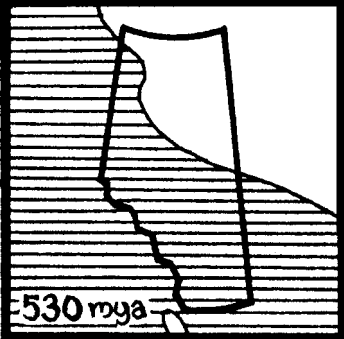
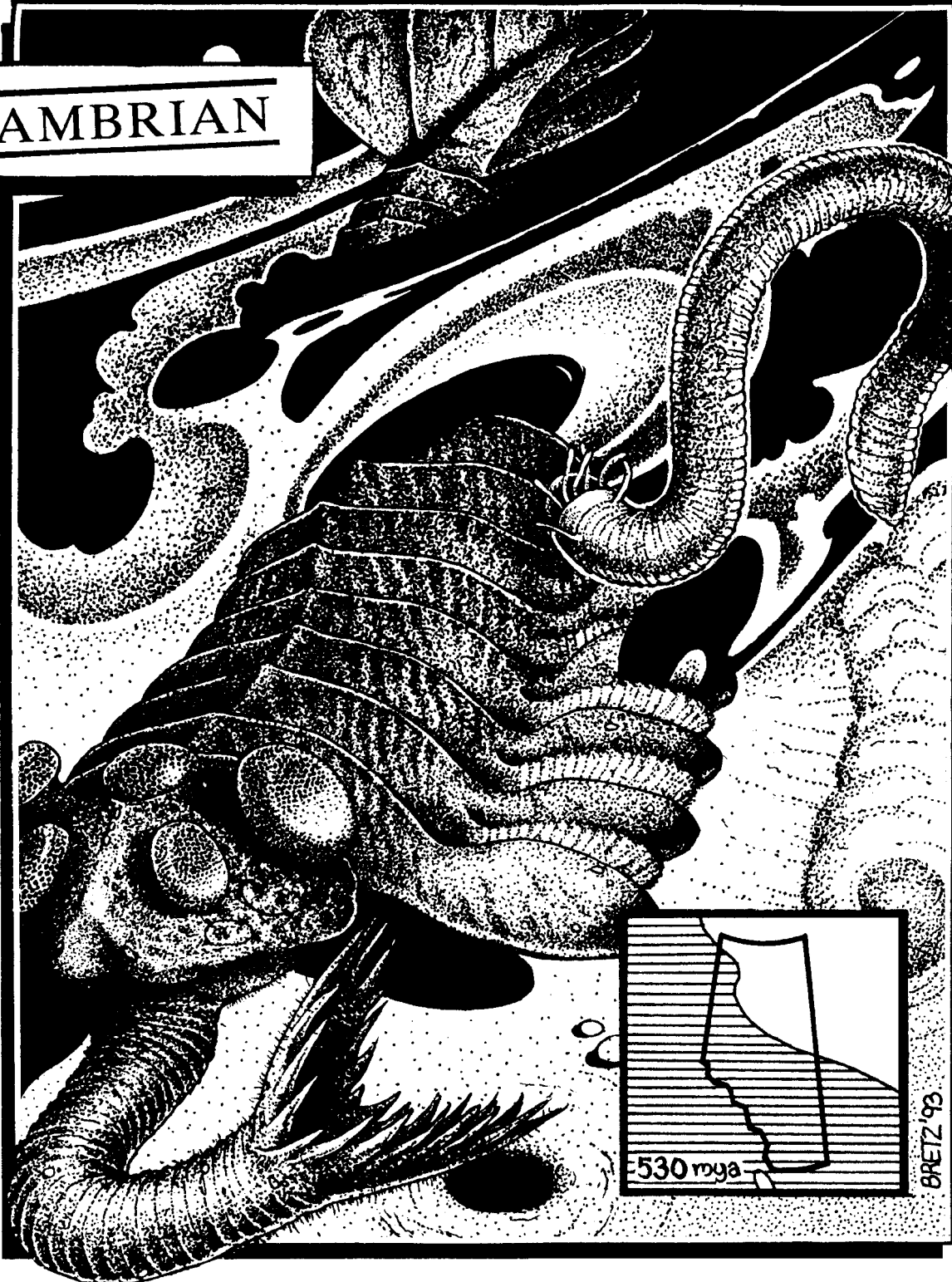


BULLETIN

VOLUME 8 NUMBER 2

JUNE 1993

CAMBRIAN



o p a b i n i a

ALBERTA PALAEOLOGICAL SOCIETY

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APAC† Representative	Wayne Braunberger	278-5154

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.

Single membership	\$10.00 annually
Family or Institution	\$15.00 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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Calgary, Alberta, Canada T2K 4M2

Requests for missing issues of the *Bulletin* should be addressed to the editor.

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. Except for articles marked "Copyright ©," reprinting of articles by exchange bulletins is permitted, as long as appropriate credit is given.

†APAC is the Alberta Palaeontological Advisory Committee

UPCOMING APS MEETINGS

Meetings take place in Room **B108**, Mount Royal College, at **7:30 p.m.**

Next meeting: September 17*—have a great summer!

*Bulletins will (hopefully) be distributed to members in attendance.

ON THE COVER: "Bizarre *Opabinia* emerges from the detritus of the sea floor to pursue an early polychaete worm". *Opabinia regalis*, Middle Cambrian, North America. Pen-and-ink art by APS member Chris Bretz. Copyright ©1992. Reproduced by permission.

President's Message

by Les Adler

At the May meeting the current executive members were renominated to continue on in their same positions for a further twelve months. If vacancies occur the other members of the executive will cover until replacements are found. In this issue you will find maps and meeting times for summer field trips. The *Greatest Show Unearthed* is at Edmonton, and the Calgary Planetarium is presenting a Dinamation show on fossil marine reptiles. Several of our members will be collecting fossils independently over the summer.

At the Calgary Rock and Lapidary Show, APS members from Texas, **Emmette and Jean Wallace**, displayed specimens. Jean scored 98% in the Professional competitive section. **Les Fazekas** collected an armful of prizes for his entries in the novice section in both the mineral and fossil categories. **Harvey Negrich** and his associates provided exhibits and identified specimens. Dealers had fossils for sale and the APS bought some for door prizes, to be distributed at meetings by **Chris Bretz**. **Don Sabo**, our society secretary, was in charge of judging.

At the May meeting **Wayne Braunberger** gave an excellent talk accompanied by an effective, two-projector slide show on scaphitoid ammonites of the Alberta Group, from the west and northwest of Calgary. Wayne discussed their structure, classification and some of the collecting sites. There were also suites of fossils to examine. **Betty and Randall Quon** have already seen the show at Edmonton and gave an extensive report.

Holger Hartmaier is attending to programs and we have speakers, shows or visits set up for as far ahead as February 1994. There is to be a dinosaur cartoon for the Xmas meeting, a video at Hampton Crescent in January; a slide show on Dinotour 1993; talks on field trips, microfossils, collecting areas and the Canadian Rockies.

Howard Allen is continuing on as editor of our excellent *Bulletin*.

The combination of the *Bulletin*, programs, and efforts of our members has caused membership to grow from about 55 earlier in the year, to nearly 75. Consequently, finances are in good order with about \$800 in the bank. We also have a stock of unsold T-shirts. Mount Royal College has agreed to allow us to continue to use their facilities at no cost. Bill Carson from Dinotour has joined us and will be advising us of future plans—probably a trip to Texas and Northern Mexico for 1994. A quarter of the participants on the 1993 tour were APS members.

Enjoy your summer trips. We would like to see you at Mount Royal College in the fall. □

From the Editor...

by Howard Allen

So, somebody *does* read the *Bulletin*! As you will see on page 3, at least one of our members caught my moronic insertion in last issue's editorial, and responded with gusto! Thanks to **Hope Johnson** for her good-natured attack on this bit of pseudoscientific rubbish, and for setting the record straight. It's too bad I have to resort to such means to get input—but keep your T-shirt on, Hope—no more "errors" of this kind will be appearing in the *Bulletin*.

