

Alberta

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Society
Bulletin*

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† APAC is the Alberta Palaeontological Advisory Committee

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

- Promote the science of palaeontology through study and education.
- Make contributions to the science by:
 - discovery
 - collection
 - description
 - education of the general public
 - preservation of material for study and the future
- Provide information and expertise to other collectors.
- 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	\$20.00 annually
Family or Institution	\$25.00 annually

THE BULLETIN WILL BE PUBLISHED QUARTERLY:

March, June, September and December. Deadline for submitting material for publication is the 15th of the month prior to publication.

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UPCOMING APS MEETINGS

Meetings take place at 7:30 p.m., in Room **B108** (or **B101**, across the hall)
Mount Royal College: 4825 Richard Road SW, Calgary, Alberta

June, July, August, 2003—No meetings. See Field Trip Updates, Page 7.

Friday, September 26, 2003—Annual "Show-and-Tell." Bring in your finds from the summer for discussion and identification, as well as any other specimens, photos, new books, etc.

ON THE COVER: Alberta fossils! A rare and beautifully preserved Lower Carboniferous (340 million years old) conulariid (phylum Coelenterata) from the basal Pekisko Formation, Canyon Creek area, Alberta. Magnified approximately 3 times. Photo by APS member Geoff Barrett. (Copyright ©)

May 2003 Board Election

by Dan Quinsey, President

Our annual election of the Board was held at the May 23, 2003 meeting. Officer positions are held for a period of one year. Director positions are held for two years. We are proud to welcome the following members to their respective positions:

Officers	Elected
President	Dan Quinsey
Vice President	Keith Mychaluk
Secretary	Kimberley Motz
Treasurer	Mona Marsovsky
Directors	Elected
Programs	Phil Benham

The Social (Appointed Director) position is still open. We are looking for volunteers to step forward to fill this position.

The following directors will make up the balance of the board for the next one year period; these are Directors mid-way through their term and these positions will be up for renewal next year:

Editor (<i>Bulletin</i>)	Howard Allen
Membership	Howard Allen
Events (Field trips)	Wayne Braunberger □

Library Notes

Finding Fossils

by Mona Marsovsky, APS Librarian

The APS library has copies of the following books that describe the exploits of palaeontologists in their search for fossils and an understanding of our ancient world. Each book may be borrowed from the APS library for a period of up to 2 months.

Ornithomimus: Pursuing the Bird-Mimic Dinosaur
by Monique Keiran, Royal Tyrrell Museum Discoveries in Palaeontology Series, 2001.

This book describes how the Royal Tyrrell Museum found, excavated and prepared this exquisite specimen. The book also describes what the life of this dinosaur might have been like. See the review in the September 2002 *APS Bulletin*.

The Dragon Seekers: How an Extraordinary Circle of Fossilists Discovered the Dinosaurs and Paved the Way for Darwin by Christopher McGowan, 2001.

Describes how European fossilists during the Industrial Revolution framed the world's view of dinosaurs. See the review in the Sept. 2001 *Bulletin*.

The Lost Dinosaurs of Egypt by William Nothdurft with Josh Smith, Matt Lamanna, Ken Lacovara, Jason Poole and Jen Smith, 2002.

Stromer's and Josh Smith's Egypt expeditions are traced. See the review in the December 2002 edition of the *APS Bulletin*.

A Vanished World: The Dinosaurs of Western Canada by Dale A. Russell, National Museum of Canada Natural History Series, 1977.

This book includes wonderful paintings of dinosaurs in addition to descriptions of the geology and ecology of the age of dinosaurs in western Canada.

Into the Dinosaurs' Graveyard: Canadian Digs and Discoveries by David Spalding, 2000.

Canada's dinosaurs and dinosaur hunters are featured in this book.

Hunting Dinosaurs in the Bad Lands of the Red Deer River, Alberta, Canada by Charles Hazelius Sternberg, NeWest Press, Edmonton, 1917, republished 1985.

Details of C. Sternberg's adventures.

The Dinosaur Project by Wayne Grady, published by Macfarlane Walter & Ross, Toronto, 1993.

Describes the Royal Tyrrell Museum's dinosaur hunting forays in China and Alberta.

Report upon the Extinct Vertebrata Obtained in New Mexico by Parties of the Expedition of 1874
by Edward D. Cope. A Digital Archive, US Geological Survey Open-File Report 02-270, 2002. Version 1.0 CD-ROM.

