (403) 288-7955.

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Field Trip Participant Responsibilities

It is understood that risk is inherent to some degree in all outdoor activities. Please ensure you understand the risks involved and are prepared to accept them.

• As a participant, you are responsible for your

own safety and equipment at all times.

- Trip coordinators are not professional guides. They are simply club members who have volunteered their time for your enjoyment.
- Contact the trip leader prior to the trip and again if you cancel. The leader will be able to answer questions about the trip and required equipment.
- Inform the trip leaders of any medical conditions they should be aware of in an emergency, for example: diabetes, bee-sting reaction, asthma.
- Ensure that your previous experience, ability and fitness level are adequate for the trip.
- Stay with the group. Wait for other group members frequently and at all route junctions.
- Tell the trip coordinator if you must turn back.
- Contribute to car pool expenses
- Enjoy! ❑

Program Summary

by Howard Allen

March 20, 1998
The Human Face of Trilobites, with Dr. Rolf Ludvigsen, Denman Island, B.C.

Dr. Ludvigsen was professor of geology at the University of Toronto until 1987 when he resigned to move to the west coast. He is currently a consulting palaeontologist on Denman Island and an adjunct professor in the School of Earth and Ocean Sciences at the University of Victoria. He served as the first Chair of the British Columbia Paleontological Alliance. Rolf is the editor of *The Trilobite Papers*—an international newsletter for trilobite workers. He is the author of over 50 papers and monographs (mainly on Canadian trilobites), the co-author of *West Coast Fossils: A Guide to the Ancient Life of Vancouver Island* (Whitecap, 1994; Harbour, 1998), and the editor of *Life in Stone: A Natural History of British Columbia's Fossils* (UBC Press, 1996). *

The theme of Dr. Ludvigsen's presentation was the fact that human beings are the "prime movers" in palaeontology. (If you think about it, fossils don't really even exist without humans—we are the only entity that recognizes their existence —to the rest of the biosphere, fossils are nothing more than rocky substrate.) Therefore, to properly appreciate fossils, we must recognize the people who study them, and who have helped us to understand their value to science.

Trilobites have been collected by people for thousands of years: native Americans used trilobites (such as the ever-popular *Elrathia kingi*, of Utah—by far the most abundant trilobite in rock shops and souvenir stands) for necklaces and amulets—in some cases they were supposed by their wearers to deflect arrows. Specimens have been found in graves of the Ute people.

In Canada, the Coast Salish people of the lower Fraser River area traded trilobites over great distances. Dr. Ludvigsen showed a slide of one trilobite amulet consisting of an Upper Cambrian species known only from a single locality near Cranbrook, B.C.

In western (i.e. European) science, Welshman Edward Llwyd was the first to illustrate trilobite fossils (which he called "flat-fish"), in 1698. More than 150 years later, Joachim Barrande—an engineer—produced an exquisitely illustrated monograph on Cambrian, Ordovician and Silurian trilobites of Bohemia. Barrande hired workmen to excavate and collect some 20,000 specimens, allowing him to work out trilobite growth series.

Another important work was a 19th century monograph on British trilobites, by J.W. Salter.

In North America, Elkanah Billings—the Geological Survey of Canada's first palaeontologist —published a number of works on fossils in the 1850s to 1870s. He was the first to describe trilobite legs, confirming that they did indeed belong to the arthropod phylum.

The Smithsonian Institution's famous trilobite expert Charles Doolittle Walcott (discoverer of the Burgess Shale fauna) was a major influence in the study of Cambrian trilobites in the late 1800s to early 1900s. C.E. Beecher, of Yale University, did important work on trilobite limbs. He developed crucial techniques for preparing the delicate legs from flattened shale specimens.

Trilobite science is not without its controversial figures. Many current workers (Dr. Ludvigsen included) consider the work of E.O. Ulrich and C.E. Resser in the 1920s and 1930s to have been a major setback in trilobite taxonomy. Ulrich and Resser were compulsive "splitters," using any minor variation between specimens as an excuse to erect new species, genera and higher taxa. In their aftermath, trilobite researchers are still trying to sort out the confusion.

The undeniable charm of trilobites has lured many people into palaeontology. One of the most unlikely converts was Franco Rasetti, an Italian nuclear physicist. In the 1930s Rasetti was an associ-

ate of Enrico Fermi. Both were key figures in the development of the atomic bomb. After the war, Rasetti ran the physics department at Laval University in Quebec. While there, he found trilobites in the Quebec City area, and was hooked. He wrote many papers on trilobites, including contributions to the *Treatise on Invertebrate Paleontology*.

The list of trilobite researchers reads like a United Nations roll. Teiichi Kobayashi of Japan wrote prolifically on the trilobites of Korea, China, Siberia and other parts of the world, making major contributions to the knowledge of British Columbian faunas. Emma and Rudolph Richter—a wife-and-husband team—collected Devonian trilobites in southern Germany during and after World War I. Archie Lamont, an eccentric Scot who lived like a hermit and published much of his work in obscure Scottish magazines (to the annoyance of many of his fellow scientists) made important contributions on Scottish and Irish trilobites.

The USSR had a large community of trilobite researchers who, sadly, have been decimated by the economic crisis sparked by the collapse of the Soviet Union; very few are left to continue the important work of their former colleagues. Harry Whittington, of the U.K., taught geology in Burma in the 1930s. When the Japanese invaded during World War II, he evacuated to China, eventually returning to England where he worked on silicified trilobites from the eastern United States. As documented by Stephen Jay Gould in his book *Wonderful Life*, Whittington and his students have done major new research on the Burgess Shale fossils; he is still publishing prolifically.

