Palæontological
Alberta
Society
Bulletin

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ALBERTA PALÆONTOLOGICAL 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 **B101** (or **B108**, across the hall)
Mount Royal College: 4825 Richard Road SW, Calgary, Alberta

December 14, 2001—Palaeo Photo Contest and Pot-Luck Dinner.
January 26–27, 2002—6th Annual Symposium. See details, Page 15.
February 15, 2002—Lisa Bohach, University of Calgary: Trilobites of the Cranbrook Area, BC.

ON THE COVER: Alberta fossils—Teeth of the mollusc-eating freshwater ray, *Myledaphus bipartitus* Cope, one of Alberta's commonest vertebrate fossils. Upper Cretaceous, Horseshoe Canyon Formation. Upper photo shows a fresh occlusal surface; lower photo is another specimen, the result of crunching a few too many mollusc shells. Both magnified 14.5 times. Photos by Howard Allen. Have you got a rare, unusual, or spectacular Alberta fossil we can showcase on a future cover? Please contact the Editor!

Proposed Dues Increase

by Dan Quinsey, Secretary

Important Notice of Motion

The following motion to increase membership dues will be presented during the annual general meeting of May 24, 2002.

Motion: *To increase membership dues for the Alberta Palaeontological Society to $20.00 for a Single, Family or Institutional membership commencing with the 2003 calendar year.*

The annual fixed expense for each membership whether it be a single, family or institutional membership is $16.85. This figure will rise when we take into consideration postal rates, general inflation, and the increasing cost to bring in speakers for general meetings and the annual symposium. Currently we are collecting $15.00 for a single membership and $20.00 for a family or institution.

In order to continue to provide the calibre of speakers we have had in the past and avoid operating the Society in a deficit position, the board of directors are proposing an increase in membership dues to $20.00 for a single, family or institutional membership commencing with the 2003 year.

In accordance with the bylaws of the Alberta Palaeontological Society, any change in membership fees shall be determined from time to time by the members at a general meeting. Only members in good standing with the Society may vote on this motion. Voting must be done in person and not by proxy or otherwise. Although 15% of the voting members are required to constitute quorum at the annual general meeting to vote in elections, only 10% of the voting members are required to constitute quorum in order to pass a motion regarding membership dues. A majority show of hands will pass the motion.

The Board of Directors feels this motion must be passed at this time in order to continue with the programs and events we have become accustomed to and to remain solvent as a society. ❑

New Provincial Park Boundaries

by Keith Mychaluk, Events Coordinator

Many APS members avidly collect fossils near Dinosaur Provincial Park and Dry Island Buffalo Jump Provincial Park.

Also, the APS itself has conducted field trips near both of these parks. However, we all need to be aware of recent park boundary changes, which can be found on the internet at the following site: **www3.gov.ab.ca/env/parks/lrm/index.html**. By clicking on the "Provincial Parks" link, one can locate maps and legal land descriptions of the current park boundaries.

Maps of Dinosaur Provincial Park and Dry Island Buffalo Jump Provincial Park (among others) can be downloaded from the site as Acrobat PDF files and printed at high resolution. Please note that the new southern boundary at Dinosaur Park now encompasses the popular "Wolf Coulee" or Bonebed 120 microvertebrate fossil site, which was the venue of an APS trip back in 1999. Apparently new, albeit small, Provincial Park boundary signs have been posted, but I have been unable to confirm this. Also, additions to Dry Island Park have been made downstream at the popular campgrounds on both sides of the Red Deer River at Tolman Bridge. I can confirm that new signs have been posted there. I do not know when the changes at either park were made.

Before planning future trips, please refer to the above website and make sure you avoid collecting in a park. However, I must criticize the provincial government for not making these changes more public. Signs around Dinosaur Park are rarely visible and, in many cases, have been knocked down. The signs merely say "Alberta Provincial Park Boundary" and do not discuss fines for illegal fossil collecting or trespassing. Furthermore, the province or the Tyrrell Museum (who certainly must be aware of the changes at Dinosaur) should formally contact the APS about any changes to park boundaries near fossil collecting localities. Since the APS represents over 120 individuals and groups interested in Alberta fossils, we make an obvious choice for advertising changes. Obviously these park boundary changes are meant to protect natural resources, but what if no one in the greater public is aware of them? ❑

Proposed Field Trips for 2002

by Keith Mychaluk, Events Coordinator

Onefour area, Alberta
June 22–23, 2002 (Saturday and Sunday)

We will return to the same area we visited in 2000 to search for more microvertebrate fossil sites in the Oldman and Dinosaur Park Formations (Late Cretaceous). On this trip, we will explore for new localities. Accommodations and gas stations are sparse in this region of Alberta, so please plan ahead. Campgrounds are located in Foremost, Cypress Hills and Medicine Hat. The nearest motel accommodations are in Medicine Hat.

Fernie-Sparwood area, BC
July 20–21, 2002 (Saturday and Sunday)

Our host for this year's successful trip to Cranbrook, **Guy Santucci**, will once again help lead one of our trips. We will explore a variety of Jurassic and Cretaceous plant fossil localities in the Fernie-Sparwood coal mining district. The first day's activities will centre around Fernie, so it's best to make accommodation arrangements there. On Day Two, we will journey a short drive to neighbouring Sparwood.

Little Rocky Mountains, Zortman, MT, USA
August 16–18, 2002 (Friday–Sunday)

Wayne Braunberger will help lead our second excursion into Montana. Unlike the first trip, this trip will centre activities around a single town, Zortman. As such, the APS will not arrange transportation, but we will assist with group accommodations (more to follow). Wonderful exposures, near Zortman, of Mississippian and Jurassic-aged rocks yield a variety of marine invertebrate fossils including crinoids, brachiopods and ammonites. The University of Saskatchewan has been using this area for teaching geology students for years. An opportunity to visit an open-pit gold mine may also be added. Dates will be finalized in time for the March 2002 *Bulletin*.

In an effort to improve APS field trip safety, several new measures will be adopted for 2002. These will include a "buddy system," new safety equipment and—perhaps—formal first-aid training for some members and trip leaders (more to follow in the coming months). Currently we are looking for donations of safety equipment, including first aid kits, flares, pylons, "bear bangers" and reflective safety vests.

Please contact Keith Mychaluk, Events Coordinator, for more information: (403) 228-3211, Email: events@albertapaleo.org. Watch upcoming *Bulletin* issues for more details. ❑

Program Summary

by Mona Marsovsky

September 21, 2001
Reconstructing the Past. By Gilles Danis, Prehistoric Animal Structures (PAST)

At the September meeting, Mr. Danis illustrated the trials and tribulations of mounting skeletons and how scientific research is essential to determine the best mount for a particular animal.