Hope Johnson raises a very good point about some members of the public believing anything they read in print; or at least not recognizing goof-ups and errors for what they are. One of the stated aims of the APS (page 1) is "education of the general public." This got me thinking about a new feature for the *Bulletin*, in which we could target the major (and minor) gaffes that appear at all-too-frequent intervals in the mass media. You've seen them before: the newspaper items about dinosaurs being excavated by *archaeologists*...the discovery of a fossil bed containing the bones of mastodons and *other dinosaurs*...the cabinet minister who gushes to the press about Alberta's fame in marketing new jewellery from "dinosaur skins" (actually ammonite shell—yes, this *really* happened!)

I'm not talking about the blatant "Dinosaurs Ate My Baby" garbage. The goofs that appear in the "legitimate" press is what really creates confusion and disseminates misinformation throughout the general public. I've been making an effort to point out glitches I've found while reviewing our regular "Fossils in the News" feature, using italicized editorial comments. Why not make this a regular feature? We could call it "Dinosaur Boners" or "Paleo Pratfalls..." Send in any bloopers you come across, with the offending parts highlighted, and your comments. And keep the 'normal' news items coming in!

Once again, many thanks to our boy wonder of the Rapidograph pen, **Chris Bretz**, for this month's excellent cover illustration. And speaking of cover illustrations—*run*, don't walk—to your nearest news-stand for the next issue of *Earth* magazine ("available July 6"), which will feature the work of our very own **Mike Skrepnick**, of T-shirt fame. Congratulations, Mike! (If you can't wait till July, a thumbnail version of Mike's painting appears on page 74 of the current issue of *Earth*.) And speaking of T-shirts, they're going fast—you'd better get 'em while they're hot! With Mike hitting the big-time, our APS T-shirts are bound to become a collector's item! □

A Royal Mess

Letter to the Editor

I have recently received the March 1993 APS *Bulletin*. In your editorial you lament the lack of information reaching you about palaeontological matters, and the necessity of keeping up with the goings-on in this palaeontological world.

All of a sudden there appears a statement which I take is bait, because it is very curious: “*Stegosaurus* is known to be an offshoot of the theropod lineage, with *Triceratops* and *Iguanodon* representing intermediate forms.”

I assure you that this scheme is equivalent to tracing King Henry VIII (of six wives fame) “back” to Napoleon I, further “back” to Queen Elizabeth II (present queen) who would then be “an offshoot” of Genghis Khan. This is quite comical in both cases, and may well have been carefully designed to ensure some feedback. After all, some of us out here may be virtually extinct ourselves, and perhaps need nudging.

However, the statement about *Stegosaurus* is goofy, and the rest of the sentence is *not* “known”.

There is a strong tendency on the part of many people to believe anything they see in print. You must protect the integrity of your bulletin by avoiding what I can only regard as a corny joke. Remember, there are thousands of people in Alberta who distrust science, and would love to make mincemeat of evolutionary “notions”.

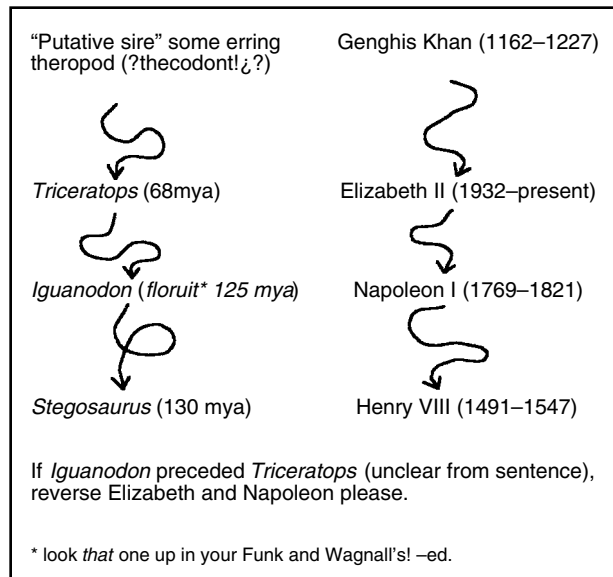
The theropods constitute the whole group of carnivorous dinosaurs. The small ones were referred to for a while as coelurosaurs, but now are called small theropods. They go back to about 210 million years ago, in late Triassic time.

The next stage in this scheme is *Triceratops* which is a very late herbivorous dinosaur that seems to have been present in some high numbers at the time of the Great Extinction, which may have occurred about 65–63 million years ago. It was preceded by numerous smaller relations, all of which have a strong family (Ceratopsidae) resemblance.

The Iguanodontidae spread in time range from Early (Lower) Cretaceous to well into the Upper Cretaceous, a matter of about 65 million to even 71 million years. They may have been on the wane by 65 million years ago. They were ornithischians, as were the ceratopsids and the hadrosaurs (duck-billed dinosaurs). *Iguanodon*, a genus, was only one kind of iguanodont, and according to Robert Carroll, is reported from the Lower Cretaceous of Europe, North Africa, North America and perhaps East Asia. Many genera have been identified, and no one genus will have persisted over this long time range.

The last term in your scheme is *Stegosaurus*, of another ornithischian family, the Stegosauridae. Until recently, the only reasonably complete skull and skeleton of this quite remarkable—even by dinosaurian standards—beast was found in company with *Diplodocus*, *Allosaurus*, and *Apatosaurus* (= *Brontosaurus*) in rocks of Upper Jurassic age, *i.e.* about 130 million years in age.

So we arrive at a so-called “lineage” from some theropod of early date—say pre-200 million years ago, to *Triceratops* of 68 million years ago, to *Iguanodon* of maybe 125 million years ago, and finally to *Stegosaurus*, of 130 million years ago. This time problem, while serious, is as little compared to the anatomical difficulties involved (with skull structure especially). *Perhaps* you thought you heard theropod when you heard thecodont... I’m sure this whole thing is bait to get some action out of some of us. It is goofy. It cannot work.



I feel I may be descended from an amoeba, but proving descent is full of traps. I ordered a T-shirt, but will return it, not wear it, ask for my money back, if you publish something I recognize immediately as ceratopsid poop!

By the way, the impact crater on the northwest corner of the Cypress Hills ridge [*Was it one big bang or a series of nudges?*—APS *Bulletin*, March ‘93, pg. 10] is much too late and far too small to have caused any but the most trivial extinction. (Personal communication with Dr. G.H.S. Jones, geophysicist [retired] from the Defence Research Establishment, Suffield, Alberta.) The age was probably 4 million years old.

Yours sincerely, Hope Johnson, LLD
(Redcliff, Alberta)

Disposition of Fossils

by Wayne Braunberger, APAC Representative

Recently I have received requests for information regarding the disposition of fossils collected prior to July 5, 1978. As everyone should be aware of the present regulations most of this will be old news. However, for new members of the Society or if you are planning to apply for a disposition the following information may be timely.

The Alberta Historical Resources Act is the means by which Alberta manages the fossil resources present within the province. The 1987 amendment to the Act (Bill 11) allows the limited trade in certain resources considered abundant and of low scientific value. Under the Act all fossils collected in Alberta are the property of the Crown and as such cannot be legally sold, exchanged or in any other way disposed of without first obtaining ownership. In order to obtain ownership several steps must be followed. The first is to apply for a Disposition Certificate from the Minister of Culture and Multiculturalism. When and if granted, the Disposition Certificate waives all claims to the named fossils by the Crown. Disposition Certificates are reviewed by the Alberta Palaeontological Advisory Committee and the Royal Tyrrell Museum of Palaeontology. Both APAC and the RTMP act in an advisory capacity to the Minister who will ultimately grant or deny the request.