Despite the current lack of funding for palaeontological research worldwide, a number of skilled workers are quietly carrying on with trilobite studies. Brian Chatterton of the University of Alberta works on the ontogeny (growth) of trilobites; his graduate student Kevin Brett (www.ualberta.ca/~kbrett/index.html) studies Ordovician trilobites. Richard Fortey, of the U.K., is doing important work on the underside detail of specimens from Spitzbergen.

Dr. Ludvigsen's own work focuses on silicified Middle Ordovician species from the Nahanni region of the Northwest Territories—often beautifully preserved in three-dimensions. He recently began work on Silurian forms from Anticosti Island in the Gulf of St. Lawrence. ❑

[* *biographical notes provided by R. Ludvigsen*]

April 9, 1998
Theropod Dinosaurs and the Origin of Birds, with Dr. Philip Currie, Royal Tyrrell Museum of Palaeontology, Drumheller

This special lecture, held in the Jenkins Theatre at Mount Royal College, was well attended by APS members (including many who hadn't been seen in years) and members of the general public. The theatre was mostly full, with an audience of probably well over 100.

Dr. Currie's talk focussed on the growing body of evidence pointing to the direct evolution of birds from theropod dinosaurs—suggesting that in fact, from a cladistic point of view, birds *are* dinosaurs. While much of the evidence and theory is not new, Dr. Currie—being privileged to participate in the very latest examination of new specimens from China—was able to shed new light on the subject, and showed us photos of some astonishing fossils.

Dr. Currie's slides showed convincing evidence of the anatomical similarity between birds and dinosaurs, as well as the antiquity of birds and feathers. The slides were shown in a roughly chronological order, documenting Dr. Currie's progressive understanding of the dinosaur/bird relationship. A common theme was the fact that good luck played a large part in many of the discoveries made over the years. An example was the discovery of a large slab of rock covered with hundreds of Early Cretaceous bird tracks from the Peace River Canyon in British Columbia, made by a technician returning to a previously visited site to retrieve a piece of equipment on the last day of the field expedition. Another example: the skin-of-the-teeth luck of Tyrrell technician Kevin Aulenback in jackhammering through a nearly perfect ornithomimid skeleton while excavating fossil plants in Dinosaur Provincial Park…missing the fragile skull by mere centimetres.

Some major pieces in the dinosaur/bird puzzle include:

• The discovery in recent years of numerous dinosaur furculas (wishbones), the absence of which was formerly offered as evidence that birds could not have descended from dinosaurs. Tyrannosaurids and other dinosaurs from Alberta have been found to have well-developed furculas.

• The remarkable similarity in the skull construction and light, hollow bones of dinosaurs such as *Tröodon* (also from Alberta specimens) to those of modern birds.

• The preservation of obvious feathers on many

of the newly-discovered small dinosaurs from China.

This latter point was a highlight of Dr. Currie's presentation, and no doubt the major drawing card for many in the audience. Dr. Currie's startling photos and verbal descriptions of the many feathered specimens being excavated from Upper Jurassic or Lower Cretaceous lake beds in China plainly reveal that much of the recent "feathered dinosaur controversy" can be categorized as little more than political face-saving on the part of the naysayers. As the close-up photos showed in detail, any further speculation that the beautifully preserved structures attached to the skin of these animals—with strong central shafts, secondary parallel fibres, and even downy plumes at their bases—are not feathers, is as futile as believing that the Earth is flat.

Dr. Currie described specimens he'd seen (several hundred examples of the pigeon-sized *Confuciusornis* have already been excavated from the Chinese site) that suggest sexual dimorphism in feather arrangement: specimens showing head crests (like a modern cardinal or jay) and long tail feathers, lying on the same slab with specimens (presumed females) lacking these adornments.

Dr. Currie also neatly pulverized one conjecture making the media rounds recently [see "Diaphragm deflates bird-dinosaur link," *Bulletin*, Dec. 97, page 6]. Allegedly, one of the Chinese *Sinosauropteryx* specimens shows an internal diaphragm separating the liver and other abdominal organs from the chest organs—supposed evidence that *Sinosauropteryx* was more like crocodiles and mammals, and therefore couldn't be directly related to birds. It turns out that the "diaphragm" is nothing more than the curved, broken edge of a layer of matrix overlying a darker, organic stain on the surface of the flattened specimen.

Summing up, Dr. Currie pointed out that even without the convincing evidence of feathers, birds and theropod dinosaurs share over 120 anatomical characters that are held in common with no other groups of animals: strong evidence indeed that the idea of avian descent from theropod dinosaurs is by far the best current hypothesis.

Several entertaining anecdotes—such as the story of Currie and Mike Skrepnick walking into a media ambush in Beijing—kept things lively, as did an extended question-and-answer session following the lecture. ❑

May 22, 1998
Hunting Dinosaurs in Argentina, with Vaclav Marsovsky, APS Vice-President

As a prelude to this presentation, Vaclav was interviewed by CBC Radio host Judy Hamill on her *Daybreak Alberta* program, the morning of Sunday, May 17. We were delighted to hear Vaclav chat for a good 20 minutes (a relatively long interview), with nary a stumble, nor lapse into paralytic terror, as I know I would have under similar circumstances. Well done!

Vaclav's presentation to the Society was a slide-show travelogue of his April 1997 adventures chasing down dinosaur fossils in Argentina with wife Mona. His two articles for the *Bulletin* (June and September, 1997) described their exploration of Argentina's rich palaeontological resources, now illustrated by this slide show.

Starting with the first discovery of dinosaur bones in 1882, Vaclav reviewed the history of dinosaur palaeontology in Argentina, and the scientists who have made major contributions to South American dinosaur palaeontology: Lydekker, in the 1890s; Freidrich von Huene in the 1920s to 1940s; Romer, Colbert, Jensen and Powell in the '60s and '70s; Sereno, Currie and McIntosh in the '90s (note: all foreigners).