Gilles Danis graduated with a BA at the University of Laval in 1965. Under the leadership of Dr. Dale A. Russell, Gilles began his career of mounting dinosaur skeletons for the Canadian Museum of Nature. In 1979, he moved to Alberta at the insistence of Dr. Philip Currie, to head the mounting program at the Provincial Museum in Edmonton and later the Royal Tyrrell Museum in Drumheller. In 1989, Mr. Danis started Prehistoric Animal Structures (PAST), a company that specializes in mounting fossil remains of various animals, ranging from insects to dinosaurs. So far his company has mounted over 400 specimens.

Mr. Danis took us on an entertaining tour of the challenges of mounting specimens. Under the subheading "I'll Never Do That Again," Mr. Danis showed us the logic of using modern animals to help determine how dinosaurs and ancient mammals might have stood and walked. He used numerous examples of both poor and excellent reconstruction to illustrate these ideas. Mr. Danis concluded that it is important "not to force your ideas on the skeleton."

October 19, 2001
Komodo! The Mythology and Evolution of a Dragon. By Philip and Peter Benham

Philip Benham and son Peter described the palaeontology, anatomy and behaviour of the Komodo dragon (*Varanus komodensis*, a member of the monitor lizard family). Philip described the first encounters of white men with the dragon from the remote Indonesian island and the mythology that surrounds the dragon.

The varanoid family originated in the Late Jurassic. The Komodo dragon, monitor lizards and gila monsters belong to one branch, while the snakes make up the second and mosasaurs belong to a third branch. The monitor lizards first appear in the Late Cretaceous of Mongolia. Fossils of the monitor lizards are rare until the Eocene. Eocene remains include those found in the Canadian Arctic at Axel Heiberg Island. The genus *Varanus* evolved in North America, expanded to Asia and then reached Australia 15 million years ago.

Megalania prisca, a 7 m long, one tonne varanoid lizard with a skull 80 cm long, chased giant mammal fauna (including wombats the size of hippos!) in Australia until that lizard became extinct 35,000 years ago. The varanoids have spread to areas ranging from tropical jungles to subtropical deserts and live in every continent except South America and Antarctica. No other animal genus has as large of a size range as *Varanus*, which includes both tiny lizards and the Komodo dragon.

Philip discussed the reasons why isolated populations, such as those on islands, tend toward either dwarfism or gigantism. The large size of the Komodo dragon is probably due to the lack of predators, lack of competitors and the large size of its prey.

Philip showed slides from his trip to Komodo Island National Park to visit the dragons. The Komodo dragon is an ambush predator that is 2.5 to 2.8 m long and up to 80 kg in weight. Being cold blooded, the dragons move slowly except for short bursts of speed when ambushing prey. What they don't kill outright often succumbs from blood poisoning due to fifty-two different kinds of bacteria within the dragon's saliva. The dragons have been observed following their victim for two weeks waiting for the toxic effects of bacteria to take over. Some think that the dinosaur *Allosaurus* depended on the same toxic bite to bring down its prey.

Philip described the anatomy and behaviour of the Komodo dragon. A dragon can eat 80% of its weight in one sitting, which, it was pointed out, would be equivalent to 10-year-old Peter Benham eating his 5-year-old brother Ryan for supper. Philip compared and constrasted the Komodo skull and skeleton with those of dinosaurs. He concluded his talk by describing the greatly reduced habitat of the Komodo dragon and the need to conserve these special animals. ❑

Other Talks of Interest

by Philip Benham, Program Coordinator

The Royal Tyrrell Museum is running a Friday speakers' series through the spring. To see which talks are upcoming, please check out their website: **http://www.tyrrellmuseum.com/whatshot/whatshot.htm**

The Archaeological Society of Alberta, Calgary Division, presents the following talks which may be of interest to APS members. All are held at the University of Calgary in Earth Science 162 at 7:30 P.M.

Wednesday, January 16, 2002
Cities in the Sand: the Graeco-Roman Sites of Libya by Dr. John Humphrey

Wednesday, February 20, 2002
Pre-Contact Inuvialuit Culture in the Outer Mackenzie Delta by Dr. Charles Arnold

Wednesday, March 20, 2002
Variation in Mainland Saladoid Site Environments and the Implications for Island Colonization by Dr. Richard Callaghan.

Wednesday, April 17, 2002
Burial Practices and Mummification at Huaquerones-Puruchoco, an Inca Cemetery in Central Peru by Jocelyn Williams

Phone K. J. Braaten at (403) 239-3970 or email kjbraaten@aol.com for more information on Archaeological Society of Alberta talks. ❑

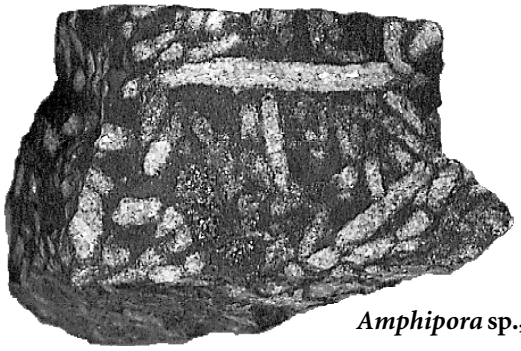
Bookmark our website!
www.albertapaleo.org

2001 Field Trip Reports

Cripple Creek, Alberta August 18-19, 2001

by Keith Mychaluk

A small but determined contingent of APS faithful undertook the challenge to reach Cripple Creek on the last field trip of the summer. The mountainous Cripple Creek area, northwest of Rocky Mountain House, Alberta, is famous for its exposures of late Devonian-aged carbonate reefs and reef margins.



***Amphipora* sp., x1**

Petroleum geologists searching for oil and gas in Alberta have long associated the Cripple Creek rocks with those of the economically valuable Leduc Formation, source of major oil discoveries in the 1940s and 50s. Fossil stromatoporoids in Leduc reefs have been leached out in the subsurface of Alberta, creating a network of holes (*porosity*) that are interconnected (*permeability*) creating a natural reservoir for oil to reside. Since the Cripple Creek reef is exposed, geologists can more closely study it.

Reaching Cripple Creek, however, is a rather "bumpy" experience. From the Ram River Falls Campground, we branched off to the west and took the Onion Lake Road, which quickly deteriorates into a potholed minefield. Fortunately, like much of Alberta this past summer, the area was very dry and no mud was encountered. Our trucks were certainly "shook up" though; my truck now has several new rattles and squeaks as a result.

