ALBERTA PALAEONOTOLOGICAL SOCIETY

BULLETIN

VOLUME 6 NUMBER 2

JUNE 1991

NEXT MEETING: 7:30 p.m. September 20, 1991
Room B108, Mount Royal College

ALBERTA PALAEONTOLOGICAL SOCIETY

OFFICERS:	President	Percy Strong	242-4735
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	Secretary	Betty Quon	274-5965
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	Fieldtrip Co-ordinator	Wayne Braunberger	278-5154
	Public Relations	----------	--------
	Program & Education	----------	--------
	Director at Large	Dr. David Mundy	281-3668

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 paleontological 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.

Single membership	$10.00 annually
Family or institution	$15.00 annually

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

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NOTICE: Readers are advised that opinions expressed in the articles are those of the author and do not necessarily reflect the viewpoint of the Society.

This month's cover: from Jeff Doten

PRESIDENT'S MESSAGE
by Percy Strong

This summer as you head out for some great collecting, I hope that you will keep in mind two things. First, before you begin to excavate any vertebrate remains, remember that not only is it illegal, but you stand to destroy a potentially important find. Most of us know from experience how fragile fossils, and bones in particular, are. Without proper preparation, their scientific or even display value will be lost. So, in a phrase, "Think before you dig."

The second thing to remember is to start planning a display for the next CRLC Show. This year there was only minor APS representation at the show. This is unfortunate as the show can provide the APS with greater exposure, which we need to continue to grow. It would also provide some impetus for us to start some courses on fossil preparation and casting next fall.

Enjoy the collecting season.

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Editor's Note: See you all in September - meeting date is on the FRONT COVER!! - h.w.

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FIELD TRIPS 1991
by Wayne Braunberger

Field trips will be held on the date specified; if the weather turns bad they will be held on the following day **if possible,** if not, they will be held the following week. Most trips will involve a moderate amount of walking and we will be away from our vehicles for most of the day, so bring along your lunch, water, and rain gear. The trips are planned as one day excursions out of Calgary. You are welcome to spend the weekend in the area and visit the sites on your own.

TRIP 91-1: June 15, 1991, Adanac Mine/Carbondale River
Leader: Wayne Braunberger (278-5154)

Jurassic and Cretaceous localities; numerous excellent exposures can be found along the river and in the mine. This area is a classic Foothills locality, and the stratigraphy and sedimentology of several units can be observed. For those who are interested, the structural geology of the area is also well exposed. The most common fossils are bivalves, ammonites and belemnites There are also some well preserved logs in the mine.

TRIP 91-2: July 20, 1991, Morrin/Munson Badlands
Leaders: Les Adler (289-9972) & Alex Harich

This trip will be to the badlands along the Red Deer River near the Morrin Bridge and the Munson Ferry. We will be going to look at several bone beds that are exposed. Part of the purpose of this trip will be to determine why the bones are deposited here.

TRIP 91-3: August 17, 1991, To be confirmed

Either a trip to a coal mine in the Crowsnest Pass area to collect plant fossils and to tour the mine, or a collecting trip to Moose Mountain/Canyon Creek area. Contact Wayne to see which trip is a "go".

• Before attending any of the field trips, please contact the leader, or the field trip coordinator: Wayne Braunberger, 278-5154.

• If you have indicated that you will be attending a trip, and later have a change of plans, please let us know that you cannot make it.

1991 CALGARY ROCK AND LAPIDARY CLUB ANNUAL SHOW
by Les Adler

The show was held at the West Hillhurst Community Arena on the first weekend of May. The Friends of the Tyrrell dropped out this year due to budget restrictions. Lawrence and Marge Halmrast brought their extensive dinosaur and reptile display from Warner. The Identification Booth was manned by past and present APS members, including Harvey Negrich, Don Sabo, Wayne Braunberger, Geoff Barrett, Lyle Hartwig and Les Adler. Because of the Tierney Mineral Collection, a special exhibit from Vancouver, there was only space for 80 display cases this year. Of the 80, 13 had a strong fossil content.

Emmett and Jean Wallace, APS members from Texas, brought two showcases of fossils for display. One was their 1990 Award Winning case of 22 Cretaceous echinoids and one Eocene echinoid, including specimens from many classes and families. Their other display was of 26 clean, complete trilobites from several geological periods and different biological classes. Many of the specimens stood out in three-dimensional relief above the host rock.