If you have fossils collected prior to July 5, 1978 a Disposition Certificate may be granted if these fossils have been registered with the Department of Culture and Multiculturalism through the Royal Tyrrell Museum of Palaeontology. If you have fossils collected after July 5, 1978 Disposition Certificates will only be issued for fossils on the Control list of the Disposition Regulation. The Control list includes:

- 1) ammonite, including all gemological byproducts of ammonite
- 2) oyster shell
- 3) petrified wood
- 4) plant leaf impressions

If you do not wish to apply for Disposition Certificates for fossils in your collection you may still retain possession without ownership. The possessor becomes a custodian of the fossils on behalf of the Crown.

In order to register fossils and obtain a Disposition Certificate the following steps are suggested:

1) Assign a registration number to each specimen or related group of specimens. Small or poorly preserved specimens and those of similar identification may be numbered and photographed in batches (to a maximum of 50 specimens per photograph). To obtain registration numbers, contact:

Resource Planning
Royal Tyrrell Museum of Palaeontology
Drumheller, Alberta
T0J 0Y0
Phone: (403) 823-7707
(403) 294-1992 (Calgary direct)

2) Provide one photograph of each specimen or group of specimens with the registration number visible in the photograph or written on the back. Please ensure that a scale is included so that the size of each specimen is apparent. Black and white photographs of good quality are preferable but not mandatory. Large, well-preserved and/or unique specimens should be numbered and photographed separately. When photographing more than one specimen please ensure that all specimens are visible and can be easily recognized. The Royal Tyrrell Museum has the right to refuse photographs of poor quality.

3) Provide a brief description of each specimen or group of specimens including collection date and detailed locality information where possible. An example of the procedure is as follows:

SPECIMEN NUMBER
IDENTIFICATION
LOCALITY
AGE/FORMATION
COLLECTOR
COLLECTION DATE
DESCRIPTION OF SPECIMENS
GENERAL REMARKS

Registration of collections made prior to July 5, 1978 must be completed by December 31, 1993. Only one registration is available to each individual. If a single registration is difficult an inventory system is available to collectors by contacting the museum. **Collections not registered by December 31, 1993 will be treated as collections made on or after July 5, 1978.**

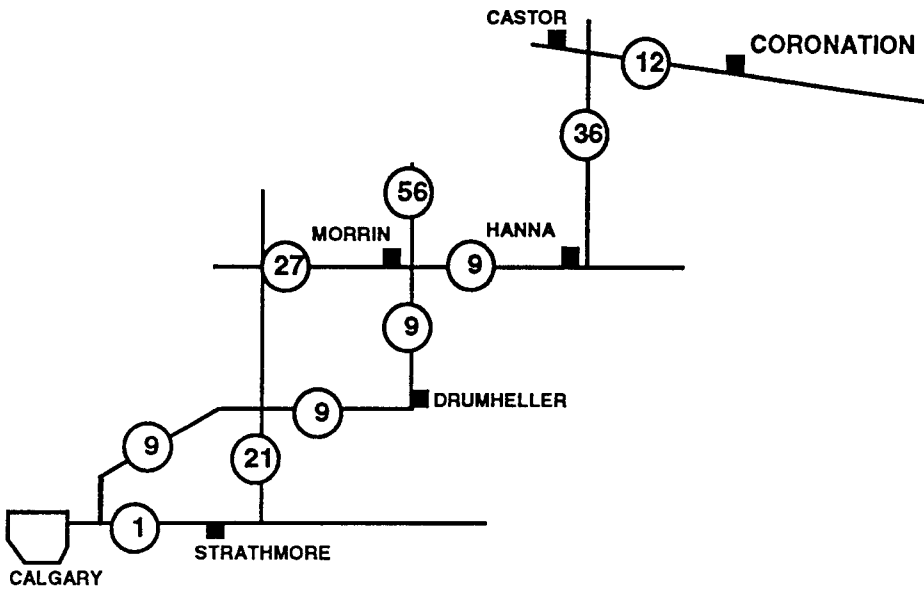
I thank Andrew Neuman, Curator of Collections at the Royal Tyrrell Museum of Palaeontology for providing the above information. For further information on the registration of collections or to clarify any points please contact the museum. □

Alberta Palaeontological Society Field Trip 93-01

Coronation/Hanna

Saturday, June 19, 1993 - Day 1

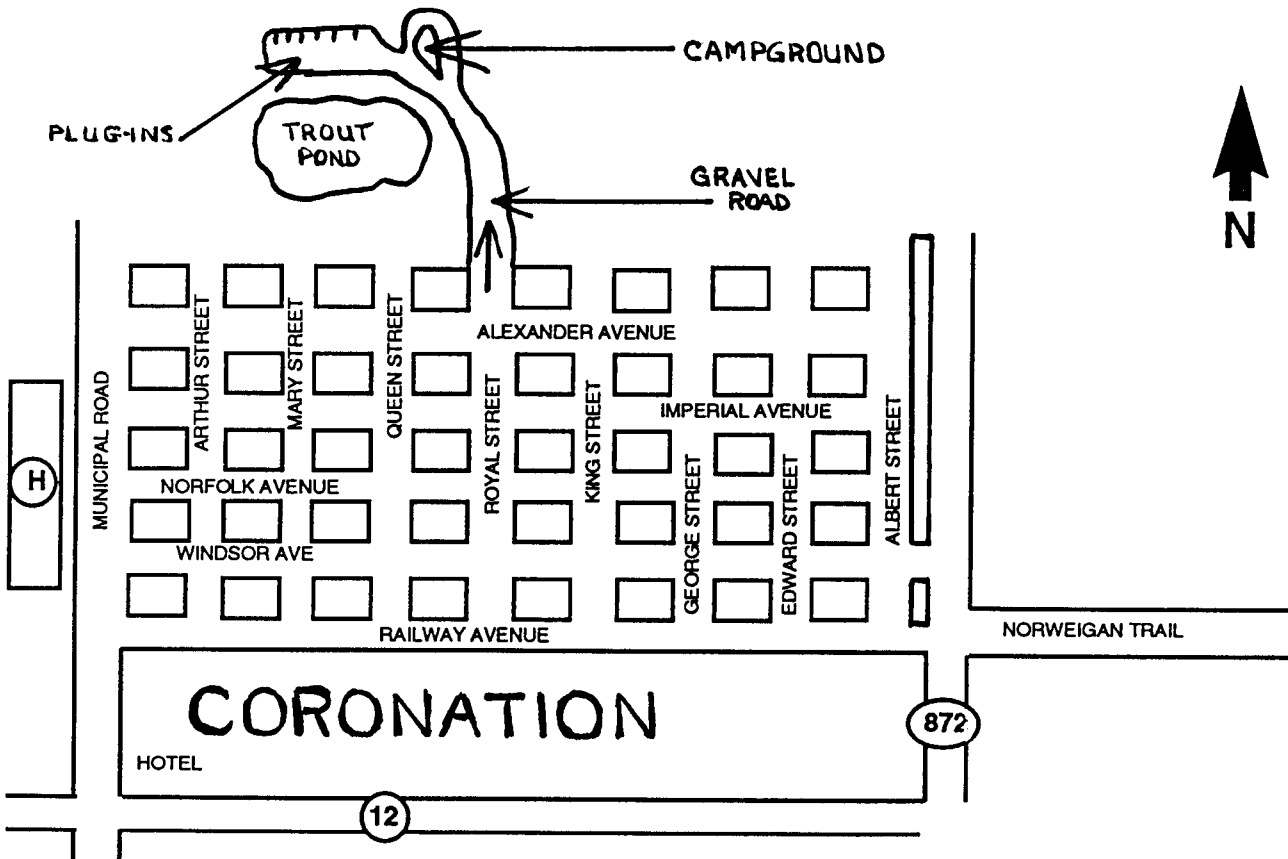
Directions to meeting location



Campground Fees:

\$5.00 per night
\$7.00 with services

Driving time from
Calgary is about 3
hours - give yourself
at least 3.5



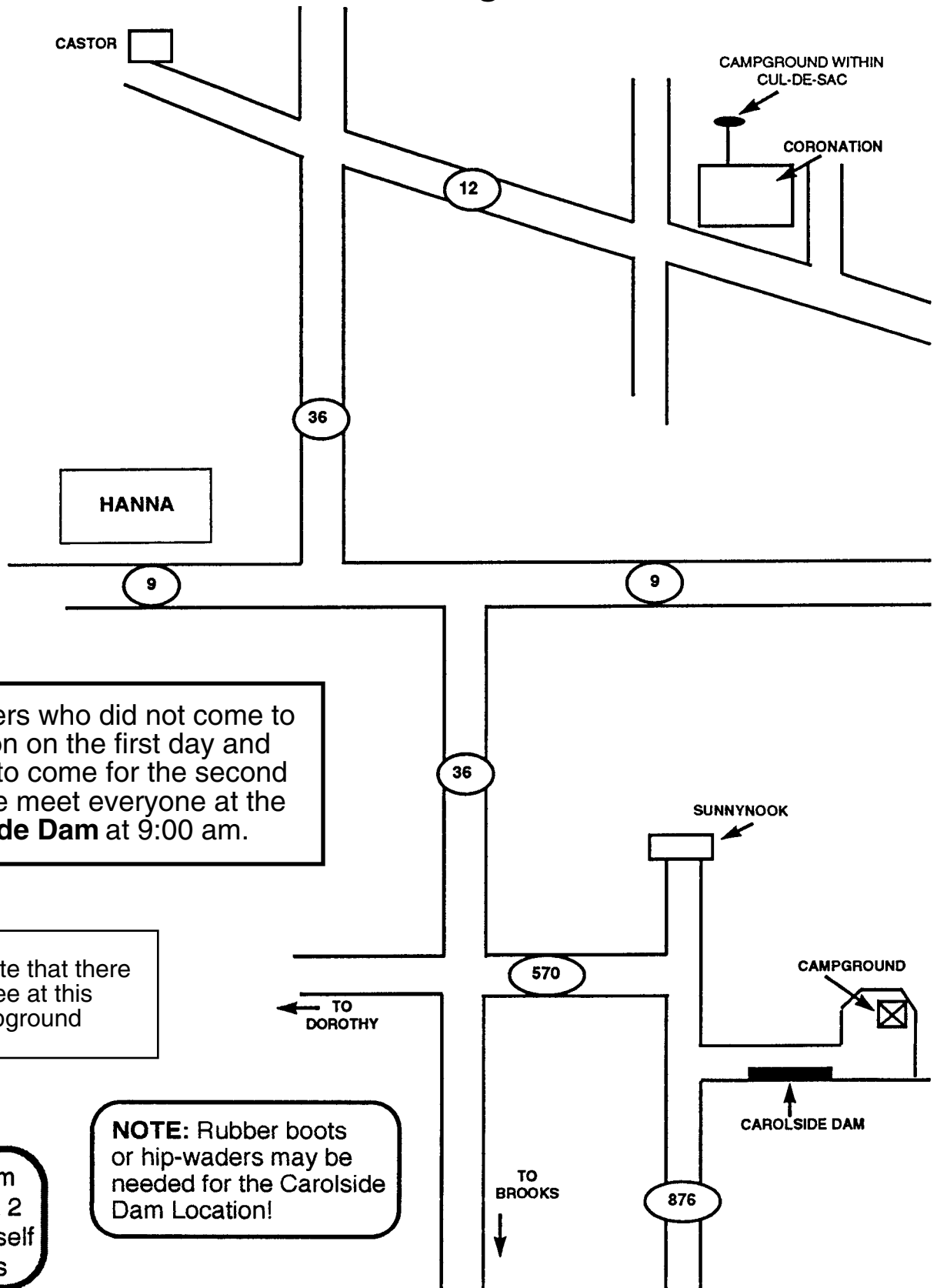
Meet at **Campground** north of Coronation on Royal Street
at 10:00 a.m.

Alberta Palaeontological Society Field Trip 93-01

Coronation/Hanna

Sunday, June 20, 1993 - Day 2

Directions to meeting location



Any members who did not come to Coronation on the first day and would like to come for the second day, please meet everyone at the **Carolside Dam** at 9:00 am.

Please note that there is no fee at this Campground

Driving time from Calgary is about 2 hours - give yourself about 2.5 hours

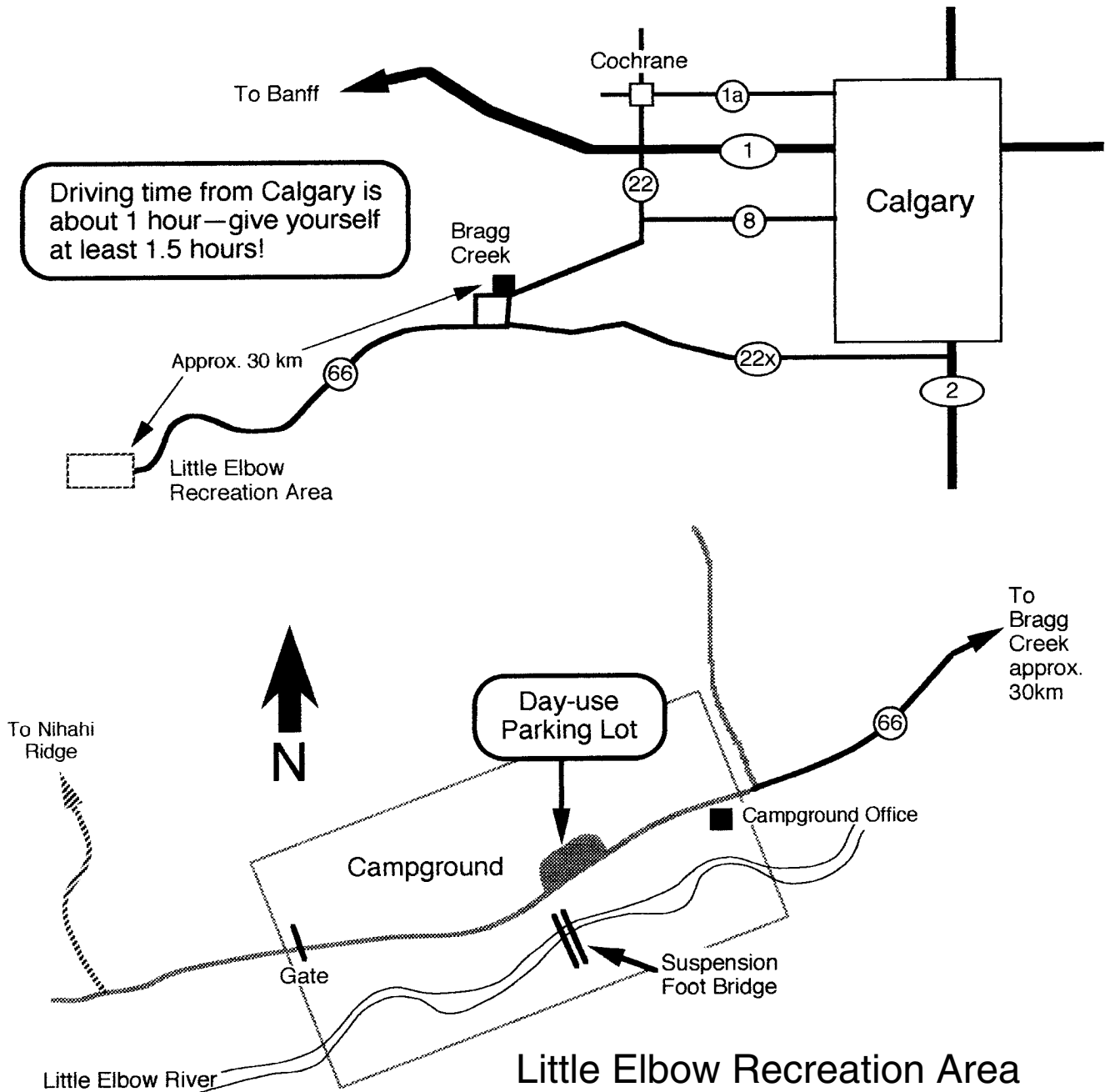
NOTE: Rubber boots or hip-waders may be needed for the Carolside Dam Location!