Once we reached our turn-off, we hiked several more kilometres to reach Cripple Creek. At the base of the main outcrop area, the creek was littered with fossil stromatoporoids (mainly *Amphipora*)—there was limited fossil diversity observed on our short trip. Most of our time was spent rummaging for samples in the creek bottom, though a few of us headed up the mountain to view the outcrop. Unfortunately we ran out of time to hike up neighbouring Tina Creek to view the off-reef exposures, which are reportedly highly fossiliferous. The trip was well worth the effort, especially on such a beautiful day in the mountains.

PAST Workshop Tour, September 22, 2001

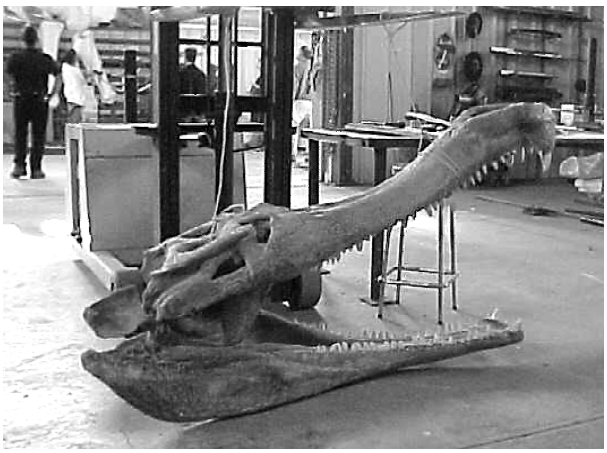
by Mona Marsovsky

On Saturday, September 22, Mr. Gilles Danis (see Program Summary, elsewhere in this issue), led fourteen APS members through the workshops of Prehistoric Animal Structures Inc. (PAST) in East Coulee, Alberta, for a two-hour tour. PAST is involved in all stages of reconstruction, including removal of fossils from field jackets, making molds and casts and then assembling the skeletons.

PAST's first project was a *Brachiosaurus* mount (12 m high, 23 m long), which had to be built in

***Seismosaurus hallorum* under construction. Host Gilles Danis in white sweatshirt. Photo by Vaclav Marsovsky.**

two pieces (neck and head in a separate piece) due to the 8.5 m height of their workshop. This specimen guarded the inside entrance to the Field Museum in Chicago, until the upstart "Sue" the *T. rex*, took its prominent spot at the entrance. The *Brachiosaurus* was relocated to O'Hare International Airport in Chicago.



Reconstructed skull of the giant African crocodile *Sarcosuchus imperator*. Photo by Vaclav Marsovsky.

APS members viewed the progress of the mount of *Seismosaurus hallorum*, being assembled for a museum in Japan. Mr. Danis outlined the challenges of reconstructing this specimen, probably the biggest sauropod in North America (32.5 m long), using only the limited body parts found to date (vertebrae, pubis, ischium, sacrum). Information from *Diplodocus* was used to help fill in the missing pieces.

PAST is also reconstructing *Sarcosuchus*, a 13 m long crocodile with a 1.6 m long skull, using the information gleaned from an excellent skull found by Dr. Paul Sereno in the Niger desert.

A Columbian mammoth looked ready to head for its new home in Hidalgo, Texas. Mr. Danis allowed APS members to help pack an Orca killer whale skeleton for shipment to the Calgary Science Centre. A Calgary company creates the shipping containers. First the skeleton (divided into 3 parts) is placed in the plywood shipping container. The partial skeleton is covered with plastic. The empty spaces are then filled with an expanding foam, which then hardens to create a custom-fit package. Repacking the specimen is a matter of figuring out which piece goes where.

All of the APS members enjoyed the tour, which gave us a much better understanding of the science behind mounting skeletons. APS would like to thank Mr. Gilles Danis for volunteering his time to provide both a Friday lecture and a Saturday morning field trip. ❑

Palaeo Santa's Hideout?

by Philip Benham (copyright, © 2001)

[*The following is an extract from Phil's work in progress, tentatively titled "Trips Through Time: Western Canadian Excursions to the Palaeontological, Historical and Just Plain Weird." –ed.*]

About 160 km east of Haines Junction, along the Alaska Highway towards Whitehorse, is the junction with a road that leads south to Kusawa Lake. There is a viewpoint 3 km in and a lakeshore campground at 24 km. Icefields in the Kusawa Lake area have yielded gifts from the past that some people might define as crappy but to a select group of scientists and the local First Nations the gift has been a goldmine of information.

In 1997, in the mountains around Kusawa Lake, west of Whitehorse, a researcher stumbled across a thick layer of dung melting out of glacial ice. That in itself is not unusual, for caribou like to congregate on the snowfields to get away from insects.

Discoverer Gerry Kuzyk knew caribou dung when he saw it, but he also knew that there were not enough local caribou to produce the volume of dung he had found. The massive layer of dung, then, was likely evidence of a large herd that had lived there sometime in the past. The question was: how far into the past? No one was prepared for the answer radiocarbon dating gave: 3510 years BP.

I have noticed that, in fossil hunting, people often don't find much until they get their eye in tune with what they are looking for. In this case, no one had thought to systematically look for items of archaeological or palaeontological significance in melting glacial ice. Sure, there were stories of hikers or climbers melting out of the ice in the Alps decades after they had fallen to their depth. But artifacts and animal remains thousands of years old? Rare indeed. Perhaps it was the discovery of "Otzi," the frozen body of a 5300 year old Bronze Age man, discovered in the Alps in 1991 that was the spark for the more recent discoveries.

As soon as Kuzyk discovered this site, scientists began searching for black streaks in the snow patches and glacial ice of the southern Yukon. In a few years, upwards of 80 of these sites had been recorded. All of them are east of the Coast

Mountain Range. The timeliness of the discovery and the urgency of the recovery can't be underestimated. As the ice continues to melt back, new materials are being exposed. The less resistant materials decay and the tougher items remain, slowly weathering.

The discovery of the caribou feces (they can't be called coprolites as they haven't been lithified) and associated artifacts is very recent, but has set off a whirlwind of research. Besides the dung, skeletal remains of caribou, bison, mountain sheep, small mammals and birds have been recovered from the ice (Farnell et al, 2000).

Rick Farnell is a caribou biologist working for the Yukon Department of Renewable Resources. What excites him is the ability to track the population distributions of ancient herds of caribou. Genetic material can be extracted from the organic remains (such as teeth, fur, antlers) and will help to track the evolution of the caribou since the last ice age. The oldest patch of caribou dung so far dates back over 8000 years, plenty of time to see subtle changes in DNA as the various herds evolved.