Wayne Braunberger of the APS again won an award for his display of 28 carefully prepared Paleozoic invertebrate fossils from the Rocky Mountains of Alberta and British Columbia. The various horn corals, colonial corals, brachiopods, blastoids, trilobites and one echinoid had been gently treated with hydrochloric acid to expose the external structure to aid in study and identification. These specimens were nicely laid out and displayed in the showcase.

Allister Peach presented "The Petrified Forest", which consisted of 8 large fossil tree trunks and branches of Carboniferous, Triassic, Cretaceous and Miocene ages. Don McLafferty and Karen Seidel also showed a display of large wood sections, mostly highly polished Miocene pieces from the United States.

Tom Shrake of the APS displayed 3 Brazilian fish in large nodules, *7* trilobites, 2 large nautiloids from Morocco, and a large oreodont skull from the United States.

Ron Shannon of Medicine Hat displayed Alberta ammonites

Les Adler's theme was "Life Pulse - Expansions and Extinctions", illustrated by a mastodon tusk, fossil leaves from Calgary, ammonites from Manyberries, and a collection of several hadrosaur tail vertebrae.

Because of government regulations, there were no Alberta fossils for sale. However, the dealers brought in a huge array of other fossils for sale, such as cephalopods from Morocco, ammonites from the United Kingdom and Germany, brachiopods, crinoids, beetles and trilobites from the United States, fossil leaves from British Columbia and dinosaur eggshell fragments from France. Many of these fossils were very reasonably priced.

Les Adler took pictures of many of the cases and will place several of these in the APS photo collection at a later date.

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IN THE NEWS

Calgary Herald, May 4, 1991, p. A15: Living bacteria found in remains of mastodon.
Discusses what is reported to be 11,000 year old live bacteria found in a mastodon unearthed in a peat bog at Newark, Ohio; to be published in July in *Quaternary Research.*

IN THE (?)NEWS

Sun (tabloid), March 26, 1991, p.13: Dinosaur lays egg in native village… and it's hatching!
Of course, it's "in a remote region of South America", and authorities are "keeping the exact location of the dinosaur egg a secret', but it is fun to speculate, right "Sun"??

POSSIBLE COLOUR PATTERN ON A CRETACEOUS BIVALVE

by Howard Allen

In summing-up his talk on "Preserved Colour Patterns in Fossil Invertebrates" (May 25, 1990; see APS Bulletin, Vol. 5, No. 2), Dr. Dave Mundy encouraged members to examine their collections for possible examples.

Being very familiar with my own small collection, I was quite sure none of my specimens had any obvious markings. However, I had a fluoroscope (long-wave ultraviolet) and decided to re-examine my collection with UV light, in the slim hope that some previously unseen fluorescent pigments might appear. The results were disappointing, until I examined a small clam from the Upper Cretaceous of northern Alberta, which had a clearly visible pattern of thin, concentric lines. A more detailed examination under the microscope revealed peculiarities (discussed below) that cast some doubt on the origin of the colour pattern.

The specimen (HBA-230) is a small, poorly preserved bivalve collected from the scree of the Lower Santonian Badheart Formation in the Smoky River region of northern Alberta. Preservation is so poor that the specimen may not be identifiable. The outer shell material is missing on the ?right valve (RV); the other valve is crusted with indurated, muddy sandstone and gypsum. The hinge and shell margin are similarly damaged or obscured. The few useful features include general shell shape, and a few coarse, concentric ribs visible in the middle of the ?left valve (LV).

The colour banding occurs on the thin layers of inner shell material exposed on the ?RV (Fig. 1). The colour bands are just faintly visible in normal light as pale ochre stripes. Under UV, they appear dark purple or black against the dull gold fluorescence of the calcareous shell material. Shell coloration in bivalves often penetrates well into the shell material (Cox et al., 1969, p. N71). The absence of colour bands on the surface of the outer shell material may well be a case of absence of evidence. Any pattern on this specimen would be obscured by matrix or leached away by weathering.