Native Argentines began having a major influence in the 1960s. José Bonaparte, the country's leading dinosaur scholar, has published volumes of work to date, having named and described more than 25 species. Younger scientists, such as Fernando Novas and Rodolfo Coria are becoming well-known to the modern scientific community.

Vaclav discussed the palaeogeography of South America throughout the evolution of the dinosaurs, and their relationships to animals of other continents. He then introduced the audience to a number of Triassic, Jurassic and Lower Cretaceous dinosaurs, with numerous slides of original specimens and reconstructions, pointing out distinguishing characteristics and evidence of relationships to other dinosaurs.

Vaclav and Mona were lucky to have visited a number of museums and field localities, and seen many exquisite specimens—they even had the privilege of handling famous type specimens, and meeting some of the palaeontologists doing current research. ❑

[*Thanks to Vaclav for providing lecture notes used to prepare this review –ed.*]

Fossils in the News

Calgary Herald, and
Edmonton Journal, May 15, 1998

Dinosaur specimen gives clues to world evolution

WASHINGTON (AP)—A new dinosaur discovered in Madagascar last year is providing support for the idea that the island of Madagascar was once connected to India, Antarctica and South America, after all four split from Africa, during the breakup of the supercontinent Pangaea, some 200 million years ago.

The announcement of the new dinosaur, a huge 70-million-year-old carnivore dubbed *Majungatholus atopus*, was published in the journal *Science*. According to Scott Sampson of the New York College of Osteopathic Medicine, senior author of the paper, *Majungatholus* is "a dead-ringer" for the South American horned theropod *Carnotaurus*. No similar animal has yet been found in continental Africa, suggesting that *Majungatholus* and *Carnotaurus* evolved after Africa broke away from the other continents.

Indianapolis Star, March 20, 1998

State Museum will house mammal fossils

INDIANAPOLIS—Geologists at Indiana State Museum announced work on a 5.5-million-year-old fossil mammal site in an Indiana gravel quarry. Excavation for fossils will commence this summer. Professor James Farlow of Indiana U.-Purdue U. will lead the team, investigating the oldest mammal fossils known from Indiana.

[*APS member Fred Lewis, who sent in this item writes: "A preliminary investigation has indicated rhinoceros, camel, and tortoise plates which have been identified. A full-scale dig is planned for early June. As I do volunteer work for the Museum's Natural History Department, I hope to be in on the dig." –ed.*]

Indianapolis Star, and
Calgary Herald, March 26, 1998

Scientists keen to study dinosaur's internal organs

LONDON—Italy's first-ever dinosaur find is a spectacular one: a nearly complete baby dinosaur with some of its internal organs preserved. The 33 cm. specimen, of a theropod hatchling named *Scipionyx samniticus* was discovered in southern Italy by a private collector in the 1980s, but announced only this year in the journal *Nature*. Christiano Dal Sasso, one of the paper's authors, estimates the animal may have grown to more than two metres in adulthood. The skeleton is missing part of the legs and much of the tail, but includes traces of the windpipe, large intestine and parts of the liver.

Calgary Herald, June 3, 1998

Fossil-hunter turns up 75-million-year-old dino

CALGARY—A commercial ammonite hunter has discovered the remains of a juvenile hadrosaur (duck-billed dinosaur) along the St. Mary River, near Magrath, Alberta. While the discovery of a hadrosaur usually elicits only a yawn in Alberta, this specimen is different—for two reasons: first, it was found in the Bearpaw Formation, which is a marine deposit, meaning the dinosaur must have been buried a good distance offshore in the ancient sea. Secondly, the specimen includes excellently preserved skin impressions. "I haven't seen such good skin impressions ever," says Tyrrell Museum technician Wendy Sloboda. "It's got just incredible detail on it."

Greg Hopp, an employee of Calgary-based Canada Fossils Ltd. found the skeleton, which so far includes a skull, backbone and some other bones. Hopp spotted a row of vertebrae projecting from the cliff face and called the Tyrrell Museum's Betsy Nicholls, assuming it was the remains of a marine reptile. Dr. Nicholls identified the bones as those of a young hadrosaur, which must have floated out to sea after death, and been buried in the sea-floor mud. A shark tooth has been found in the animal's shoulder area, indicating the carcass was scavenged prior to burial. Museum staff are currently excavating the skeleton, and hope to put the skin impressions on display at the museum, "as soon as possible."

Indianapolis Star, March 19, 1998

Indiana geologist finds dinosaur footprints

INDIANAPOLIS—Indiana University geologist Erik Kvale, scouting a northern Wyoming locality for an upcoming field trip, discovered a major Mid-Jurassic-age dinosaur trackway last May. Researchers from several institutions are to study the site this summer. The tracks are in an area previously considered to be marine in origin, and comprise only the third major site known from this age. Kvale estimates that the site may hold a million or more footprints.

[*Thanks to Fred Lewis and Trudy Martin for clippings. –ed.*]

The Care and Feeding of Sauropods for Fun and Profit

by Sam Richter

Vern Johnson, a lean and vigorous local rancher, was enjoying his first visit to the Calgary Zoo since he was a youngster. He liked big animals and was at the zoo to observe the elephants close-up. He joined the crowd at the elephant compound where two animals were showing off their tricks and skills. The two trainers had an elephant each and different styles of asking for each trick. One used the traditional method of loud commands reinforced by using the elephant stick with a hook, known as an *ankus*, to ensure attention. The other trainer used hand signals and a quiet voice, combined with bribery; after each trick he gave a small reward. Vern was impressed—this elephant did flat spins faster than a good horse could, even though it weighed five times more.