When Gerry Kuzyk brought other people to the site near Kusawa Lake other treasures were soon discovered. Besides caribou poop it turns out that native artifacts were associated with these "organic rich" layers. These sites all lie within the traditional hunting range of the Champagne and Aishihik, Carcross-Tagish and Kwanlin Dün First Nations and coincide with oral traditions regarding hunting caribou in the region. The first artifact found was the wooden shaft of an atlatl. This tool was used to throw spears, and was dated to 4300 years BP, making it a very important find. The site is now called Thandlat or "sharp-pointed mountain" in recognition of the atlatl discovery. The atlatl uses the principle of the lever, showing that these people were technologically adept. Between 3000 and 4000 years BP, newer technology swept south from the High Arctic. The bow and arrow began replacing the atlatl, being of surer aim and greater distance. Within 1500 years BP it had fully replaced the atlatl and spear as weapon of choice throughout the continent.

Greg Hare, Yukon Heritage Branch archaeologist, and Sheila Greer, under the employ of the Champagne-Aishihik First Nation are playing a major role in coordinating the research on the artifacts associated with the caribou feces. What is exceptional about the artifacts is the fact that not only stone implements are found. The acidic nature of soil typically leads to the rotting away of any wooden implements. Glaciers, the ice locker of time, as it were, preserve these wooden implements much better. What are the odds of recovering a several-thousand-year-old arrow with its feathers still attached and red ochre paint on the shaft? This is one of the more spectacular articles recovered from these melting ice patches. The first atlatl found at the Thandlat site was one of the oldest reported for North America but it is young compared to an atlatl shaft reported from another nearby site to be 6800 years old. The bow and arrows that replaced them date back to at least 1300 years BP. Traditionally, North American archaeological efforts require theorization as to what various stone points were used for and where and how they were attached. In these southern Yukon sites, the arrowhead is still attached to the arrow. This is an unprecedented opportunity to study complete artifacts and much more is sure to come.

Detailed study awaits all these artifacts. They have been freeze dried to prevent deterioration. Right now the focus is on recovering as many as possible before all the ice patches are gone, which by Greg Hare's reckoning could be five to ten years. After the recovery effort is complete, lifetimes of study await the researchers.

Some avenues of study include a heavy mineral analysis to see if mercury levels were traditionally as high as today. Pollen and plant macrofossils extracted from the dung will allow scientists to say something about palaeoclimate, vegetation patterns and the diet of ancient caribou.

There is one theory yet to be advanced, perhaps because no one has been bold enough to do so. I propose, given that we are rapidly approaching Christmas, that this is not a paleo-Indian site but rather an ancient encampment of Santa's. Given encroaching civilization he has obviously needed to move his workshop to the more remote setting of the North Pole. ❑

Could *Spinosaurus aegyptiacus* beat a full-grown *T. rex?*

by Steven Coombs (copyright © 2001)

What is it?

With all the excitement of this summer's *Jurassic Park 3*, people have witnessed an incredible movie with some very neat technology and computerized dinosaurs, and —hey—the film was an adrenaline rush. (I haven't seen it yet, but I heard about it from some movie goers!)

The film also had its inaccuracies and the characters sound very stupid for even going back to that island—once or twice is enough. The big superstar of this film is a sort of spinosaurid as I would call it. Not much is known of this North African theropod, but in the film they tried to depict it as one of the most dangerous carnivorous dinosaurs the world has ever seen—in the film it battled a full-grown *T. rex*, and won!

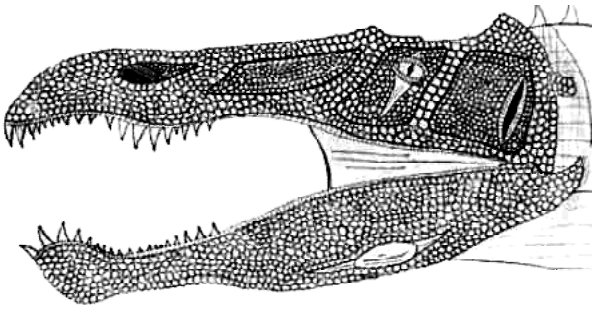
But could it really beat a full-grown *T. rex*? Well, I wouldn't really know, because like I said, not much is known about this animal. The remains that were found (fragmentary dentary, vertebrae, hind limb elements, teeth) were all destroyed in World War II bombing raids, along with other rare fossils.

Spinosaurus aegyptiacus was found in 1910 by German palaeontologist Ernst Stromer, who led an Expedition to Northern Africa where he found this mysterious animal in the Baharija Formation of Egypt. It lived around 95 million years ago, in the the Late Cretaceous. It was a spinosaurid, and some of its ancestors were animals such as *Baryonyx* and *Suchomimus*.

Today not much is known of *Spinosaurus*, though some more remains have been found (neck vertebra, fragmentary dentaries, dorsal neural arch and teeth). This dinosaur is estimated to have been around 12 to 17 metres in length, and weighed about 4 to 6 tonnes. Its skull was very crocodile-like in appearance. *Spinosaurus* had a distinctive sail on its back; there are a lot of theories about the function of this sail—one is thermoregulation, heating or cooling off its body temperature.

Another possible function is intimidation towards a carnivore or to keep another of its species away from its territory or to protect its right to mate with a selected female.

Spinosaurus was likely a very well-built picivore (fish-eater), which may have preyed on terrestrial animals too. For its being picivorous, there is no direct evidence, but its ancestors such as *Baryonyx* did indeed eat fish, by the remains of its last lunch—an undigested fish. The teeth of these animals are conical (teeth of its relative *Baryonyx* are modified with serrations), the same as a crocodile; they have no curve or serrations like other theropods. *Spinosaurus* is known to have this type of teeth so it may have included fish in its diet. The crocodiles of today feed on fish and terrestrial animals.



***Spinosaurus aegyptiacus* reconstruction. Art by Steven Coombs.**

Spinosaurus was maybe one of the longest dinosaurs, but also one of the slimmest. Recently (prior to the filming of *Jurassic Park 3*) Jack Horner—a consultant on the dinosaurs in the film—spoke about a spinosaurid having a skull two metres long. He said in an interview that this spinosaurid found in Africa would have been over 18 m long and was the biggest carnivore ever found. He's writing a paper at the moment about this new find that could shed more light on this very interesting and mysterious dinosaur.

The Battle!

If the *Jurassic Park 3* battle were to be a reality my bet would be for *T. rex* to win the championship in this match. *Spinosaurus* was not your normal flesh eating terrestrial giant—it was more a scaly-fleshed eater; in other words its diet included fish. Modern bears are an example of an animal

that will feast on fish, but they do eat other prey as well. Possibly *Spinosaurus* was the same.