The first peculiarity to invite question is the orientation of the colour bands. One would normally expect natural patterning to

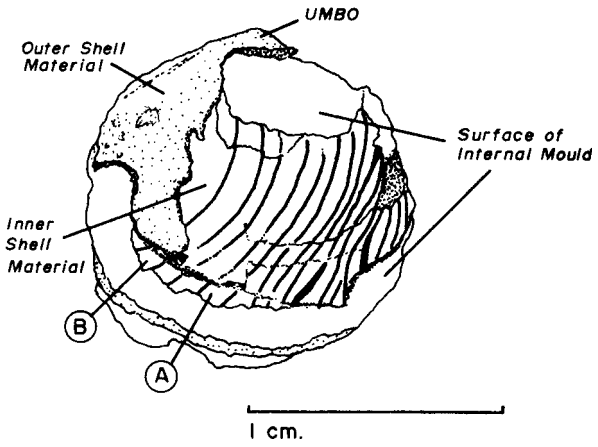

Figure 1: specimen HBA-230 (RV?)

be symmetrical with respect to the umbo, the margins, or both. Most bivalves grow concentric to the umbo, with new shell material deposited along the shell margins. This growth pattern shows in the growth lines that are visible on nearly all shells, and in most shell sculpture, which is nearly always concentric or radial to the umbo. It is somewhat troubling to imagine natural colour bands being oblique to the umbo. A bit of research reveals, however, that oblique ornamentation, though uncommon, is not impossible (Fig. 2). Several species in the superfamily Tellinacea exhibit oblique, concentric ornamentation (Cox et al., 1969, p. N613-N643). In all of these examples, however, the ornament consists of physical sculpture rather than coloration - still, such a colour pattern appears to be within the realm of possibility.

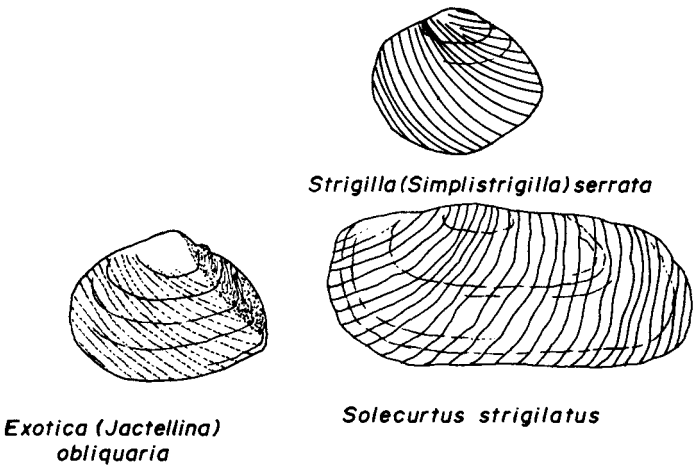

Figure 2: examples of bivalves with oblique ornamentation
(all drawn from illustrations in Cox et al, 1969)

If the colour bands were the result of some inorganic process occurring after death, what sort of mechanism could produce such a pattern and what supporting evidence might one expect?

One possibility is suggested in Figure 3. The fossil, embedded in porous sandstone matrix, is oriented at an oblique angle to the water table. Minute changes in the water level might leave mineral stains on the shell surface, analogous to the formation of a bathtub ring. The colour of the stripes (pale ochre in visible light) is consistent with the ochre iron staining of the sandstone matrix. One objection to this theory is that the stripes appear to be restricted to the inner shell material, and do not seem to continue across the surface of the outer shell, or the exposed surface of the internal mould. As well, the stripes seem to penetrate the entire thickness of the inner shell material. (Detail [A] in Fig. 1 shows the stripes present on a freshly exposed lower layer of inner shell). Perhaps the mineral stains were absorbed by the chalky, relatively porous inner shell material, but not by the harder outer shell or internal mould matrix. Alternately, the colour bands might simply be better preserved in the inner shell material.

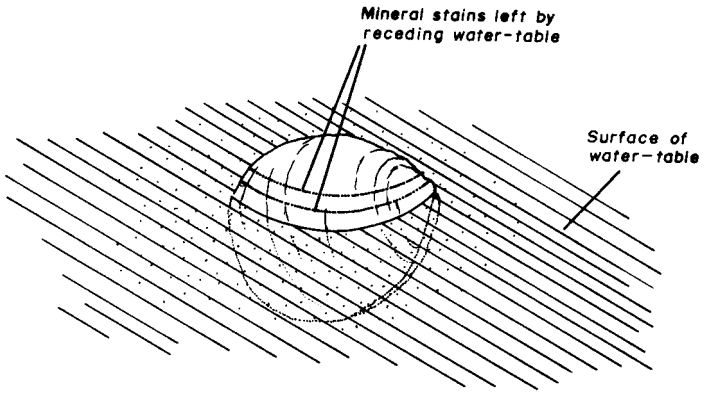

Figure 3: possible mechanism for creation of "pseudo"-color banding (see text).