Big elephants are quick and agile enough to play polo. The World Elephant Polo Association (WEPA), founded at Tiger Tops, Nepal in 1982, has applied to the International Olympic Committee for official recognition of the sport. The WEPA Fifteenth Annual Championship matches were held in December '96. The sponsors are blue-chip companies like British Airways and Citibank. Polo teams of four players each come from around the world to compete in Chitwan, Nepal at the Meghauly polo field, which is 70 by 140 metres.

Regular horse polo willow-root balls are used and the specially made elongated polo sticks are over two metres in length. Players sit behind the *mahout* (elephant driver) in a leather saddle equipped with rope stirrups and a jumbo-sized girth to keep the saddle in place. A soft rope goes around the elephant's neck for the player to hang onto with one hand. A game consists of two ten-minute *chukkas*; the eight elephants and mahouts are swapped out at half-time for fresh mounts.

The referee is perched on a huge bull elephant and keeps order among the four-tonne elephants. For comparison, the big male elephant Ganesha (nicknamed "Spike"), in the Calgary Zoo weighs five tonnes—11,000 pounds. There are no restrictions on height, weight, or sex of the elephants. Close cooperation is required between player, mahout, and elephant.

The Canadian team, the Z Ladies, is the first all-female team and the first ever entry from Canada. They won the award for being the best-dressed team, resplendent in white polo shirts, bright red jackets and zebra-print jodhpurs. The team captain is Catherine Lawrence of Toronto. In their first two matches the British Gurka Gladiators and the National Parks teams won. The next round saw the Z Ladies upset the favoured J&B Rare Whiskey team by two goals to one, but losing to the Screwy Tuskers. In the final round the host Tiger Tops won, dropping the Canadians to fifth of the nine entries.

[*Rules, minutes of Committee meetings, and other information can be found on the Internet using "elephant polo" for the search string.*]

Leaving the elephant compound after the show, Vern saw the big brontosaur statue known as "Dinny" on the other side of a large green space and headed toward it. Big statues are a popular zoo attraction. The Calgary Zoo has a life-size brontosaur 31.4 metres long and 9.8 metres tall, built in 1934 of concrete and steel by John Kanerva. Dallas Zoo has the tallest statue in all of Texas, a 20+ metre tall, bronze and Plexiglas giraffe, with a long, 1 metre tongue sticking straight up.

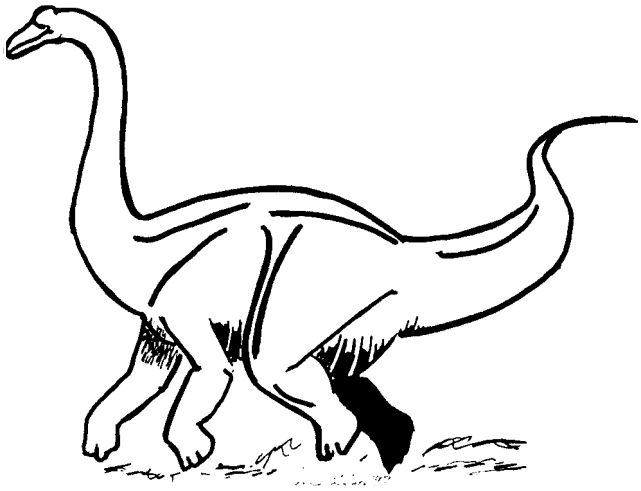
Turn-of-the-century museum people who put dinosaur skeletons together for display purposes seldom had any idea how bones, muscles and tendons work together dynamically to propel the animal at speed. Dinosaurs have changed from being seen as weak, slow and stupid, to being seen today as fast, agile and smart, as in the movie *Lost World.* Newer museum displays reflect this thinking with mounted specimens striking much more dynamic action poses.

Vern enjoyed the speed and thrills of riding and training skilled arena performance horses. He thought that Dinny would look great in an arena performance show. Dinny would be startlingly quick if he had fast-twitch dense muscle like a quarter horse. Sauropods would likely have similar athletic abilities to the elephants he had just observed. A Dinny doing fast manoeuvres would be a treat to see. The aim is to strive for a smooth, flowing performance. The long neck and tail would be expressive as they aided in making manoeuvres.

A big elephant can shuffle along at 32 kilometres per hour for many kilometres. Dinny would be faster because his stride should be much longer, with his longer legs. This speed is more than fast enough for a great sliding stop. Back legs end up under the body with the centre of gravity in line with the back feet. The base of the tail is nearly into the dirt. Front feet bounce off the ground and stay in the air. Now the body is balanced over the back feet. For a rollback to the left, the right rear leg pushes the body to the left, pivoting around the planted rear left foot. Near the 180° point, the front end is dropped and the front legs are jammed into the dirt to the left, stopping the rotation. Then the left rear leg pushes off to get into a run to the other end of the arena. After the sliding stop at that end, the rollback will be to the right, pivoting around the planted right rear foot. Now a hard run to the centre of the arena and, in front of the judges, complete a long, dust raising, deep, trying-to go-to-China, sliding stop! The crowds love it!