This multimedia CD-ROM includes the text and figures from Cope's publication. It allows you to zoom in to have a better look at the specimens, plus it includes video of Cope's quarries and interviews with historians describing Cope's work. Thanks go to **Kimberley Motz** for donating this CD to the APS Library. □

Program Summary

May 23, 2003

Ammonoid Faunas from the Cardium Formation (Turonian-Coniacian, Upper Cretaceous) and contiguous strata, Alberta foothills and adjacent subsurface

Speaker: **Wayne Braunberger, consultant**

While the Cardium Formation is one of the major hydrocarbon sources and consequently one of the most intensely studied siliciclastic formations in the Western Canadian Sedimentary Basin, it remains one of the more controversial units in terms of understanding the depositional environments and processes it represents, and correlating between subsurface and outcrop. Proposed subsurface subdivisions based on sequence stratigraphic concepts, and relation of these allomembers to long-established members of the outcrop belt, have provoked further disagreements. The general lack of biostratigraphic data within the Cardium Formation makes it difficult to test different models and to resolve conflicting proposals.

This presentation provided stratigraphic and taxonomic information on all known collignoniceratid, scaphitid, and placenticeratid ammonoids from the Cardium Formation and correlation of these faunas with the Turonian and Coniacian zonal scheme established in the United States Western Interior. Although many of the species used in this zonation were endemic to the Western Interior seaway, more cosmopolitan forms at some levels do allow correlation with western European sequences.

Biography:

Wayne Braunberger received his B.Sc. (Hons.) and M.Sc. degrees from the University of Calgary. He has worked for several Canadian petroleum exploration companies and is currently consulting in the oil and gas industry. Wayne is a longtime member of the Alberta Palaeontological Society and is currently the Society's Events Director. □

Symposium Workshops

by Mona Marsofsky

On the Sunday of our March 2003 Symposium, the APS sponsored two workshops. In the morning, **Georgia Hoffman** presented a workshop entitled *Plant Fossils of Alberta: Precambrian to Paleocene* to twenty-nine eager participants. Georgia discussed plant evolution, focusing on Alberta specimens. Mount Royal College graciously provided three microscopes, which helped the participants get a better look at the numerous plant fossils provided.

In the afternoon, **Dr. Anthony Russell** of the University of Calgary enthusiastically (3.5 hours without even a break to catch his breath!) presented the workshop *Functional Morphology of Vertebrates: Interpreting the Skeleton*. The workshop introduced the twenty-four participants to terminology, methods and challenges of using fossil bones to deduce function, performance, behaviour and biological roles. Dr. Russell illustrated concepts by allowing the participants to examine his varied collection of animal bones. He also facilitated class discussions. In one, he invited the class to infer differences in lifestyle based on the differences between dog and cat skulls.

The APS wishes to thank Georgia Hoffman and Dr. Anthony Russell for their excellent presentations and for writing and duplicating the workshop manuals. Thanks also go to **Wayne Haglund** and **Mike Clark** for overseeing the arrangements with Mount Royal College. □

**Bookmark
our website!**

www.albertapaleo.org

- Field Trip updates
- Meeting schedule and updates
- Special Events schedule

Shell Canada helps fund APS Symposium

The Society is pleased to announce that it has recently received \$850 from the Shell Canada Community Service Fund. The funds have been awarded to recognize and support **Philip Benham**, a Shell Canada employee. Philip volunteers his time as Technical Program Director of the APS. The funds were used to cover the expenses of running the 2003 APS Palaeontological Symposium including manufacture of display boxes and covering speaker travel costs. This is the third year in a row that the company has contributed to the APS Symposium.

“Shell believes that the contributions of time, effort and caring to non-profit organizations benefit the entire community. Through the Community Service Fund, we recognize and support Shell people who give personal time to non-profit organizations on a regular, volunteer basis,” says Jeff Gabert, Shell Public Affairs.

“We have supported Shell volunteers through the Community Service Fund for 25 years. In 2002, Shell Canada granted \$430,000 to nearly 300 non-profit organizations across Canada.” Further information on the Community Service Fund is available by calling 1 (800) 338-1410. □

The Great Norman Wells Fossil Hunt

This annual event provides opportunities for fossil hunting and exploring the Canadian north. In past years invited scientists have provided talks and judged the collected fossils. It will be held from August 2-9, 2003.