Spinosaurus lived in a coastal environment teeming with huge fish up to two metres long or more, and its technique for catching prey was with its huge thumb claw, borne on the first digit of the manus (hand); this thumb claw measured around 40 cm in length with a sheath of keratinous material (such as our fingernails) and with a very raptorial curve to it. With this claw and the way it was shaped, it must have been easy to capture fish by swinging the hand like a sickle. In nature, bears do this with their claws. Another weapon that was used was its crocodile-shaped head that had a kink in the jaw, similar to that of crocodiles. By having this kink it was much easier to hold onto the fish while eating it—just like modern crocodiles.

Now *T. rex* was a pretty huge, carnivorous, 7 tonne tyrannosaurid which measured 12+ m from nose to tail. It was the biggest carnivore of its time, but not the biggest to ever live. It was very swift for its size as well. *T. rex* was closer to birds than *Spinosaurus*; it had a brain much larger than any other carnivore proportional to its size.

T. rex had a skull with up to 60 teeth; each was curved with serrations and measured up to 30 cm in length including the root (not all teeth, mainly just maxilla teeth). The jaw force that *T. rex* produced was estimated to be around 12.9 kN (2,900 lbs.) for one side of the jaw, or 25.8 kN (5,800 lbs.) for the whole jaw. Its teeth were shaped like bananas (they are D-shaped in cross-section) for crushing bone. This would kill something fast and was very efficient.

The architecture of the skull of *T. rex* was very different from some other theropods. It was made to have a longer field of view while hunting or looking for carrion—this is called deep perception—it was a very unique tool for *T. rex*. By having deep perception it was much easier to track prey and to know its distance and whether the prey was big enough to tackle. Humans have the same type of vision. (*Spinosaurus* did not have deep perception, but had its eyes placed on the side of its skull like other typical theropods, such as *Allosaurus* or *Giganotosaurus*).

One thing that *T. rex* didn't have is big arms—it had arms almost the size of an adult human's. The function of these arms is very puzzling. Studies estimate they might have been able to lift 180 kg or more.

Which one of these specialized carnivores would have won? Well, *Spinosaurus* was much more primitive than *T. rex* in many features, so it would be better to think that *T. rex* would have won by being more specialized—maybe not a battle, but I'll leave that up to you! ❑

[*APS member Steven Coombs is a high school student in Barachois, Quebec. This is his second article for the* Bulletin. *– ed.*]

APS Members attend 2001 SVP Conference

This year's annual conference of the Society of Vertebrate Paleontology (SVP) was held in Bozeman, Montana. APS attendees included Les Adler and Mona and Vaclav Marsovsky. Following are their accounts of the activities.

Field Trips

Cenozoic Vertebrate Palaeontology and Geology of Southwestern Montana and Adjacent Areas.

The reason I joined this trip was to cover new ground—I had been on large areas of the other field trips that were offered by *Dinotour* in the early 1990s. Also the other trips concentrated on dinosaurs, whereas this trip provided experience in collecting a variety of fossil mammal material over a wide area of southwestern Montana and Idaho.

There were four leaders: a historian, a structural geologist and two vertebrate palaeontologists. At one location the rocks were white and the fossils were black. At another location the rocks and the fossils were all white. At some locations, people fanned out over an area. At another location the collecting was done as a team where everybody got down on their hands and knees and slowly worked uphill in a line.

Participants were expected to hand over their finds to the leaders who tagged special containers. The specimens were being collected for the Museum of the Rockies collections. I found freshwater fish fragments, much turtle, oreodont teeth and brontothere bone pieces. I met with palaeontologists from China, Sweden, Australia and the United States.

The trip started at Bozeman, went west to the Pipestone area, where the fossil location is up for

sale; then to McCartey's Mountain, then on to Dillon where we stayed for two nights. From Dillon we proceeded to the Bannock Pass and on to the Railroad Canyon area of Idaho. On the third day a large territory was covered, including the Diamond "O" Ranch, Ruby Valley, Nevada and Virginia City ghost towns; Madison Bluffs lookout and the Madison Buffalo Jump.

This region is characteristic of the basin and range structure where a basin may be about 90 km in length and 50 km wide, separated from adjacent basins by giant faults. Within a basin may be found great thicknesses of sediments, up to 16,000 metres, and faults and unconformities. Within, the exposed rocks ranged from Precambrian garnet gneisses through Carboniferous limestones and Jurassic, Cretaceous and Cenozoic sediments. Cirques were visible on high mountains with thick basic and acidic lava flows and ash layers. Precise dating is available from magnetic reversal measurements linked to mammal fossil distribution lists which can be matched to Cenozoic epochs.

This well-planned trip was enhanced by experienced leaders and copious field-trip notes.

— Les Adler

Middle and Late Jurassic dinosaur fossil-bearing horizons: Implications for dinosaur paleoecology, northeastern Bighorn Basin, Wyoming.

Sedimentologist Erik Kvale from the Indiana Geological Survey/Indiana University led the trip with the able assistance of invertebrate tracksite specialist Stephen Hasiotis from the University of Kansas and dinosaur track expert Debra Mickelson from the University of Colorado.

On the first day, the twenty participants (including APS members **Vaclav and Mona Marsovsky** and **Richard McCrea**) were taken by a luxurious bus (including microwave and coffee maker) to Greybull, Wyoming. Luxury is not a good indicator of quality, as the bus, once stopped at the rest area, never did start again. Erik's uncle, Cliff Manuel, a tour operator, came to our rescue by ferrying us in his 13-person van to and from the fossil site, the restaurant and hotel. The next day, a replacement bus, less luxurious but much more reliable, took over transportation duties.

The tour leaders took their educational responsibilities seriously, carrying portable flipcharts into the field every day to explain the geology, sedimentology, paleosols, invertebrate tracks and dinosaur tracks that we would see on each leg of the trip.

The first day concentrated on the dinosaur tracksites in the upper Morrison Formation (Brushy Basin Member, Late Jurassic, 145–147 MYA). Paleosols there indicated wet-dry seasonality. We saw sauropod and three-toed tracks, termite nests, bioturbation by invertebrates that lived under the tracks and the odd dinosaur bone. The second day we visited the Red Gulch tracksite, which was discovered in 1997 by Erik Kvale, in the lower Sundance Formation (169–164 MYA). The field trip leaders showed us examples of crevasse splays where palaeo channels breached their banks. Ripple marks and intensive invertebrate traces indicated that this was a shoreline at the edge of the Sundance Sea.