Alberta Palaeontological Society Field Trip 93-02

Nihahi Ridge

Saturday, July 17, 1993

Directions to meeting location



Meet at the **Day-use Parking Area** in Little Elbow Recreation Area
(opposite the suspension foot bridge)
at 9:00 A.M.

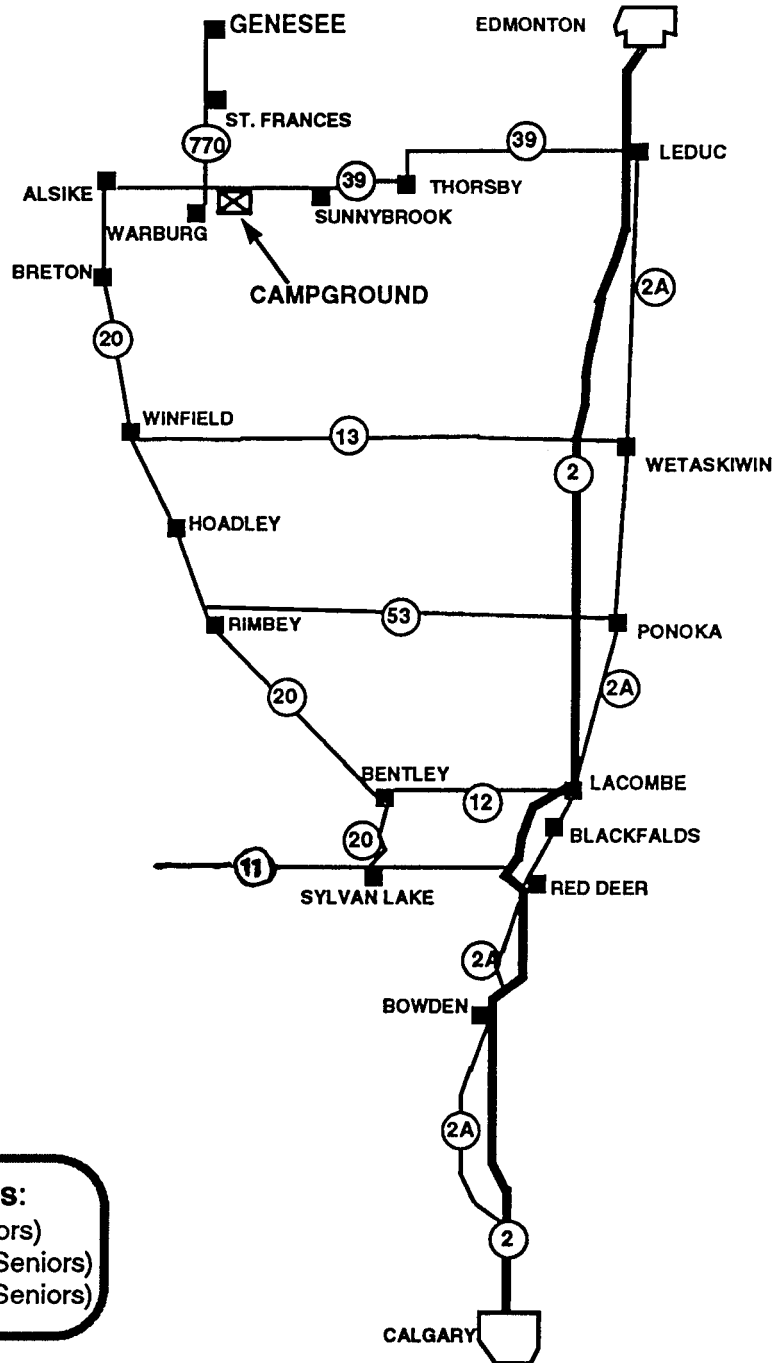
Reference: *Kananaskis Country Trail Guide*, Second Edition, by Gilleen Daffern,
© 1985, Rocky Mountain Books, Calgary (available in most book stores)

Alberta Palaeontological Society Field Trip 93-03

Genesee

Saturday, August 21, 1993

Directions to meeting location



Campground Fees:

- 1 Night - \$5.50 (\$3.25 - Seniors)
- 2 Nights - \$11.00 (\$6.50 for Seniors)
- 3 Nights - \$16.50 (\$9.75 for Seniors)

Driving time from
Calgary is about 3
hours - give yourself
at least 3.5

Meet at **Campground** between Warburg and Sunnybrook on the
South side of Highway 39.
at 10:00 a.m.

Highlights from Exchange Bulletins...

The APS receives several bulletins and newsletters from other societies and clubs on a regular basis. Members are encouraged to examine copies of these, which are filed in the APS library. —ed.

The Earth Science News—Earth Science Club of Northern Illinois (ESCONI)

March 1993

- *Why Not the Mammals?* by Allen A. Debus—Second of a two-part, illustrated article on the historical treatment of fossil mammals; the author compares the public's perception of mammals with that of the much more popular dinosaurs.
- *Dinosaurs & Fossils* by John Boland—an article reprinted from AFMS Newsletter, reviewing fossil-related news items from the United States.

April 1993

- *Plate Tectonics and Dinosaurs* by John Good—A summary of how the theory of plate tectonics explains the distribution of dinosaur species in various parts of the world, and how tectonics may have played a role in their extinction.

May 1993

- *Local MWF Club Donates State Fossil*—an article reprinted from MWF Newsletter on how an amateur rock club located, purchased and donated a specimen of Illinois' state fossil, *Tullimonstrum gregarium* to the Illinois State Museum, which had no specimen of its own.
- *What Will Happen to Your Collection?* by Gordon A. Auton—some thoughts on the various options a collector should consider when arranging for the disposal of his/her collection after death.
- *Sculpting Dinosaurs* by Allen A. Debus—an illustrated article on the history of dinosaur sculpture and museum models.

MAPS Digest—Mid-America Paleontological Society

March 1993

- *Alert, Alert: Baucus Bill S-3107 Coming Around Again* by John Boland—A bill introduced by Montana State Senator Max Baucus which would strengthen restrictions on the collection of vertebrate fossils in the United States was held up in committee in 1992 after a flood of letters and phone calls opposing the bill. Meetings were called on January 8 and February 22 of this year, and attended by representatives of scientific institutions, government land agencies, commercial collectors, amateurs and various other interest groups. Professional palaeontologists and others urged the revival of the bill, which is expected to cause another flood of protest. The amateurs' posi-

tion is that everyone should be able to collect on public land—for casual use and with hand tools—all types of fossils, like they presently can for rocks, minerals and petrified wood.

- *Judge Rules T. rex Not Institute's*—A US federal judge has ruled that the now-infamous *T. rex* skeleton nicknamed "Sue", excavated from land held in trust for local Indian bands, does not belong to the Black Hills Institute of Geological Research, the group that paid a farmer US\$5,000 for excavation rights. The fossil, meanwhile, remains in storage at the South Dakota School of Mines pending the outcome of the court case. In related news, the court has subpoenaed documents from the Black Hills Institute relating to the collection of other fossils from public lands, dating back to 1977.