For more information contact:

edo@normanwells.com

Phone (867) 587-3707

Fax (867) 587-3701

Or write to:

Box 5 Norman Wells, NT X0E 0V0

Website with information:

www.normanwells.com/fossilhunt/main.htm □

Field work volunteer opportunity

Emily Frampton is a graduate student at the University of Calgary working on a masters thesis in palaeontology. She will be doing field work this summer on a Cretaceous shell bed in the Milk River valley in southern Alberta and she is looking for volunteers to assist in the excavation and collection. Her supervisor suggested that she contact the Alberta Palaeontological Society, as our organization would likely have many people who would be interested in this type of field work.

Ms. Frampton has the field work tentatively scheduled to start in the last week of July, and depending on how many volunteers she has, may run from one to three weeks. Food and field equipment will be supplied, and the volunteers would only need to bring a tent and sleeping bag as they will be camping at the site. If enough people volunteer, transportation to and from the site from Calgary will also be supplied.

No field experience is necessary as all excavation techniques will be taught at the site.

Interested volunteers can contact Emily Frampton at (403) 289-5722, email eframpton20@hotmail.com or ekframpt@ucalgary.ca. □

Dinosaur Provincial Park Open House March 23, 2003

by Mona Marsovsky

After a 1:00 P.M. introduction by Fred Hammer, Supervisor of Visitor Education, the Dinosaur Provincial Park Field Station's Preparation Lab doors were opened to allow visitors to talk with the three volunteer preparators as they worked on a couple of fossil turtles (*Macrobaena* and *Plesiobaena*) and a duckbill dinosaur jaw. Meanwhile the Dinosaur Park episode from the *Great Canadian Parks* TV series was shown in the Sternberg-Anderson Theatre.

At 2:00, Kevin Kruger, a technician at the Tyrrell Museum, described the activities of the 2002 Field Experience crew. Field Experience is a program in which volunteers, in one week shifts, help researchers find and excavate fossils. In 2002, the Field Experience crews completed the 3-year excavation of a ceratopsian (horned) dinosaur from the Iddesleigh area. They also excavated a mosasaur from the Blood Reserve near Lethbridge, which had been spotted by an alert backhoe operator.

Five vertebrae spotted by Dr. Eva Koppelhus near one of the roads in Dinosaur Provincial Park led to an entire hadrosaur skeleton, which was also excavated in 2002. The utility of car hoods, as dinosaur "sleds" was illustrated. In May and June 2003, Field Experience crews will be working on a bone bed in Dinosaur Provincial Park with the help of an Australian crew, as well as excavating an ankylosaur that was found in 2002, working on microsites and prospecting for more fossils. In July 2003, the crew will work in the Manyberries area. August 2003 work will be centered in the Tolman Bridge locality.

Dr. Eva Koppelhus gave a talk entitled "Dinosaur Footprints from Nemegt Formation." Two years ago, while excavating a juvenile tarbosaur (a relative of *T. rex*) in the Nemegt Valley in the Gobi Desert of

Mongolia, three large dinosaur footprints from a type of hadrosaur, possibly *Saurolophus*, were found in the Campanian age strata by Dr. Koppelhus, Dr. Philip Currie and a team of volunteers. The tarbosaur's skull had been stomped on by a hadrosaur (well after the tarbosaur's death). The team excavated nearby footprints which were perched precariously in a cliff face. In this same area over the past two years they have found numerous footprints. One set of footprints showed where a theropod (from *Tarbosaurus bataar* or *Deinocheirus* or *Therizinosaurus*?) had sunk up to a metre deep in soft mud. The footprint had skin and claw impressions as well as the slide marks from the foot sliding through the mud. A sauropod footprint (from *Nemegtosaurus* or *Opisthocoelicaudia*?) also showed skin impressions. A total of three different types of tracks were found. Dr. Koppelhus and Dr. Currie intend to go back to the Gobi this September 2003 with the help of volunteers (contact www.nomadicexpeditions.com for details), Nomadic Expeditions and Dr. Demchig Badamgarav of the Mongolian Academy of Sciences to excavate and prospect for more dinosaur tracks.

Dr. Philip Currie talked about "Hunting Dinosaurs in Mongolia." Philip compared Dinosaur Provincial Park in Alberta to the similarly aged (Late Cretaceous: Campanian) Nemegt Formation in the Gobi Desert of Mongolia. Both areas have large numbers of fossils; however, more skeletons of large dinosaurs are preserved in Dinosaur Provincial Park while the Nemegt Formation yields relatively more skeletons from smaller dinosaurs. The dinosaurs of the Nemegt Formation are closely related to those in Dinosaur Provincial Park.