Hundreds of three-toed tracks led to and from the ancient sea. This site has been developed for tourists by the Bureau of Land Management (BLM), including a picnic area and informative signs. Nearby, the Flitner Ranch dinosaur site had more tracks, but much less bioturbation. A short hike (uphill in the heat) allowed us the privilege of walking the "Yellow Brick Road." This "road" is covered with well preserved dinosaur tracks.

On the third day, we went even farther back in time to see the dinosaur tracks at the Gypsum Springs (170 MYA) site. Dinosaurs and crocodiles had wandered this area. Some of the tracks were thought to be marks made by swimming dinosaurs, as they pushed themselves off the bottom in shallow water. More invertebrate traces, including a pattern that appeared to be sea urchin feeding trails, helped to indicate the conditions of the area when the tracks were made. The Sundance and Gypsum Springs tracks are especially important because they were laid down during the 20 million year period in which no North American dinosaur fossils have been found.

The participants were grateful for all of the hard work done by the organizers. This tour showed that the study of tracks is more than just a story of the track makers but has a strong sedimentology component and trace fossil component which tells the full story about the environment in which the tracks were made. There is more to dinosaur tracksites than just dinosaur tracks.

— Mona Marsovsky

SVP 61st Annual Meeting at Bozeman, Montana

These annual meetings enable palaeontologists to keep up to date with the latest research in their fields of interest, to establish networks and to examine fossil collections.

Three field trips occurred before the technical papers were presented, two specializing on dinosaurs and one on Cenozoic mammals. Each par-

ticipant was provided with notes on his or her particular trip and notes on the other two trips, plus notes on a post-meeting trip to dinosaur sites in Alberta and to the Royal Tyrrell Museum.

At the beginning of the event, the sky was hazy due to the heat and forest fires in the vicinity. A few days later snow fell and the mountains seven kilometres out of town were covered. A couple of days later the snow had all melted.

In addition to four days of meetings, a number of other activities took place—including the official dedication of a life-size bronze *Tyrannosaurus rex* in front of the Museum of the Rockies, with Jack Horner amongst the dignitaries. There were displays of posters, books, models, carvings, paintings and T-shirts; also a welcoming reception at the Museum and a benefit auction and social which raised about CDN$45,000.

About 490 technical papers were presented, covering many facets of vertebrate fossils. Speakers were given a fifteen-minute time limit; two screens and computer connections—usually two going simultaneously—kept everyone interested. Shuttle buses operated between the University of Montana, about a mile to the south of town, and the hotels about a mile to the north.

The SVP has about 2,000 members of whom about 1,300 came to Bozeman from 17 countries. From southern Alberta came Drs. Phil Currie and Eva Koppelhus, Dave Eberth, Don Brinkman and Betsy Nicholls. Also Darren Tanke, Darla Zelenitsky, Mike Skrepnick, Miss Jamniczy, Richard McCrea, Vaclav and Mona Marsovsky and Les Adler. Another former APS member, Dr. Paul Sereno of Chicago was there. Mike Skrepnick was presented with the Lazendorf Paleo Art Award for best 2-dimensional art at the SVP conference awards banquet. ❑

Fossils in the News

Quirks and Quarks, CBC Radio One,
September 29, 2001

Patagonian fossil eggs contain titanosaur embryos

Host Bob MacDonald interviewed Dr. Luis Chiappe, assistant curator of the Los Angeles County Museum of Natural History.

A team of scientists including Dr. Chiappe has been collecting dinosaur eggs since 1997 at a site called Auca Mahuevo in Patagonia. The eggs are softball size, 12 to 15 cm in diameter. They are found in clutches containing between 25 and 35 eggs. Some eggs were preserved with embryos in them, which allowed the scientists to assign them to the titanosaurs (large sauropods). The sediments surrounding the nests are 80 Ma old.

The discovery allows the scientists to observe the transformation of this dinosaur from embryo stage to adulthood. They have found that the embryos have their nostrils located close to the tip of the snout and as the animal ages, the nostrils migrate backwards toward the eyes. CAT-scan methodology was used first in an attempt to study the fossil bones but that proved to be unsuccessful. After that a more conventional approach was taken, which was to remove the rock matrix surrounding the delicate bones.

Based on the number of nests, the dinosaurs gathered in hundreds or perhaps thousands to lay their eggs. They dug their own nests by making a shallow bowl depression. The eggs may have been covered by vegetation but these dinosaurs did not bury their eggs like a turtle. There is no evidence that there was any parental care after laying. There would be a danger of trampling the eggs by an animal weighing several tons. There were no signs of eggs being broken by trampling and the spacing of the nests was too dense to have allowed the large dinosaurs to be walking around among them.

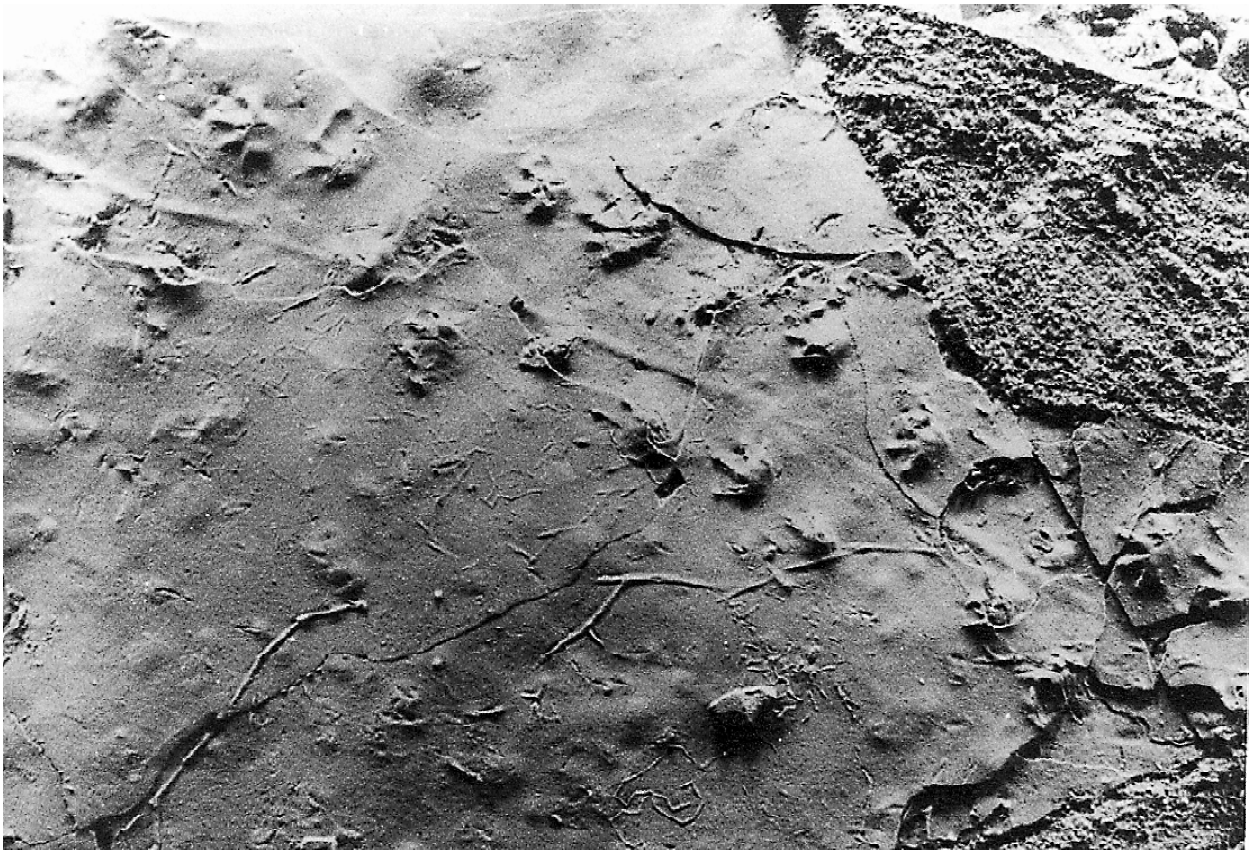
[*Reviewed by Vaclav Marsovsky*]