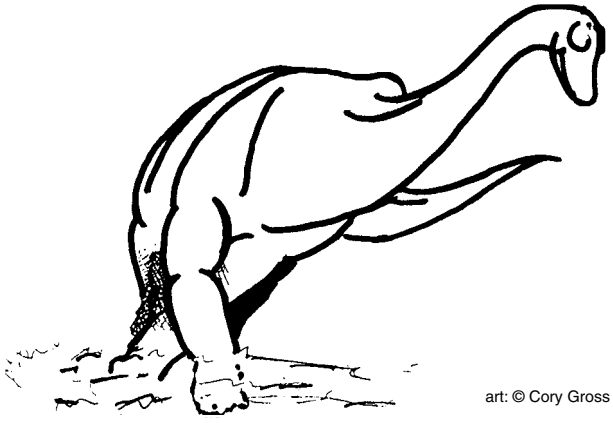
End the show with a smooth, snappy 360° spin to the right, pivoting around a planted right rear foot. The head, long neck and tail are thrown horizontally to assist the start and stop of the spins. Front legs do the propelling. Near the end, the spin is stopped by jamming the front feet into the dirt to the right. Then immediately, a snappy 360° spin to the left, pivoting around the planted left rear foot. Then a 90° spin to face the judges. This stop ends with the head, neck and tail centred and in line with the body. All four feet on the square, directly under the body. A spectacular show!

Amazing actions like these can occur because front legs are not directly fastened to the body. Shoulder blades of the horse partially cover the first six ribs. The blades are separated from the ribs by muscles under the blade and a lot of loose connective tissue with the consistency of foam rubber. This allows the blade to move freely over the ribs when pulled by muscles attached to the border of the blade. This can easily be seen when watching a



cat walk by. The shoulder blades of a cheetah move inches above the top line of its body, as they alternately carry the weight of the body. The front end of the body is supported as if it were in a sling, by the muscles attached to the blades. This gives the front legs freedom of movement while the body remains relatively rigid. The less vertical the blade is, the longer it can be, with the optimum angle being 45 degrees. The top of the leg bone is attached to the bottom of the blade. A large backward and forward movement here allows for free-flowing front leg action and a long sweeping stride. Going downhill fast is a dynamic but possibly lethal test for front leg action. The steepness of the hill determines how far forward the centre of gravity shifts toward the front legs. They may be carrying most of the body's weight. If the front legs cannot reach out ahead they will be tripped up and the body will come crashing down, possibly going end over end, resulting in damaged or broken body parts.

Vern was close to Dinny now and saw the sign: "*…weighing 30 tons…found with gizzard stones…*" Vern had handled actual dinosaur gizzard stones (gastroliths) that were in a private fossil collection. The smoothness was expected but the greasy feeling was a surprise. He had raised chickens and



art: © Cory Gross

knew that birds have gizzard stones to grind up tough, hard material like seeds. Sometimes the seeds are stored for later use in a simple chamber ahead of the gizzard called a crop, where they are soaked in digestive juices to soften them up and start the digestive process. Gizzards are like muscular coffee bean grinders that can somehow pick out the indigestible bits, packaging them up in pellets to be coughed up. Dinny would not require teeth for grinding or chewing.

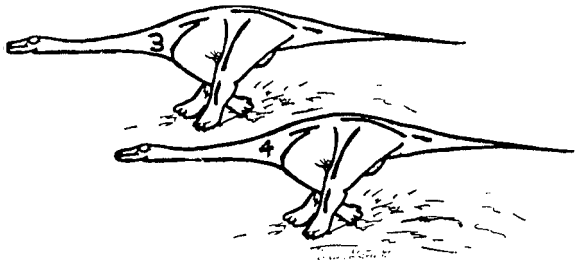
Stepping out of the hot sun, Vern stood underneath Dinny. He noticed the enormous mass above him. Suddenly, a thought occurred to him: what if Dinny really was a bird? What if this mass above him was meat that looked and tasted like chicken? What if it could be sold at the deli counter, packaged up as low-fat, ready to eat in 5 minutes?

Vern would argue over the value of a Dinny with his buddy Billy, the buyer at XL Meats. Dinny should be worth at least $1.67 a pound, live weight, the same as buffalo. Vern got out his cowboy calculator—which is any surface that can be marked and something to mark it with. Here—some bare dirt and a stick. The value of Dinny at 30 tons is $1.67 times 60,000 pounds, which is $100,200.00! This is big money for a single animal!

He had seen the movies *Jurassic Park* and *Lost World*. Those big Dinny-like creatures seemed docile, no horns or long sharp-pointed fangs. They didn't go nuts when motorcycles ran under them. This makes them definite candidates for domestication. In *Lost World*, the dinosaurs were tagged, put into the jungle and left on their own. They did just fine. Taming and maintaining sauropods away from the jungle environment would have some surprises that he would enjoy coping with.

How fast could a Dinny grow? Live birth babies have a head start of many pounds over those hatching from relatively small eggs. How would young Dinnys be kept from getting into the neighbour's place? Electric fences, as used in *Jurassic Park*, would work until the power went off. But when they do get out, how fast do they run—and how far? Could a man riding a good horse head them off? Dinny's tail is long enough, at 12 metres, to easily reach past his front legs; if used on a rider, it would be deadly!

Vern had successfully trained performance horses and raised rodeo bulls. He looked forward to the interesting challenge of raising and training big dinosaurs. The local paper had an article about DNA from 135 million years ago being found in insects that were preserved in amber. Increasing sophistication in transgenic DNA processes and the everyday making of synthetic DNA could make the animals in *Lost World* a reality. A transgenic replica would be just fine. He would be prepared to place an order for six Dinnys to anyone capable of making them. Some of his costs might be defrayed by attracting people to quarter horse and dinosaur races on Saturday afternoons. Might lay a few bets himself!