Gorgosaurus libratus (a tyrannosaur from Dinosaur Park) is believed to be a common ancestor of both *T. rex* and the Gobi's *Tarbosaurus*. The *Velociraptor mongoliensis* closely resembles Dinosaur Park's *Saurornitholestes*.

Last year they had a distinctly international team, including scientists from Poland, Canada, Argentina and Norway and volunteers from the U.S.A. Three kinds of oviraptors, namely *Oviraptor*, *Conchoraptor* and *Rinchenia* have been found. The team revisited the quarry of an *Oviraptor* to try to find the tail and determine if the *Oviraptor* had a pygostyle (fused vertebrae in the tail). They found the tail with its five fused vertebrae (similar to a bird's pygostyle) plus another skeleton. Preparation of that specimen yielded another skull (perhaps *Ingenia*). Dr. Currie plans to

return to the Gobi in September 2003 with more volunteers to further explore that quarry and try to find the new specimen's feet and determine if the foot bones were fused like those in modern birds.

They also found a part of the skull of *Elmisaurus rarus*. Examination of this partial skull indicates that this rare animal may be related to oviraptors. This is another species closely related to one in Dinosaur Park (namely *Elmisaurus elegans*). Other finds included an ankylosaur similar to one found in Alberta; the hadrosaur *Saurolophus angustirostris* (a larger version of Alberta's *Saurolophus osborni*), a tail from a sauro-pod and various lizard and mammal fossils. More than 35 species of dinosaur have been found in the Nemegt valley's 75 million year old sediments. □

Gemstone TV series to feature "Ammolite"

Discovery Channel's new series on gemstones, debuting this month, will feature an episode on the Alberta gemstone "Ammolite" (made from Cretaceous ammonite shell). Our own resident expert, APS Vice-President **Keith Mychaluk** was interviewed for this episode, which is slated to air later in the summer.

Each episode is shown more than once, in case you miss one. Thursday evening premiere dates announced so far include:

- Brazilian Topaz—June 5
- Colombian Emerald— June 12
- Synthetic gems—June 26
- Aussie Opal—July 3
- Amber— July 10**
- Ammolite—July 24**

Viewers with internet access can navigate to the Discovery web site: www.exn.ca then click on "Program Guide." □

T-Shirts!

Get your Society T-shirt or sweatshirt, with the new, award-winning design by Cory Gross, while they last!

T-shirts are available in three fabric colours: gold, red or natural (unbleached white), in sizes M, L, XL and XXL. Quantities of M and XXL may be limited—please inquire.

Sweatshirts are available in gold fabric only, in sizes M, L, XL and XXL. Quantities of M and XXL are limited—please inquire.

	PRICES	
	Members	Non-members
T-shirt	\$15.00	\$20.00
Sweatshirt	\$25.00	\$30.00

Buy yours at the next meeting (see Page 1) or by mail order. Contact Mona (403-547-0182, email vaclav@telusplanet.net) to inquire about availability of sizes and colours.

For mail orders, please include the following postage and handling charges:

Canada: \$3.00 per T-shirt, \$8.00 per sweatshirt
USA: \$5.00 per T-shirt, \$8.00 per sweatshirt



Mail your cheque or money-order to:

Alberta Palaeontological Society
c/o Mona Marsovsky
7 Edgeridge Court NW
Calgary, AB, Canada T3A 4N9

2003 Field Trip Updates

by Wayne Braunberger

• Trip 2003-1, June 21–22 Red Deer River badlands, Drumheller, Alberta

Meet Saturday, June 21 at the Hoodoos Recreation Area which is located on Highway 10, east of Drumheller (between Rosedale and East Coulee). Allow at least 1.5 hours driving time from the Calgary city limits to Drumheller. Travel will be on pavement with short stretches on gravel and trails. Due to limited parking space at many of the sites we will be carpooling. Registrants will be telephoned or emailed with details of the meeting time. Sunday's meeting place will be announced on Saturday.

Not registered? Sorry! The registration deadline was June 14, 2003.