The Globe and Mail,
September 20, 2001

Early whales, small dogs much alike, fossil shows

PAKISTAN—Recently announced discoveries of two whale-ancestor fossils have helped fill the gap in understanding the evolution of Earth's biggest animals. The older of the two discoveries was a small, dog-like animal that probably didn't swim. Both *Pakicetus*, the 50-million-year-old fossil found by Hans Thewissen of Northeastern Ohio University, and a 47-million-year-old creature (unnamed in the article) unearthed by Philip Gingerich of the University of Michigan, show ankle-bone anatomy that links them to the even-toed ungulates—sheep, pigs, hippos.

This fossil evidence confirms the suspicions of molecular biologists who, studying DNA, had previously concluded that whales and the even-toed ungulates must have been related through a common ancestor. The link is reinforced by inner ear bones, found in both fossils, that are exclusive to the whales and their ancestors.



APS member **Fred Lewis**, of Carmel, Indiana, sent this photo. He writes: "These are footprints of a Pennsylvanian (300 million-year-old) reptile found in an ancient tidal flat area in Martin County, Indiana by geologist Eric Kvale. The rock was split revealing prints and casts measuring approximately 2.5 cm across. Several names have been suggested, but without other evidence they are only speculation. The reptile *Petrolacosaurus* could apply as it fits the time period and measures 40 cm long, with a foot pattern that could match. I photographed this rock specimen for the Indiana State Museum where it is now in the fossil collection. As a volunteer for the Indiana State Museum I do photography and a variety of other assignments in the Natural History Department." (Copyright ©2001, by Fred Lewis)

Calgary Herald, September 4, 2001

Thieves target Burgess Shale fossil

FIELD, BC—Fossil poachers have made off with a valuable museum specimen of the Burgess Shale fossil *Ottoia*, a segmented worm. The fossil, on a 15-kilogram slab, is estimated to be worth as much as $25,000 on the black market. Says Randle Robertson of the Yoho Burgess Shale Foundation: "…it's every fossil thief's dream to steal a fossil from the Burgess Shale and sell it." The specimen [*according to a CBC radio interview it was labelled and catalogued*] was "in the quarry for educational purposes." Why such a valuable specimen was left unattended for thieves to haul away is unclear—it must have been quite a job lugging a 15-kilo slab down the rugged Walcott Quarry trail, presumably in the dark.

The Globe and Mail, June 7, 2001

The key to life as we know it? Good teeth

KOTELNICH, RUSSIA—Little *Suminia getmanovi*, a squirrel-sized animal that lived 260 million years ago, appears to have been one of the earliest herbivores to make efficient use of "leaves and grasses" [*sic—there were no grasses 260 million years ago –ed.*] thereby paving the way for the development of later ecosystems in which large numbers of herbivores populate the Earth. Fossils of *Suminia*, a (presumably) hairless creature belonging to the extinct anomodont group, were recovered from rocks in central Russia. Its teeth and jaws, studied by Dr. Robert Reisz of the University of Toronto and grad student Natalia Rybczynski, suggest that *Suminia* was an efficient chewer.

The Globe and Mail, June 1, 2001 and *Calgary Herald*, June 1, 2001

New species of dinosaur unearthed in Egypt

BAHARIYA OASIS, EGYPT—Yet another titanic sauropod has emerged from the rocks, this time in the Sahara of central Egypt. *Paralititan stromeri* ("tidal giant") a 94-million-year-old Cretaceous sauropod, is estimated to have weighed 70 tonnes, and stretched 30 metres long—second only to the current South American title-holder, *Argentinosaurus*. The fossils were found by a team led by University of Pennsylvania grad student Josh Smith. The general area had been explored early last century by a German geologist, Ernst Stromer von Reichenbach. Fossils collected at that time were unfortunately pulverized by World War II bombing raids in Munich. Smith and his colleagues, reinvestigating forgotten historical sites, stumbled onto the new bones by accident, thanks to a GPS error.

The Globe and Mail, June 19, 2001

Fossil find places dinosaur species in America

NEW MEXICO—The discovery of dinosaur remains in the Zuni Basin, near the New Mexico-Arizona border is forging links with Asian fossil finds. Palaeontologists Jim Kirkland and Doug Wolfe recovered fossils of a therizinosaur—an exotic, bipedal herbivore related to tyrannosaurs—in 90-million-year-old rocks (mid-Cretaceous).

The "sloth-like" *Nothronychus* is the first North American representative of the therizinosaurs, which have previously been found only in China and Mongolia. Asian therizinosaurs have been found with hairy feather structures. *Nothronychus* would have stood about 3 metres tall, and weighed about 900 kilograms. Remains of another dinosaur, found a kilometre away, but apparently the same age, belong to a coelurosaur—a small, bipedal carnivore about 2 metres long. This latter animal has not yet been named.