Calgary Lapidary Journal—The Calgary Rock and Lapidary Club—Trudy Martin, editor of the Journal has kindly forwarded several news clippings, as well as copies of three pamphlets from the Black Hills Institute of Geological Research. The pamphlets, titled: *What is a Dinosaur?*; *What is an Ammonite?*; and *What is a Trilobite?* offer novices an introduction to the biology and palaeontology of the respective animal groups. The pamphlets will be filed in the APS library for examination by members. Thanks again to Ms. Martin for her thoughtfulness. □

Welcome New Members

William E. Carson, Calgary AB
 Christopher Gervasi, Haverford PA
 Rose Hanssen, Calgary AB
 Fred W. Lewis, Carmel IN
 Gazelle Liu, Prince Rupert BC
 Norman and Paddy Lunde, Airdrie AB
 Ron Manz, Calgary AB
 Suzanne McGillis, Calgary AB
 Shannon Lee Morin, Calgary AB
 Troy Myers, Calgary AB
 Don Pearson, Eastend SK
 Dale and Bonnie Venn, Calgary AB
 Matt Vickaryous, Calgary AB
 Earth Science Department, Mount Royal College, Calgary AB

Reviews

from Les Adler

Ancient Mariners by Judy A. Massare, *Natural History*, September 1992, pp. 48–53.

A biography of Judy A. Massare and a set of references is provided on pages 86 and 87. Massare obtained a PhD from Johns Hopkins University at Baltimore in 1983 for a study of

ichthyosaur evolution and natural history. While doing so, she assisted in the excavations of specimens in Wyoming, Idaho and Nevada.

The most remarkable feature of ichthyosaur preservation is the number of embryos and juveniles found. This is normally a rare occurrence in the fossil record. In Germany, the number of specimens at certain levels indicates that a specific site was used repeatedly over time by a large number of ichthyosaurs [Dr. Philip Currie notes that a similar situation is possible at Devil's Coulee, Alberta, for certain dinosaurs—L.A.]. Massare postulates that at a certain time of year this spot was particularly favourable for giving birth due to calm waters and that the sheer number of mothers and young afforded protection from predators; also the conditions were favourable as a social meeting place where the sexes could meet and mate.

Massare provides the following notes on ichthyosaurs (“fish-lizards”): They were shaped like fish, had heads like those of reptiles and had tail flukes and flippers like those of whales; they ranged in size from one to twelve metres and inhabited the world's oceans from 245 to 85 million years ago. The best known ichthyosaurs from the period of 190 to 200 million years ago are from Lyme Regis in southern England [APS members Dr. Dave Mundy, Alex Harich and Les Adler have each visited these deposits—L.A.] and Holzmaden in Germany. At Holzmaden, carbonized skin impressions outlining the limbs, tail and dorsal fin have been found.

Ichthyosaurs gave birth to live young in the water. One fossil shows a small ichthyosaur in the birth canal of its mother. Ichthyosaurs developed ovoviviparity, in which the eggs stay in the body as the embryos develop, the egg sac getting its nourishment from the egg yolk, not from the mother. Up to eleven embryos have been found in a single specimen.

The various genera display an array of tooth forms suggesting that they filled nearly all of the large predator niches. There were various ecological differences during the Triassic and Jurassic periods resulting in different habitats which are reflected in the body shapes and preservation modes of ichthyosaurs and also in their predatory methods, which reached a peak of diversity in the Jurassic. The niches occupied by ichthyosaurs about the end of the Jurassic became occupied by plesiosaurs, especially short-necked types. The ichthyosaurs became extinct about 85 million years ago, 20 million years before the demise of the dinosaurs. The reason (or reasons) for the disappearance of this group remains a mystery. [Ichthyosaurs may be seen at the Tyrrell Museum of Palaeontology, and specimens have recently been collected in British Columbia—L.A.].

This View of Life: Cordelia's Dilemma by Stephen Jay Gould, *Natural History*, February 1992, pp. 10–18.

The title refers to Shakespeare's *King Lear* wherein Cordelia remains silent on moral grounds and loses her inheritance. Gould discusses the importance of negative results where there is silence or nonacquiescence to one's expectations in scientific studies. There may be a bias toward papers that produce spectacular results or conclusions. So the dilemma is to say nothing or take action to attract attention.

Gould relates the investigations involving punctuated equilibrium, developed with Niles Eldredge in 1972, where there is non-change in fossil species during lengthy geological time spans. The evidence treats stasis as uninteresting non-evidence for non-evolution. Statistics appear to show no evidence for gradual change as proposed by Darwin. In fact a similar study led to one scientist changing his life studies to another section of geology. Gould and Eldredge used the evidence and made stasis into data and fitted stasis into a theory requiring a long period of time and trends.

Nonprogressive evolution in a clade of Cretaceous Montastraea-like corals by Budd and Coates (*Palaeobiology*, 1992), uses these ideas. The early history of these corals over an 80 million year period was investigated. The results showed a series of oscillations over a range of maximum to minimum size of individual corals within a colony due to the clearness or turbidity of the seawater and the availability of a variety of types of food. Other constraints were studied such as the skeletal framework, seas advancing and retreating and the range of colonies during Cretaceous time. They found lots of evolutionary change, but no story of clear and persistent direction.

Gould then refers to Molly Bloom in James Joyce's *Ulysses*, wherein she promises to pay attention to the little accumulating events of daily life and not treat them as nothing against the rare and grandiose moments of history.

The Artist Who Saw Through Time by Robert McCracken Peck, *Natural History*, August 1992, pp. 60–64.

Peck provides a biography of Charles R. Knight, who made the American Museum of Natural History his home as he was provided with the facilities and finances to paint immense murals of prehistoric life. Knight is credited with being the man who brought dinosaurs and a host of other long extinct creatures out of the attic and into the public eye.

Young Charles Knight had special visiting

privileges arranged by J.P. Morgan from before the age of five. Knight drew from models, then from actual animals and thus was able to draw muscular structures and apply this experience. After museum work, Knight developed portfolios of animal drawings to obtain freelance assignments from New York publishing houses and magazines. The American Book Company gave him a rich assignment and he was on his way. With each published illustration his reputation and the number of his friends grew (including Sir Arthur Conan Doyle and Rudyard Kipling).

In 1894 he stumbled on to illustrating a fossil animal, *Elotherium* sp., which led him to forty years of illustrating past life. Knight had the combination of anatomical knowledge and artistic ability. By adding flesh and fur to the bones Knight seemed to breathe life into his subjects. He filled a niche in which he could combine his talents in science and in art.

Some of Knight's work is being restored for the 1993 opening of the Hall of Human Biology and Evolution. [A Knight painting appears on the front jacket of *S.J. Gould's Wonderful Life—ed.*]

The Big Bang of Animal Evolution by Jeffrey S. Levinton, *Scientific American*, November 1992, pp. 84–91.

Levinton's quest is to find out if the mechanism of evolution has been altered in ways that have prevented fundamental changes in the body plans of animals following a Cambrian explosion in the appearance of many diverse forms about 600 million years ago.

Levinton is basically summarizing his book, *Genetics, Paleontology and Macroevolution*. His article is accompanied by illustrations, graphs, a painting and two photographs involving about 100 specimens from a dozen phyla. Look at these first and then read over the article. A lot of this material can be found in Gould's book, *Wonderful Life*.

All of the evolutionary changes since the Cambrian period have been mere variations on basic themes after dramatic leaps that occurred during the Cambrian. The body plans by and large served as the blue prints for those seen today. The phyla seem to have appeared suddenly and simultaneously; thus palaeontologists refer to the Cambrian "explosion".

Biologists postulate that the sequences of nucleotide bases in DNA and of amino acids in proteins mutate at approximately constant rates. Bruce Runnegar of UCLA estimates that multicellular animals probably divided into lineages that anticipated the major phyla about 900 million years ago. Levinton believes that Gould and some others have exaggerated the diversity in the Cambrian period. At the end of the Permian

Period, 230 million years ago, according to D.M. Raup, as many as 96% of all maritime species disappeared, but no fundamentally new body plans and phyla arose to fill the vacated niches.