Figure 4 shows another possibility for water-borne mineral stains. The shell lies exposed and partly weathered, and part of the outer shell is beginning to peel away from the inner shell material. Rain/snow/dew water, leaching minerals from the matrix, is trapped between the shell layers at the line of separation, staining the porous inner shell material. The water freezes, wedging the two layers slightly farther apart, then melts, staining the newly exposed inner shell. As this process is repeated, the outer shell is wedged off, and the inner shell receives bands of stain. This theory would explain the absence of stripes on the outer shell material. Unfortunately, as detail (B) of Figure 1 shows, the theory fails here, as some of the stripes are clearly seen to continue beneath a still firmly attached portion of outer shell material.

The origin of the colour pattern on this specimen so far remains in doubt. If the pattern were a little less ambiguous, say zigzags or radial bands, such doubts could be put to rest. If nothing else, this case demonstrates that a certain amount of caution must be used in the interpretation of colour pattern on fossils.

Reference: Cox, L.R. et al. 1969. Part N, Mollusca 6: Bivalvia, v.1, 2. In Treatise on Invertebrate Paleontology, R.C. Moore (ed.). University of Kansas and the Geological Society of America.

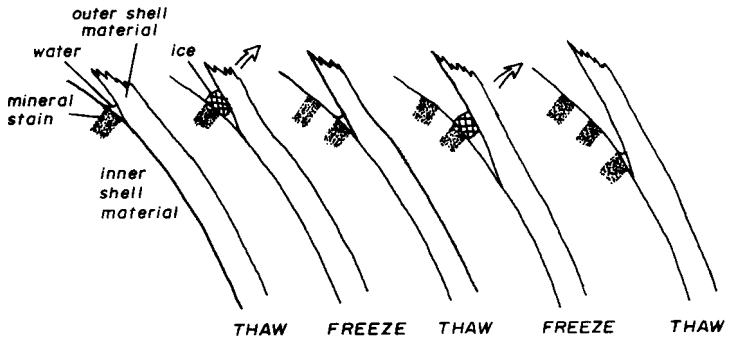

Figure 4: hypothetical freeze/thaw mechanism for incremental staining of inner shell material (see text)

PROGRAM SUMMARIES
by Heather Whitehead

March 15, 1991; Dr. Godfrey Nowlan, ISPG, Calgary, on Conodonts, the mysterious microfossil

Conodonts were discovered in 1856. They are the hard parts of an unknown organic group, range in size from 0.1-1 mm, are made of calcium phosphate and existed from Precambrian to Triassic times, becoming extinct in the latest Triassic. Several different types of the tooth-shaped fossils belonged to one organism. Distribution is worldwide in marine rocks, including those of Antarctica. Since their colour varies systematically with temperature, and they survive in identifiable form up to 600˚C, they are used to create thermal maps and to help understand mountain-building. Because of rapid evolution, they are used to define biostratigraphic zones, with resolution of 300,000 years per conodont zone in the Devonian.

The process for recovering the relatively heavy conodonts includes acid breakdown of rock samples, sieving and drying of residue, heavy liquid separation, magnetic separation (from magnetite), picking, sorting and identification. Normally, only disaggregated single elements are found, but occasionally a "fused cluster" gives an idea of what belongs with what. Very rarely, conodonts oriented in life position occur on the surface of black shale, but no indications of the animal remain.

There have been many candidates for the conodont animal, including one that ate conodonts (the assemblages found with it were always randomly arranged). In 1972, a slab bearing conodonts arranged in the same pattern as the fused clusters and on shale surfaces was found in a museum drawer in Glasgow, labelled as a worm. This organism was 3.5 mm long, of Carboniferous age. There are now *5* known specimens. The conodont animal was most likely a very early vertebrate that lived in deltaic, shallow water environments. It was probably a weak swimmer and used the conodont assemblage as a complex food gathering/ processing system. The structure of individual conodonts indicates that they were embedded in tissue most of the time. Were they a skeleton for an organic food gathering system, perhaps like the food net that barnacles send out? Did they function as teeth, retracted when not needed? If so, they did not chew - there are no worn conodonts found.

Conodonts come in simple and complex types, and even if they don't look much alike, there is a similarity of pattern in position, ornament and geometry between the simple and complex types. Patterns are used to identify what belonged to one animal, and are the basis for conodont classification.