The National Post, August 3, 2001

Scientist moves dinosaurs' nostrils

ATHENS, OHIO—In another example of false notions dying hard, Dr. Lawrence Witmer of Ohio University has revised the way we look at dinosaurs' noses. Early palaeontologists, stuck on the idea that dinosaurs must have spent most of their time in water to support their huge bulk, supposed that the animals' nostrils would have to be placed toward the top of their heads, to facilitate breathing—like whales or dolphins. Even after it became apparent that these dinosaurs really did roam about on land, reconstructions continued to show nostrils high up on the dinosaurs' heads.

Lawrence Witmer, deciding to restudy skulls of a number of dinosaur types, found that marks on the skulls, left by the growth of blood vessels, were consistent with those on the skulls of living vertebrates; thus, the dinosaurs' nostrils were probably oriented toward the front of the snout, just like those on modern animals.

Calgary Herald, October 26, 2001

Crikey! That's a croc!

TENERE DESERT, NIGER—Specimens of the biggest, nastiest crocodile ever discovered have been revealed by a team led by University of Chicago palaeontologist Paul Sereno. The fossils, unearthed in 1997 [*see* Bulletin*, Dec. 1999 and Page 6 of this issue*] include several skulls and other bones of a 12-metre long—the length of a school bus—8 tonne monster that looked like a scaled-up version of modern crocodiles. *Sarcosuchus imperator*, the "flesh-eating crocodile emperor" apparently preyed on dinosaurs that wandered too close to its lair in African rivers of 110 million years ago.

Science, December 15, 2000

"Sir Mammoth" leads charge to uncover Ice Age fossils

AMSTERDAM—This article highlights the accomplishments of Dutch amateur palaeontologist Dick Mol, a customs officer at Amsterdam airport who doubles as one of the world's foremost authories on mammoth remains. The 45-year-old, who has been knighted by Queen Beatrix, is scientific coordinator of an expedition to recover mammoth remains from the Siberian Taimyr Peninsula. He has amassed a collection of some 15,000 specimens, many of Pleistocene mammals dredged from the bottom of the North Sea by fishing boats.

Palaeontologist Jelle Reumer, director of the Rotterdam Natural History Museum points out a recent trend in the science: "Vertebrate palaeontology as an academic subject now hardly exists here. Amateurs help fill that gap." The article concludes that "Mol's [legacy] may be the credibility he lends to a thriving community of amateur palaeontologists." ❑

[*Thanks to Les Adler, Georgia Hoffman and Sam Richter for clippings. —ed.*]

Alberta Palaeontological Society
Sixth Annual Symposium

January 26 & 27, 2002

(continued from back page)

WORKSHOPS

Saturday, January 26
1:00 – 4:00 P.M.

Room B108, Mount Royal College (Lower Level) **Fee: $5.00**

Kids Drawing Dinosaurs — Steve Raymond, Sartech Enterprises. Session will teach kids big and small some basic drawing techniques.

Sunday, January 27
9:00 – 12:00 P.M.

Room B108, Mount Royal College (Lower Level) **Fee: $15.00**

Micropalaeontology for the oil industry — Bert Van Helden, of Stratigraphic Services will show how microfossils provide valuable clues to finding oil and gas.

Sunday, January 27
1:00 – 4:00 P.M.

Room B108, Mount Royal College (Lower Level) **Fee: $15.00**

Vertebrate Micropalaeontology — Dr. Don Brinkman, Royal Tyrrell Museum, on recognizing and identifying vertebrate microfossils.

There is a fee associated with the workshops—all other events are free. Special reduced fee of $25.00 for those attending both Sunday workshops. These fees are used to offset the expense of the workshops and symposium. Limited space is available in the workshops; to register or for more information, contact Philip Benham at (403) 691-3343 or email: programs@albertapaleo.org. Also see our website: www.albertapaleo.org

ALBERTA PALAEONTOLOGICAL SOCIETY
CALGARY, ALBERTA

Operating Statement for 2000 (Audited)
January 1, 2000 to December 31, 2000

Revenues		**Expenses**	
Membership	$1666.00	Postage	$8.02
T-shirts	95.00	Bulletin	1002.61
Donations	22.50	Bank charges	73.95
Pins	3.00	Name tags	94.14
Field Trips	4070.00	Speaker expenses	153.92
Raffle proceeds	30.50	Post Office box	77.04
Credit memo	52.78	Printing	377.26
Abstracts volume	420.00	Field trip expenses	4115.04
Bulletin sales	3.00	Website expenses	449.37
Miscellaneous	15.00	Refreshments	9.84
Refreshments	23.91		
Typewriter	25.00		
TOTAL REVENUES	**$6420.69**	TOTAL EXPENSES	**$6361.19**

Excess of revenues over expenses: **$59.50**. As of December 31, 2000, members' equity is approximately **$2600.00**, consisting of $1600 in cash and $1000 in pins and T-shirts.

Treasurer: Cindy Evans. Auditors: Vaclav Marsovsky and Mona Marsovsky

Alberta Palaeontological Society Sixth Annual Symposium

in conjunction with the Mount Royal College Geology Department and the C.S.P.G. Palaeontological Division

Mount Royal College Science Wing (Lower Level)
4825 Richard Road SW, Calgary, Alberta

SPEAKERS

Jenkins Theatre, Saturday, January 26, 2002, from 10:00 A.M. to 4:30 P.M.
All talks are FREE and open to the public

10:00 – 10:30 A.M. ***Kimberlites, Diamonds and Microfossils in Saskatchewan***
Dr. Dave McNeil, Geological Survey of Canada

10:30 – 11:00 A.M. ***Trilobites, Sponges and Worms—Oh My! Five Million Years After the Burgess Shale***
Kimberly Motz, University of Calgary

11:00 – 11:30 A.M. ***Chemosymbiotic Bivalves at Modern and Ancient Hydrothermal Vents and Cold Seeps***
Dr. Paul Johnston, Royal Tyrrell Museum and Mount Royal College

11:30 – 12:00 P.M. ***On the Origins of Snakes: Old Problems, New Data***
Dr. Michael Caldwell, University of Alberta

12:00 – 2:00 P.M. ***Poster Viewing***
Posters will be available all day, January 26, outside Jenkins Theatre

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2:00 – 2:30 P.M. ***The Hunt for Mary Jane: Search for the Lost Fleet of the 1910–1915 American Museum of Natural History Palaeontological Expeditions to Alberta, Canada***
Darren Tanke, Royal Tyrrell Museum

2:30 – 3:00 P.M. ***Fossil Discoveries in the Churchill Area, Northern Manitoba***
Dr. Graham Young, Manitoba Museum Man and Nature

3:00 – 4:30 P.M. ***Mass Extinctions: Past, Present and Future***
Dr. Peter Ward, University of Washington

WORKSHOPS

see Page 14! ☞