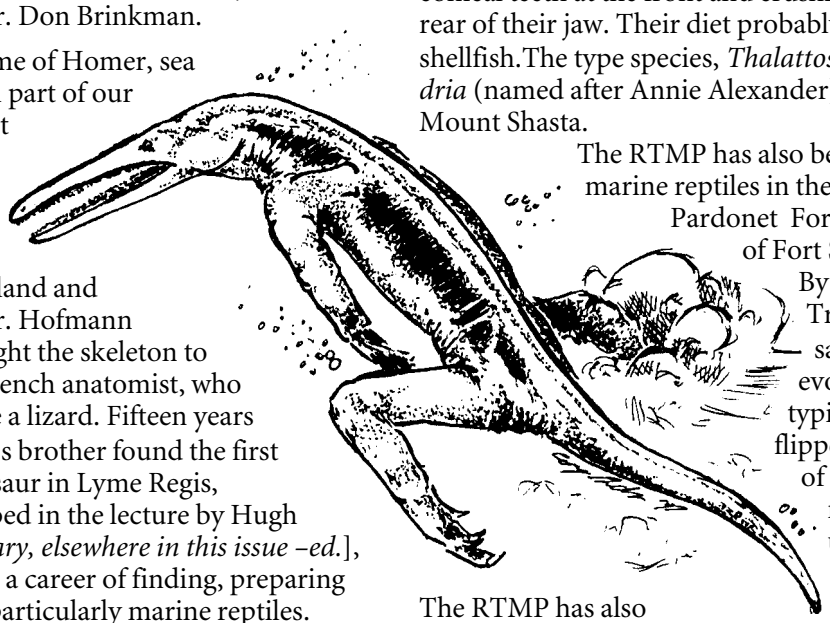
It had been a long time since breakfast. Vern knew a place nearby that cooked what he liked—the way he liked. As he left the zoo, he stopped and bought a season pass…and started musing again…the compensation for the stale air left in Dinny's long neck might be answered by how giraffes dealt with stale air in their long necks… How are blood pressure changes in the head handled when there are large, quick movements up and down, from tree top level to the ground and back? Giraffes don't black out from these quick movements. He would go examine the nearest actual brontosaur skeletons on display in museums, to see if they actually were birdlike, with no chewing teeth…he would check the type and positioning of the shoulder blades…did sauropods sweat? Getting answers to these and other questions would keep him busy for a long time. ❑

Sea Monsters of the Past

by Mona Marsovsky

On April 19, 1998, Dr. Betsy Nicholls, Curator of Marine Reptiles at the Royal Tyrrell Museum of Palaeontology (RTMP), gave a lecture at the museum, describing marine reptiles from the Triassic to the Late Cretaceous.

Dr. Nicholls received her degree at the University of California (Berkeley) and did her postgraduate work in Calgary. She has been studying marine reptiles at the RTMP for ten years now, taking over from Dr. Don Brinkman.



Art: © Cory Gross

Ever since the time of Homer, sea monsters have been part of our mythology. The first Mesosoic marine reptile found was a mosasaur in the Maastricht chalk mines between Holland and Belgium in 1799. Dr. Hofmann studied it and brought the skeleton to George Cuvier, a French anatomist, who pronounced it to be a lizard. Fifteen years later, Mary Anning's brother found the first articulated ichthyosaur in Lyme Regis, England. As described in the lecture by Hugh Torrens [*see summary, elsewhere in this issue –ed.*], Mary Anning made a career of finding, preparing and selling fossils, particularly marine reptiles.

In the late 1880s Annie Alexander, a young woman from the wealthy family that owned California and Hawaii Sugar Company (C&H Sugar), obtained her Life Sciences degree at the University of California. For many years Annie Alexander financed her professor, Dr. John Charles Marion, and his research of Triassic ichthyosaurs in California (Mount Shasta) and Nevada.

In 1985, Dr. Don Brinkman started collecting marine reptiles for the RTMP at Wapiti Lake, in northeastern British Columbia. This area yields Triassic marine reptiles that lived in the ocean near the western edge of the North American continent, at a time when all the continents were united in a single landmass. In the Wapiti Lake region, the Lower Triassic Sulphur Mountain Formation is exposed near the tops of the mountains. Exposures are free of snow only during late July and early August. Most specimens are collected in the scree slopes below because the formation itself is hazardously steep, inaccessible and crumbly.

Last summer the RTMP crew found a primitive ichthyosaur in place on a rock ledge near the top of the mountain. This 25 cm. long specimen had unusually long fingers, a short snout and a skin impression preserved as a discoloration of the matrix. A second type found at Wapiti Lake, the mixosaurid ichthyosaurs, had upper and lower jaws which were quite different, and until recently were mistakenly assigned to different taxa.

Thalattosaurs, another type of marine reptile present in the Lower Triassic at Wapiti Lake, more closely resembled marine iguanas with webbed feet and high neural spines on the tail. They had high conical teeth at the front and crushing teeth at the rear of their jaw. Their diet probably consisted of shellfish.The type species, *Thalattosaurus alexandria* (named after Annie Alexander) came from Mount Shasta.

The RTMP has also been finding marine reptiles in the Upper Triassic Pardonet Formation, north of Fort St. John, B.C. By the Late Triassic, ichthyosaurs had evolved the more typical ichthyosaur flipper appearance of a very short radius and ulna, with disk-like phalanges. The RTMP has also found remains of an unidentified marine reptile with dinner-plate sized (20 cm.) vertebrae in the Pardonet Formation.

Western Canada does not have many exposures of marine Jurassic or Early Cretaceous deposits. In 1992, the RTMP received a phone call from the Syncrude tar sand mine in Fort McMurray, Alberta. Workers had found some of the ribs of an ichthyosaur of Early Cretaceous age while removing the overburden to access the tar sands.