Conodonts through time: The oldest known conodonts, of late Precambrian age, are from the Wernecke Mountains. They are slender, shaped like a tooth, robust and bear some ornament. Cambrian ones are very delicate. Ordovician conodonts are the most diverse and bizarre. Diversity dropped after both the Ordovician and the Devonian extinction events. By the Triassic, they had reverted to simple conical shapes and were very small. They died out at the end of the Triassic.

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April 19, 1991; Dr. Dave McIntyre, ISPG, Calgary, on Eocene fossil forests. Axel Heiberg Island

These extensive and well preserved fossil forests were discovered in 1985 and studied in 1987 by a large scientific party.

The area (2-3 hours flying time out of Resolute) is very near the polar ice cap, and has no visible vegetation from the air except along rivers. Annual precipitation today is 6 mm/year; temperatures can reach 20˚C in summer, but summer average is 0˚C and winter average -30˚C. There are no trees, no shrubs, and what plants there are grow horizontally along the ground. Plants today include Arctic willow, Arctic poppy, cottongrass and Arctic dandelion.

The fossil forests are found in the Buchanan Lake Formation, the youngest part of the Eureka Sound Group (Cretaceous and Tertiary age). This formation consists of gravel, sandstone, shale and coal, deposited in alluvial fan/braided river plain/lower floodplain environments. The upper coal member contains the forest beds, from the densely vegetated floodplain. The age of the fossil forests is generally believed to be 45 million years.

The forest section contains 20-30 cm of soft, unconsolidated material on top of permafrost, and includes silt, sand, mud and organic layers (leaf litter layers up to 1 m thick, stumps, wood, fossil soils). The organic layers are barely altered, not even to lignite.

The wood is compressed, may be slightly mineralized, but in most ways looks like fresh wood (except it has no woody smell - all the aromatic compounds are long gone). When dry, it burns. The leaf litter layers are well preserved but brittle, and crack and blow away once uncovered (samples were packed out in sand to protect them). The stumps occur in rows along the edge of the outcrop, are rooted in leaf litter and silt layers, and also shrink and crack once exposed to air. The stumps are as dense as 325 per hectare. Many are meta-sequoia (dawn redwood) up to 1 m in diameter; the species still lives in China. On the basis of stump size, these trees were 20-30 m tall, and probably cone-shaped.

Pollen study shows a rich variety of trees, shrubs and flowering plants. The dominant pollens are usually either metasequoia or spruce. This pattern suggests a swampy metasequoia forest, with a spruce forest where the land was a bit higher and drier.

There also were areas of mixed woodland, alder and flowering plants. The mosaic of vegetation types would slowly shift as the rivers altered course in the floodplain, and as climate changed. The area was warm and moist, temperate to warm temperate, with mostly deciduous trees that grew well in the 24-hour daylight of the 4 months of summer and became dormant in the winter. The temperature may have dipped below freezing occasionally. The fossil forests would require rainfall of 1000-1500 mm /year to sustain them. Lack of light would not be a limiting factor, as most trees are dormant in the winter. This environment is similar to that at 30-50° latitude today (Carolinas and Florida), yet the forests grew at ≈90° latitude.

There are no macrofossils found associated with the forest layers, but the strata below have yielded rhino, crocodile and lemur fossils.

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REVIEW
from Les Adler

The Real Jurassic Park, Discover, March 1991, p.52-59; article by Jim Robbins.

This article presents the ideas of Bob Bakker, a paleontologist who has a reputation for disturbing the pet theories of the majority of other paleontologists. He is noted for presenting the idea that the dinosaurs were warm blooded, rather than cold. The Alvarez theory of asteroid collision as the cause of the demise of the dinosaurs has stirred the scientific world, but Bakker believes thatother considerations may be more important.

Bakker believes that scientists should examine the configuration of land, seas and inland lakes at the time of extinctions. Land bridges in the past would have affected routes of movement of creatures that lived in the sea and on land. The movement of larger creatures would be easy along the bridges, causing mingling of previously isolated species with frequent negative consequences. Smaller creatures would move less easily along the land bridges, and therefore they were more likely to survive.

Bakker supports his theories from his paleontological finds. At present he is continuing a series of excavations along the Breakfast Bench layer at Como Bluff, Wyoming, near the famous dinosaur quarries of the 1870's. Bakker began work here in 1978, finding a large and varied fauna near the Jurassic-Cretaceous (J-K) boundary, including giant lungfish, crocodiles, small turtles, small fish and frogs. The body of a brontosaurus shielded the remains of another group of animals including salamanders, mammals and a small pterodactyl. Also found were 40 specimens of the small dinosaur *Drinker nisti,* which lived in herds and fed on swamp flora.