• Trip 2003-2, July 19–20 Nordegg Area, Alberta

Meet at 10:00 A.M., Saturday, July 19 at the David Thompson Resort, which is located on the south side of Highway 11, 44 km. west of Nordegg. We will then carpool to the Cline River. Excellent exposures of the Devonian Flume, Perdrix, Mount Hawk and Southesk Formations occur along the banks of the Cline River and the flanks of Mount Stelfox.

On Sunday, July 20, 10:00 A.M. we will meet at the Saunders Campground, south of Highway 11, 24 km. east of Nordegg. From here we will hike to a Tertiary plant locality. The hike involves a short but steep climb.

Motel accommodation is available at the David Thompson Resort and Nordegg. A full service campground is also available at the David Thompson Resort and there are forestry campgrounds in the area.

Allow at least 4 hours to drive to the David Thompson Resort from Calgary. Travel is on paved roads with short stretches of gravel.

Potential hazards include the Cline River, steep slopes, falling rocks and bears.

Cost is \$5.00 per field guide. There is no attendance limit.

Registration deadline is July 12, 2003.

• Trip 2003-3a, August 16 Lafarge limestone quarry tour



In conjunction with the Canmore Museum and Geoscience Centre the APS is holding a field trip to the Lafarge plant at Exshaw and the Seebe quarry followed by a tour of the Canmore Geoscience Centre.

The tentative itinerary is: Lafarge plant tour 10:00–11:15 A.M., Seebe Quarry 11:30–2:30 P.M., Museum tour 3:00–4:00 P.M.

There will be no cost for this trip, however space is limited. Please register as soon as possible. Spaces will be allocated in the order that registrations are received.

• Trip 2003-3b, August 17 Canyon Creek-Moose Mountain, Alberta

The Canyon Creek trip has been rescheduled to Sunday, August 17, 2003. (The originally scheduled date of August 16 was changed to allow for the Lafarge quarry tour—see above.) If you have already registered and cannot make this date you will receive a full refund. Registrants will be informed of the meeting time and place by telephone.

One of the classic field trips in the Calgary area, last visited by the Society in the early '90s, the access road has been closed to private vehicles for the last several years. Excellent exposures of the upper Exshaw, Banff, Mount Head and Fernie Formations will be visited on this trip. A short but steep climb up a scree slope will be undertaken to examine the Banff Formation. The rest of the sites require a moderate amount of hiking.

Potential hazards include steep slopes, falling rocks, bears and sour gas.

Due to the limited access, transportation will be by rental van: **No private vehicles will be permitted.**

Cost is \$5.00 per field guide and \$10.00 per person for transportation. The attendance limit may be determined by van size: register early!

Registration deadline is August 1, 2003.

If you are registered you will be contacted before each trip by email or phone. I must receive your registration and accompanying fees on or before the deadline. Late registrations will not be accepted. All trips will be held regardless of weather and number of registrants.

Trip Participant Responsibilities

It is understood that risk is inherent to some degree in outdoor activities. Before registering for a trip please ensure you understand the risks involved and are prepared to accept them.

- As a participant you are responsible for your own safety and equipment at all times.
- Inform the trip leader of any medical conditions they should be aware of in an emergency.
- Ensure that your previous experience, ability and fitness level are adequate for the trip.

For further information contact:

Wayne Braunberger
APS Events Director,
c/o 544 Queensland Place SE,
Calgary, Alberta, T2J 4T3
Phone: (403) 278-5154
Email: events@albertapaleo.org □

Personal Safety in the Field

10 Items Everyone Should Carry

by Wayne Braunberger

Personal safety is everyone's responsibility. You should not leave it up to someone else to have the items you may need if an emergency situation arises. Whether you are a participant on an APS field trip or just out for a day hike, everyone should carry the following items at all times. Relatively minor incidents can become serious if you are not prepared.

- 1) **First-aid kit.** You should be able to take care of any minor injuries (cuts, scrapes) that occur. Everyone should take a basic first-aid course and if you are in the outdoors much of the time a wilderness first-aid course is highly recommended. Wilderness first-aid courses are geared specifically to the prevention and treatment of injuries that can occur while hiking and camping.