Only one genus of ichthyosaur survived into the Cretaceous and it became extinct by the middle of the Cretaceous. The Syncrude find was only the second specimen of *Platypterygius* found in

Canada. This fossil is currently on display at the Oil Sands Interpretive Centre in Fort McMurray. The following year, Syncrude found an almost complete plesiosaur. The RTMP has spent the last five years preparing this specimen. It is a *Cryptocleidus*, which is an intermediate between the long necked and short necked plesiosaurs. Only one other specimen currently exists in the world and it is at the British Museum of Natural History. Dr. Nicholls' slide showed the gastroliths (stones) which plesiosaurs swallowed to control their buoyancy. In 1994 the Syncrude pit uncovered the severely damaged remains of a plesiosaur with a large head and short neck. The next year a long necked elasmosaur was recovered, but unfortunately the machinery split the specimen open. Each of these finds has been of a different kind of marine reptile, indicating the wide diversity present in the Early Cretaceous.

In the Late Cretaceous, the inland sea was full of mosasaurs and plesiosaurs, especially in the Bearpaw Formation shale, as found near East Coulee, Alberta. Even the Horseshoe Canyon Formation has yielded a few marine reptiles (e.g. a tiny plesiosaur). Plesiosaurs swam up rivers and have even been found in Dinosaur Provincial Park.

Fossil evidence shows that ichthyosaurs gave birth to live young, but it is unknown whether plesiosaurs or mosasaurs bore live young.

In terms of modern day "sea monsters," the Loch Ness monster was recently shown to be a hoax consisting of a toy submarine with latex neck. Other "finds" of sea monsters have been discredited as either giant squid tentacles, or basking shark corpses whose gill baskets have worn away. ❑

Welcome New Members!

Diane Adler, Calgary, AB
Darren, Hayley & Chelsea Amberson, Calgary, AB
Lawrence Dohy, Calgary, AB
Virginia Friedman, Mansfield, TX, USA
Harry Gluth, Edmonton, AB (welcome back!)
Paul Godard, Calgary, AB
Amr Khedr, Calgary, AB
Ibrahim Lababidi, Alain, Abu Dhabi, UAE
The Laurion Family, Calgary, AB
Dale MacCormack, Bolton, ON
Irina Markhasin, Calgary, AB (welcome back!)
Dan and Valerie Quinsey, Calgary, AB
Bryan Richmond, Calgary, AB
Dr. Art Sweet, Calgary, AB
Harold Whittaker, Calgary, AB
Darla Zelenitsky, Calgary, AB

(A full member list will appear in the next Bulletin!*)*

Mary Anning, 1799–1847: a Pioneer in Palaeontology

by Vaclav Marsovsky

Dr. Hugh Torrens, a visiting professor from the U.K., gave a very informative and entertaining lecture on April 5, 1998 at the Royal Tyrrell Museum of Palaeontology.

Dr. Torrens has done historical research on the Mary Anning story and is planning to write a book to document his research. The Mary Anning story has not yet been portrayed accurately.

Mary Anning is thought of as a child prodigy, a genius of discovery and an expert extractor and preparator. Her fossil finds are distributed throughout the museums of England. Her story relates an extraordinary achievement because the science in those days was dominated by men and academics. Here was a woman making a livelihood doing science who came from the working class.

Lyme Regis is a small town on the south coast of England. Rain and waves contribute to the high rate of erosion on the cliffs of Jurassic marine sediments. This is the environment where Mary Anning spent her time hunting for fossils.

Mary Anning first came to the attention of the scientific community at the age of 12, with the discovery of an ichthyosaur. The bones of this five-metre animal were first thought to be the remains of a crocodile, but were later identified as an ichthyosaur, a marine reptile. Dr. Torrens indicated that evidence seems to suggest that her brother found it instead. Therefore her first major "discovery" may not have been hers. Today only the skull survives; no one knows what happened to the rest of the skeleton.

The Anning family owned a fossil shop in Lyme Regis. This was a shop with showy fossils facing into the street behind a large display window and hundreds of specimens inside. After the death of her father, the family was supported by the sale of fossils. Mrs. Molly Anning, Mary's mother, was a

dealer while Mary was growing up. As Mary got older she ran the business. The important discoveries fetched huge sums of money even in those days, which most museums could not afford. Fossils were sold to middlemen who in turn made arrangements with museums through donations or otherwise. The middlemen are often recorded as the discoverers of the fossils; therefore while many of Mary Anning's fossils are on display in English museums, hardly any of them are labelled with her name as being the discoverer. Dr. Torrens suggests that the "hunters" and not the "gatherers" should be honored and credited.

Her second famous discovery was made in 1821 when another ichthyosaur was found. This was a small (1.5 metre) specimen. It was in perfect condition, even better then the first. The British Museum could not afford to purchase the high quality specimen. The specimen was lost during a bombing raid in World War II and only renderings remain today.

Mary's third famous discovery was a plesiosaur, in 1823. This specimen generated a great deal of controversy between British academia and Dr. Georges Cuvier, the French comparative anatomist. No one had seen a plesiosaur before and because of a short break in the neck, accusations were made that the specimen was a forgery —that the head did not belong to the lizard's body.

In 1829 a second plesiosaur was found. William Buckland stepped in to keep this national treasure on British soil, otherwise it was destined for Philadelphia, USA.

In 1829, Mary Anning's fourth major discovery was a fossil fish. Most of this specimen was destroyed in World War II—only the tail survived because it was kept in another museum at the time. Only three such rare fish have ever been found.

In 1830, Mary Anning made her fifth and last major discovery, another plesiosaur. This was the best quality plesiosaur fossil ever found.

Mary Anning died of breast cancer in Lyme Regis at the age of 46. Dr. Torrens is one of those urging museums to give Mary Anning the credit due for the discovery of the fossils on display in their halls. Mary Anning never published any scientific papers on her discoveries.