Levinton and Paul Klerks of the University of Southwestern Louisiana studied the metal tolerance of invertebrates in the Hudson River. Their results suggested that genes were largely responsible for the tolerance of cadmium in a species of earthworm. Other living forms and their tendencies were studied, such as antibiotic resistance in bacteria, guppies eluding predators, and finches resisting drought. J.J. Sepkoski of the University of Chicago studies the diversity of fossil groups through time. Joan Miyazaki studied the rate of change in fossil molluscs of Chesapeake Bay, and George Gaylord Simpson studied fossil opossums. These studies have recalled [the British biologist J.B.S.] Haldane's paradox: how can evolution in living populations be so fast when evolution in the fossil record appears so slow?

This article ends with the conclusion that the Cambrian explosion remains a mystery. Evolution at the species level continues unabated but variation in the surviving body plans does not seem to occur. For whatever unknown reasons there will probably never again be an explosion of animal diversity on the earth like the one that took place sometime around the early Cambrian.

Mammoths, Mastodons and Elephants:

Biology, Behavior and the Fossil Record by Gary Haynes, Cambridge University Press, 1991; US\$ 69.50.

[Following is a summary of a review appearing in *Scientific American*, September 1992, pp. 178–179. —LA]

What this book shows is that scientists may have been misinterpreting the evidence that hunters in Europe and North America were largely responsible for the extinction of mammoths and mastodons.

Gary Haynes has studied the last two species of elephant still in existence and finds that many elephants perish in die-off sites where the elephants are unable to cope with their now restrictive environments. Haynes also has analyzed authorized government kills and checks the proportions of adults, juveniles, males and females, with disturbing results.

Haynes suggests that the early hunters were only interested in easy pickings and were only skimming off weak infants or senile adults, so it is unlikely that humans were a major factor in the extinction of mammoths and mastodons.

Careful study of present-day elephants is needed to help scientists understand how the end came to the elephant societies of long ago.

It Came from Within by John Horgan, *Scientific American*, September 1992, pg. 20.

Thomas Gold, a physicist at Cornell University, and the scientific iconoclast who virtually alone claims that oil and natural gas stem not from decayed organisms, as most experts maintain, but from nonbiological processes occurring deep inside the earth, continues on and argues that life first began billions of years ago ... not at or near the earth's surface, but in rocky fissures underground.

Gold speculates that some of the primitive microorganisms migrated to the surface where they later evolved. He claims that most still dwell underground, sustained not by light and oxygen, but by sulphur compounds and methane or other energy-rich chemicals—and that similar subterranean communities may exist elsewhere within other planets and satellites in the solar system.

Gold points out that the most primitive of all living organisms are anaerobic, thermophilic microbes called archaeobacteria which thrive in hot, airless environments. Gold says that drills have turned up microbes five kilometres down. He also argues that the earth's interior would have provided a much more hospitable environment for proto-life four billion years ago than the surface would have, ravaged as it was by asteroids and cosmic radiation. If life emerged from within the interior of the earth, then why not within other planets?

Carl R. Woese of the University of Illinois, an authority on archaeobacteria, applauds Gold's speculation on its terrestrial component: "All the theories in the microbiology world and on the origin of life are in flux. However, Gold goes beyond what I am comfortable with".

Evolution Comes to Life by Ian Tattersall, *Scientific American*, August 1992, pp. 80–87.

Ian Tattersall is the curator of the American Museum of Natural History's Hall of Human Biology and Evolution. Tattersall and his associate, Willard Whitson, decided to create reconstructions of early humans for the museum. In this issue a set of 44 photos shows the successive steps in reconstructing human ancestors engaged in typical activities. Skulls and bones of Neanderthals were used in the reconstructions, as these are the only direct physical evidence available.

Three dioramas are being erected: Neanderthal of 50,000 years ago; *Homo erectus* at Turkana, Kenya, 1.5 million years ago; and *Australopithecus afarensis* of Laetoli, Tanzania, 3.5 million years ago. Footprints and actual specimens of the fossils on which the dioramas are based are also on display. By examining the photos you will be able to understand the many challenges the preparators faced. □

Fossils in the News

Time, May 10, 1993:

News from the Ooze

Recently discovered microfossils from Australia appear to push back our dating of the dawn of life to at least 3.5 billion years ago. American Palaeobiologist J. William Schopf, in a recent issue of *Science*, reports finding 11 different types of microbes in a rock sample from Western Australia, showing that life was thriving and diversified only 400 million years—much earlier than previous estimates of 1.5 billion years—after the earth became habitable.

The Computer Paper, May 1993:

Dinosaurs go Digital

San Jose, California—Software giant Microsoft Corporation has announced a new CD-ROM title for dino fans: *Microsoft Dinosaurs*. The disc is "an interactive guide to a dinosaur's world, complete with 200 articles with photos, illustrations, narration and sounds." Microsoft apparently collaborated with The Dinosaur Society, a non-profit corporation devoted to scientific accuracy (the Dinosaur Society also consulted for Steven Spielberg's upcoming movie *Jurassic Park*). The rub: initially this CD-ROM disc will be available only for IBM-compatible PCs.

The Arizona Daily Star, Feb. 7, 1993:

Battle Brewing over Rights to Dig up Dinosaur Bones

Tucson, AZ—Fur continues to fly in the United States in the debate between commercial fossil collectors and academics. A recent gem and mineral show in Tucson once again brought the debate to the forefront, with commercial collectors from the Black Hills Institute of South Dakota offering dinosaur skeletons for sale at fabulous prices. The skeleton of an immature hadrosaur was on sale at the show for US\$350,000. Last year, a mastodon skeleton was on sale for US\$1.5 million, and a *Triceratops* skeleton went for US\$990,000.

Opponents claim that important vertebrate fossils (often collected from publicly-owned land) are being exported to wealthy foreign collectors, where they will disappear forever into "a mansion in Stuttgart or Tokyo." One Japanese businessman reportedly purchased a mosasaur skeleton to embed in the wall of his swimming pool. The American people meanwhile, are left with little more than empty craters and heaps of dirt.

Commercial collectors counter that they are rescuing valuable fossil resources from the ravages of erosion, which would quickly reduce the bones

to dust. As well, they argue, legitimate museums can save scarce funds by buying specimens from commercial collectors, rather than spending much larger sums mounting expeditions and paying salaries to crews of excavators and preparators.

With all the rhetoric and fighting words on both sides, the debate promises to remain volatile for some time. [*a complete copy of this article can be found in the APS library—see other items on the subject elsewhere in this month's issue—ed.*]

The Calgary Herald, April 15, 1993:

Fossil Find Sparks new Flight of Fancy

New York (Reuter)—“The discovery of two ancient bird fossils has strengthened evidence birds evolved from dinosaurs and raises new possibilities about the evolution of flight.” [*This rather confused article refers to the find as “bird fossils” in one paragraph and “the new type of dinosaur” in another—ed.*] The fossils, belonging to a creature dubbed *Mononychus*, were dug up in the Gobi Desert by a joint U.S.-Mongolian team.

According to Mark Norell of the American Museum of Natural History, the discovery of 70 million-year-old *Mononychus* appears to suggest “new possibilities on how flight in birds came about.” On one hand, *Mononychus* [*presumably a flightless bird*] may have lost the ability to fly after descending from a flying common ancestor to all birds. On the other hand, the common ancestor of all birds may have lived on the ground, then its descendants evolved flight independently in two groups—*Archaeopteryx* in one group, and modern birds in another. [*But where does this leave Mononychus?*] The article goes on to state that “*Mononychus*... belongs to a previously unknown group of dinosaurs that is part of the evolutionary transition between carnivorous dinosaurs and modern birds.” [*No wonder the public is so confused about science!—ed.*]

Newsweek, January 11, 1993:

Fossils are for Everyone

By Greg Retallack—In this editorial Retallack, professor of palaeontology at the University of Oregon, appeals to those who would restrict the collection of vertebrate fossils in the U.S. Noting many of the important discoveries and contributions made by amateur fossil hunters throughout history, he further points out that most professional palaeontologists became interested in the science at an early age, and concludes: “Is there a future for palaeontology if kids cannot find fossils?”