- 2) **Whistle.** Everyone should carry whistles, as they are one of the most effective ways to call for help or alert others. You can blow a whistle longer and louder than you can yell and the sound carries much farther. Whistles should be carried where they are accessible to your mouth, not in your pocket or pack.
- 3) **Knife.** A good pocket knife can be a handy item to carry. Multitools such as those made by Leatherman are excellent but expensive. A very inexpensive and effective knife is a "Mora" knife, available at most outdoor stores.
- 4) **Flashlight/headlamp.** Hiking in the dark can be a real pain. Also great for signalling at night.
- 5) **Waterproof matches/lighter/fire starter.** You may need to start a fire for any number of reasons (signal fire, to dry out, keep warm).
- 6) **Extra food and water.** Besides your lunch, carry extra food as you may be out later than you planned. Always carry more water than you think you need. On a hot day you will drink it all. (By the time you feel thirsty you are already dehydrated.) Water is also useful for washing off cuts and scrapes.
- 7) **Bad weather clothes.** Always be prepared for bad weather. You can always take clothes off but if you did not bring extra you can be in trouble very quickly.
- 8) **Toilet paper.** Besides the obvious use, it's great for wrapping specimens.
- 9) **Sunscreen, sunglasses, brimmed hat.** Direct sunlight as well as light reflected off rock surfaces can cause severe sunburns.
- 10) **Map, compass, GPS receiver.** You need to know where you are, where you've been and where you are going. Many people become lost by not knowing how to return to their vehicle. Also, you need to be able to locate any significant fossil discoveries and be able to tell others where they are or to find your way back to them. If you do not know how to read a map or use a compass or GPS receiver, take a course.

Other useful items to bring along include: one or two emergency (space) blankets to provide warmth or form part of a shelter; a small tarp to provide shelter; a ski pole or walking stick to provide extra stability when hiking, and a small foam pad to kneel on. □

Reviews

by Les Adler

Dinosaurs Come Alive

by Joel Achenbach, photographs by Robert Clark, art by John Sibbick. Cover, editorial, pages 2–33. *National Geographic*, March, 2003.

APS members **Richard McCrae** and **Dr. Philip Currie** have been given extended coverage as being representative of dinosaur palaeontologists strongly oriented towards field work.

Richard is investigating some 10,000 footprints near Grande Cache, Alberta, of which some 1,250 have been mapped [*Bulletin*, September 2001; APS 2001 Symposium Abstracts Volume]. Other palae-ontologists dropped out while Richard continued, as he could see subtleties that others could not see; there are tracks of quadrupeds and bipeds, plant-eaters including ankylosaurs, and meat-eaters. He is able to deduce dinosaur behaviours.

Dr. Phil Currie has been studying dinosaurs in Dinosaur Provincial Park, Alberta, for over a quarter of a century, having found 35 different species. Near Drumheller only 20 species have been found, suggesting that dinosaurs were disappearing in this part of the world before the possible extinction event. Dr. Currie is now recording outcrops with satellite positioning and studying *Albertosaurus* bones which suggest that younger, faster animals as members of packs ran down dinosaur prey, allowing adults to move in for the kill with a nasty bite.

A number of scientists were interviewed for this article, to explain their ideas about dinosaur behaviours. They are using computers, CT scans, X-rays, electron microscopes and photography to publish papers relating to morphological characteristics including nasal function, musculature and locomotion, and are asking these questions:

- 1) Were dinosaurs fleet-of-foot or slow moving?
- 2) What types of food did they eat?
- 3) Did they hunt or migrate in packs?
- 4) Did they parent their young?
- 5) How fast did they grow?
- 6) Did they get bigger and bigger into old age?
- 7) How old did they get?
- 8) Were their horns and frills and spikes used in battle?
- 9) Were unusual structures part of the business of attracting mates?
- 10) How did one group develop the ability to fly?
- 11) Did the first airborne dinosaurs glide or flap?
- 12) Did the flight motion evolve from other types of motion?
- 13) Did flying emerge from climbing?

Some palaeobiologists use an “Inverted Pyramid of Inference” to guide their studies, starting at a pointed bottom with bones which may be broken, cracked or ambiguous. Above these are soft tissues, then function; above this level is behaviour, then comes environmental interaction and perhaps at the top, Barney the purple dinosaur.

Recent discoveries have been illustrated with eye-catching photography to produce a 32-page review of where dinosaur research is heading.

Gondwana Genesis

by Joel Cracraft

Natural History, December–January 2001, 2002, Pages 64–73, with 10 photographs and 5 illustrations including maps and cladograms.

Joel Cracraft of New York has studied the evolution and biogeography of birds for three decades, starting at Columbia University and continuing at the American Museum of Natural History where he has been the curator-in-charge of the museum’s department of ornithology since 1999. He has written widely on phylogenetic theory.