The famous tongue-twister "She sells sea shells by the sea shore" was invented in her memory. ❑

Check our web page!

www.geocities.com/SoHo/9094/aps.html

Reviews

The Dechronization of Sam Magruder
by George Gaylord Simpson
St. Martin's Press, N.Y., 1996
ISBN 0-312-13963-2

Fans of dinosaurs and science fiction will enjoy this little book—a 137-page novella—by one of this century's biggest names in vertebrate palaeontology. The manuscript for *Sam Magruder* was discovered among Simpson's personal effects after his death in 1984, by his daughter, writer Joan Simpson Burns, who made the effort to have it published. The book includes a foreword by Arthur C. Clarke, who points out the clear influence of H.G. Wells' *The Time Machine*, and an analytical afterword by Stephen Jay Gould, discussing the palaeontological significance of parts of the story, and what they reveal about Simpson's attitudes and personality.

Sam Magruder is a "chronologist" experimenting on the physics of time in his laboratory, in the year 2162. A minor goof with his time analyzing machinery results in his "dechronization" a few tens of millions of years back to the Late Cretaceous Period, with no hope of return to the present. What follows is an entertaining account of his harrowing misadventures with various dinosaurs and his efforts to survive in the Mesozoic world. Playing the conscientious scientist, Magruder records his adventures and thoughts on slabs of sandstone, then buries them in a muddy lagoon in the hope that future scientists might, by the slimmest of chances, discover his report. As luck would have it (of course!) the engraved slabs are turned up by archaeologists just a few years after Magruder's disappearance, and his story is revealed.

Human adventures with dinosaurs are a perennial theme in science fiction writing, and we've all read or watched more than one example. As a fiction writer, Simpson was no Mahfouz, but he far outclassed the folksy musings of fellow palaeontologist Charles H. Sternberg in *Hunting Dinosaurs*, and employed a lot more of the basic elements of good writing (character development, description, figures of speech, humour) than the bland, meat-and-potatoes combination of concept and suspense offered up by Crichton's *Jurassic Park*.

Readers who have followed the various controversies in dinosaur palaeontology will be amused

by Simpson's allusion to several palaeontological concepts; including the idea of evolutionary stasis, and a thinly-veiled jab at Bob Bakker. (Simpson was firmly rooted in the "old school," believing all dinosaurs to be cold-blooded and stupid.) In case you miss any of these references and in-jokes, Stephen Jay Gould points them out in his afterword, along with several important insights into the psyche of George Gaylord Simpson, the scientist and human being…oh, yes…and in case you've forgotten—since your last reading of a Gould essay—what "hagiography" and "hermeneutical" mean, you'd better have your dictionary close at hand.

– Howard Allen

This View of Life: Unusual Unity
by Stephen Jay Gould. *Natural History*, April 1997, p. 20–23, 26–71.

Gould first discusses mindsets which delay now-accepted theories by decades. With humans, increasing brain size represents a major trend and is the key to our species' extraordinary history of spread and domination. This does not imply that human history since the split—six to eight million years ago—of our ancestors from the common stock that also generated chimpanzees and gorillas should be interpreted as a linear step in brain power, with stragglers or groups that failed "to go with the program" relegated to extinction as side branches on an inevitable dead end. Different theories can account for brain volumes starting at 300 cc and ending up as high as 1300 cc.

Palaeontologists have favoured the linear view due to a cultural bias. The growing strength of the "bush making and pruning" view and retreat from the linear view is being supported by twentieth-century discoveries.

Niles Eldridge labels the two approaches to trends as "taxic" and "transformational." In the taxic or "bushy" theory, trends require a substantial production of independent species. The next change in a lineage depends upon a proliferation of some species, with extinction of others.

In the linear or transformational theory, trends require no bush or species but arise by the competitive success of favourable traits in a gradually progressing unit. According to "the single species hypothesis" only one hominid species could, in principle, occupy a single region at any one time.

In 1977 Brace and Montagu specified four sequential stages (linear view): 1) australopithecine, 2) pithecanthropine, 3) neanderthal, 4) modern.

Gould summarizes the change of thinking from the linear to the bushy view of our evolutionary history in five sequential discoveries and arguments as follows: 1) two branches of australopithecines—*A. africanus* and *A. robustus* (there is also *A. boisei*). 2) Coexistence of *Australopithecus* and *Homo*. Richard Leakey found both genera in the same strata. 3) The plethora of African species between three million and two million years ago—as many as six co-existent species. 4) Bushiness in later human history—the Neanderthal issue. Gould gives an extensive discussion of these theories, including "out of Africa" versus "multiregionalism." 5) More bushiness in later human history—new data from Asia. Three species of *Homo* coexisted as recently as 30,000 to 40,000 years ago.

Gould completes his essay discussing social issues that go beyond my palaeontological concerns. This is a very worthwhile essay to read over.

–Les Adler

It's an Elephant's Trunk! by Jeheskel Shoshani. *Natural History*, November 1997, p. 36–45.

Jeheskel studies both modern and fossil elephants. This article fuses his research from both the present and the past. Here he is concerned with the evolution of the trunks of elephants resulting in the two remaining forms—the African elephant, *Loxodonta africana*, and the Asian elephant, *Elephas maximus.*

The earliest ancestors of elephants and their kin lived 55 million years ago and were the size of small pigs. Some of these had a mobile upper lip. During the geological epochs that followed the proboscideans became bigger and taller, with their heads increasingly further from the ground. Natural selection favoured those with elongated mandibles or jaws for reaching food. The centre of gravity moved, the heads and jaws became shorter and the snout combined with the upper lip to become a long flexible proboscis.

A simplified family tree diagram illustrates twelve genera from the Eocene Epoch to the present. (There are about 160 species known.) The functions and development of the trunk of modern elephants can be studied, as well as the frozen remains of extinct woolly mammoths, so that conclusions can be made as to the grasping methods and dexterity of the trunk from species to species.

This knowledge is useful to ensure the survival of the existing two species.

–Les Adler ❑