Bakker claims that the small creatures were inheriting the earth at the J-K boundary. He will continue to dig here for many years to show that the fossil record points to land bridges as the steady, serial killer of the dinosaurs. To be on the safe side, he intends to test the Wyoming soil to confirm the absence of iridium at the J-K boundary.

DINO SAUR 恐龍 ™

The Dinosaur Project Delays World Premiere

The Ex Terra Foundation has just successfully completed the first phase of The Dinosaur Project. The remarkable achievements made during this time have captured international media interest. Five years of field expeditions to China, the Arctic, and the badlands of Alberta netted, among other achievements, 11 new species of dinosaurs.

These significant and exciting finds are now being shared with the public, most recently on PBS "Nova", and the first of our public programmes, the documentary "In Search of the Dragon", is now finished and will soon be premiered in Edmonton. The children's book will follow shortly, and the adult book, the educational films and specimen preparations are well in hand.

The Dinosaur Project is now entering its second phase. During this critical time period we will be concentrating on sponsorship, exhibit development, and the world tour. Although sponsorship interest is worldwide, tough world economic conditions and tragic foreign events have made the search for sponsorship dollars an even greater challenge. As a result, Ex Terra's Board of Directors has decided to delay the 1992 opening of the exhibit to allow for a concentrated sponsorship search. The exact length of the delay has not been determined, but this period will allow the board and management the opportunity to review the exhibit and world tour with the objective of linking it with sponsorship goals in the corporate world.

- Feb-March 1991 issue

Spring Debut for *Mamenchisaurus*

Spring makes us think of all sorts of traditional new beginnings, such as the return of the robins, pussy willows, new buds on trees, warmer, sunny days, and of course, the emergence of the 27-metre-long *Mamenchisaurus* from its own sort of "hibernation".

In mid-May, Drumheller will witness the spring debut of this 140 million year old giant. Far too long to reconstruct in the Ex Terra work facility, the *Mamenchisaurus* skeleton will be assembled in a parking lot outside the building.

Over the winter, technicians have been remounting this creature so it can be assembled in the exact pose it will take in the exhibit - under attack by two newly discovered meat eaters from the Gobi Desert.

Although not the largest dinosaur that ever lived, *Mamenchisaurus* is the largest Asian dinosaur to be found. It reaches a height of 15 metres.

- April 1991 issue

Dino Display for Seville World's Fair

Work has started at the Ex Terra Drumheller facility on a dinosaur display that will be included in Canada's pavilion for the 1992 World's Fair in Seville. The World's Fair theme of "Age of Discovery" celebrates the 500th anniversary of Christopher Columbus' discovery of America. Exhibit planners, on behalf of the Department of External Affairs, contacted Ex Terra because of the natural fit between the discovery theme and the significant dinosaur finds in the Alberta Badlands, the High Arctic, and China's Gobi Desert.

- April 1991 issue

ALBERTA PALAEONTOLOGICAL SOCIETY, CALGARY, ALBERTA
FINANCIAL STATEMENT FOR TWELVE MONTHS, JAN-DEC 1990

BALANCE SHEET

BANK BALANCE DEC 31, 1990		$307.22	Unearned Revenue 1991		$12.00
INVENTORY OF PINS AT COST		$77.54	Members' Equity:		
INCORPORATION EXPENSE		$78.00	Previous Years	$577.58	
TYPEWRITER	$379.00		Revenue, current	$150.37	$727.95
less depreciation	$184.95	$194.05			
LIBRARY	$119.29				
Less depreciation	$36.15	$83.14			
TOTALS		$739.95			$739.95

OPERATING STATEMENT FOR 12 MONTHS, 1990

REVENUE:		EXPENDITURES:	
		Advertising	$0.00
Dues	$657.00	Bank Charges	$36.30
Raffle Revenue	$112.75	Postage	$108.00
Pin Sales	$60.00	Pins, cost of pins sold	$29.06
U.S. Exchange	$1.61	Coffee Expense	$52.19
Coffee Revenues	$71.76	General Expense	$110.50
		Office Expense	$39.00
		P.O. Box Rental	$50.00
		Printing & Copying	$255.33
		Depreciation Expense	$72.37
		Other	$0.00
SUB-TOTALS	$903.12		$752.75
EXCESS OF REVENUES OVER EXPENDITURES FOR 1990			$150.37
GRAND TOTALS	$903.12		$903.12