CSPG Reservoir, May 1993:

Digging for Dollars

In an apparent attempt to supplement fast-dwin-

dling government funds, the Royal Tyrrell Museum has placed an ad in the newsletter of the Canadian Society of Petroleum Geologists offering members of the public the chance to excavate dinosaur fossils for a fee—\$75 a day for adults (16 and over), \$50 for youths (10–15, accompanied by an adult). The new program (complete with logo) is dubbed “Day Digs.” For information: P.O. Box 7500, Drumheller, Alberta T0J 0Y0 or call (403) 823-7707 or 294-1992 (Calgary direct).

Calgary Herald, May 8, 1993:

Dinosaur Park to Get Big Expansion

Dinosaur Provincial Park, Alberta—Provincial Environment Minister Brian Evans has announced the expansion of the UN-designated Dinosaur World Heritage Site and Provincial Park. The park will be expanded by more than 2,428 hectares, an increase of about “seven percent” to the park’s existing 16,000 hectares. [*My calculator says this is a 15% increase—ed.*] The change includes the removal of 423 hectares of benchland above the Red Deer River badlands which are considered to have “minimal cultural or palaeontological value.”

Calgary Herald, May 8, 1993:

Big-Time Talent

By Mark Lowey, Herald writer—This illustrated article features the Czech-Canadian dinosaur artist Jan Sovak, who produces internationally acclaimed art from his Calgary studio. Sovak began drawing on the backs of sugar boxes as a child in Czechoslovakia, producing his first book of drawings at the age of seven. Today, his work appears in over 50 museums worldwide, in books (*The Last Great Dinosaurs* by Monty Reid & Jan Sovak—Red Deer College Press; *The Canadian Junior Encyclopedia*; The Audobon Society’s *Dinosaurs Pocket Guidebook*), magazines and television. Sovak is the featured artist for the Dinosaur World Tour in Edmonton [*see elsewhere, this issue*] where nearly 30 of his paintings will appear in multimedia presentations.

Lapidary Journal, May 1993:

Getting Warm: T. rex had Cold Feet

In a recent issue of *Geotimes* William J. Showers of North Carolina State University reports using stable isotope mass spectroscopy to determine that *T. rex*, among other dinosaurs, was warm-blooded. Employing the theory that isotope ratios in bones vary according to the body temperature of the living animal, Showers and his associates tested the isotopic ratios in the bones of modern mammals and the Komodo dragon (a living, cold-blooded lizard), and compared the results to those of several dinosaurs. The bones from the extremities—legs

and feet—of warm-blooded animals should be similar in isotope ratio to bones near the core of the body, while cold-blooded animals should have colder extremities.) Their conclusion: the dinosaur bone ratios fell within the range for warm-blooded animals.

[Thanks to Trudy Martin, Harvey Negrich, and Evelyn Wotherspoon for saving and handing over clippings —ed.] □



Dinosaur World Tour Kicks Off

Edmonton—The long-awaited **Dinosaur World Tour**, produced by Edmonton's Ex Terra Foundation and presented by the Capital City Events Foundation opened its doors May 14.

"The half million people expected to visit the Dinosaur World Tour from May 14 to July 25, will witness a world class exposition that's been rated by the Globe and Mail as one of the world's top events for 1993," says Michael Welsh, Chairman of the Capital City Events Foundation.

"Visitors can spend anywhere from a half to a full day investigating, learning and unravelling for themselves the mysteries of dinosaurs. They can also experience an exciting festival packed with comedy, music, entertainment and lots of fun."

The major dinosaur discoveries to be unveiled at the show follow five years of expeditions by the Ex Terra Foundation to China's Gobi Desert, Canada's high arctic and the badlands of Alberta. The discoveries will be featured in the 2,300 square metre (25,000 square foot) dinosaur pavilion situated on the seven acre site below Edmonton's downtown Convention Centre.

What makes the Dinosaur World Tour so special is the unique educational experience it offers visitors and, in particular, students. Created by Aldrich Pears Associates of Vancouver, the expo-

sition combines hands-on palaeontology with theatre experiences, live stage shows starring a full-size *Tyrannosaurus rex* skeleton, grisly dinosaur scenes, a video host—"Fraser"—and his animated sidekick—"Gobi"—and a realistic Gobi Desert field camp. Visitors will get a chance to encounter the dinosaur discoveries in a hands-on lab setting and witness science in the making.

"Never in the history of palaeontology has such an important dinosaur exposition ever been staged," says Philip Currie of Alberta's world-renowned Royal Tyrrell Museum of Palaeontology and one of Canada's leading palaeontologists who unearthed some of the specimens to be featured at the show. "The fact that this is the largest travelling dinosaur exposition ever makes it all the more impressive. It promises to be a once-in-a-lifetime dinosaur event."

In addition to the dinosaur pavilion, the exposition offers festival activities which will give visitors an opportunity to burrow for fossils in "The Digs"...make a plaster cast of a dinosaur footprint...hunt for dino-clues and solutions in a fact finding mystery tour...climb on top of a life-size baby dinosaur or be amused by a variety of roving entertainers, comedy acts, musical live theatre and the works of a number of world renowned visual artists. The exposition site has full facilities including concession booths and souvenir stores.

A team of 1,750 volunteers will be needed to stage the exposition in Edmonton. To date 1,400 volunteers have been recruited.

Following the world premiere showing of the tour in Edmonton, the exposition will travel to other Canadian cities before beginning its world tour to Asia and the United States.

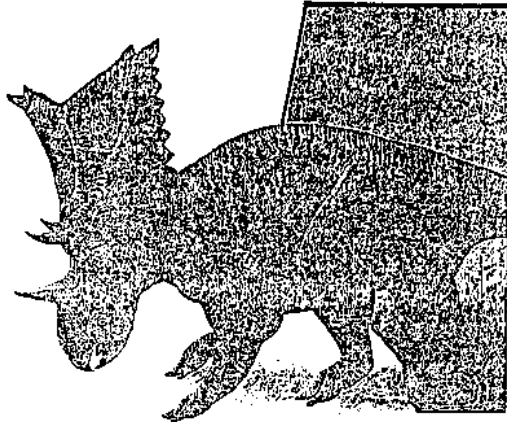
Ticket Information:

Prices—	\$15.00	Adults (17 and up)
	\$10.00	Children (5–16) (4 & under free)
	\$10.00	Seniors (65+)
	\$8.00	Organized School Groups
	\$10.00	Special group rates for 30 or more adults

Tickets are available at Ticketmaster outlets in Alberta, B.C. and Seattle, Washington. **The show has a timed entry** so visitors are encouraged to buy their tickets early in order to get the day and time they want.

[Adapted from a press-release by the Capital City Events Foundation. For further information, contact Joy McGill, Communications Director, at (403) 423-8369 —ed.] □

THE
ALBERTA PALAEOLOGICAL SOCIETY
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ALBERTA PALAEOLOGICAL SOCIETY
1993

Once again the Society is pleased to offer T-Shirts and Sweatshirts to its members. We are privileged to have an original colour drawing by Mike Skrepnick, a ceratopsian dinosaur on a province of Alberta background, for this offering. A black and white illustration appears above.

To order your T-Shirt or Sweatshirt fill out the order form below and mail to the Society as soon as possible.

T-SHIRTS / SWEATSHIRTS

NAME: _____

ADDRESS: _____

T-Shirts:	Small	_____	
	Medium	_____	
	Large	_____	
	Extra Large	_____	
	Total	_____	X \$15.00/ shirt\$_____

Sweatshirts	Small	_____	
	Medium	_____	
	Large	_____	
	Extra Large	_____	
	Total	_____	X \$20.00/ shirt\$_____

Shipping and Handling: \$3.00/ shirt\$_____

Total Enclosed.....\$_____