Perhaps about 65 million years ago a giant asteroid slammed into the Gulf of Mexico carving a crater nearly 100 miles in diameter. The associated mass extinction event marks the boundary between the Cretaceous and Tertiary Periods.

There are claims that this brought about the end of the dinosaurs; however the descendants of dinosaurs—birds—survived and are with us today. The common ancestor of modern birds (Neornithes) and of bipedal maniraptoran dinosaurs, possibly *Velociraptor*, lived sometime during the Jurassic Period, more than 150 million years ago.

Many lineages of premodern birds subsequently branched off the avian tree including *Archaeopteryx* from the Late Jurassic Solenhofen limestone quarries of Bavaria. Numerous Cretaceous forms evolved which were less advanced anatomically than modern birds and all are now extinct with possibly none surviving the K-T asteroid event.

Joel sets up four questions:

- 1) What are birds' relationships to dinosaurs?
- 2) When and where did birds arise?
- 3) How and when did birds diversity and spread around the world?
- 4) Did the K-T mass extinction event affect birds' history?

Palaeontologists have noticed the virtual absence of modern birds in the Late Cretaceous and their abundance in the Early Tertiary Period in North America and Europe, concluding that the evolutionary history of modern birds began in the Northern Hemisphere after the K-T extinction event.

Another view arises from the expanding science of molecular systematics using comparative DNA data to illuminate genealogical relationships. By correlating the amount of genetic difference between pairs of species with their presumed time of divergence from each other based on fossil evidence, a molecular "clock" allows for the dating of the divergence of species pairs having no fossil record: the greater the difference between two organisms the farther back in time their evolutionary separation is

thought to have occurred.

For a small number of bird groups DNA sequences have been examined using various fossils and several different methods of analysis showing that the groups diverged during the Cretaceous Period before the asteroid hit; this means that the fossil record is biased because Tertiary sediments are more extensive than Cretaceous sediments and North America is where palaeontologists do most of their studies. Also palaeontologists argue somewhat, not universally agreeing to conclusions.

The methods used at New York use new data, both molecular and anatomical to show that modern birds existed on the ancient supercontinent of Gondwana before the asteroid, and survived the K-T mass extinction event. Joel provides a lengthy detailed description of the breakup of Gondwana, with a climatic period of global warmth and moisture as being a favourable time for the dawn of modern birds. Joel's hypothesis is that birds originated in Gondwana.

Joel examines three major lineages of the earliest modern birds with maps and cladograms:

- a) Flightless birds such as moas, kiwis, ostriches, other ratites and tinamous, not suited for crossing oceans.
- b) Guiformes such as cranes, rails and allies.
- c) Perching birds (Passeriformes), oscines and suboscines—based on anatomical differences in the syrinx, a vocal organ.

Distribution patterns strongly indicate that Gondwana harboured a diverse bird fauna, from New Zealand, Africa, South America, Madagascar, Antarctica and India. Joel speculates that the asteroid disruption was not as severe in the Southern Hemisphere as in the Northern Hemisphere to explain the present distribution of various bird groups.

Digging up fossils, studying bird anatomy under a microscope and sequencing DNA allows palaeontologists to test, refine or reject the above scenarios, but one thing seems to be emerging: the relatives of our feathered friends are older than previously suspected and were flying and walking on the supercontinent of Gondwana. □

ALBERTA PALÆONTOLOGICAL SOCIETY

CALGARY, ALBERTA

Operating Statement for 2002 (Audited)

January 1, 2002 to December 31, 2002

Revenues		Expenses	
Memberships	2605.00	Bulletin Printing	947.84
\$US Exchange	50.85	Bulletin Postage	761.33
T-shirts	465.00	Speaker Expenses	0.00
Pins	9.00	PO Box Rental	77.04
Field Trip Guides	205.00	Field Trip Expenses	540.58
Abstract Volumes	703.00	Membership Printing	246.46
Bulletin back issues	10.50	Membership Postage	118.04
CD-ROM	50.00	Symposium Speaker	1195.17
Misc. Sales	90.00	Symposium Printing	877.09
Refreshments	45.62	Sales Postage	13.62
Field Trip Fees	402.18	Website Expenses	486.85
Raffle Proceeds	0.00	Refreshments	24.58
Donations	78.15	Bank Charges	87.80
Symposium Workshop Fees	695.00	Miscellaneous	56.66
Symposium Workshop Manuals	65.00	Special Projects	10.15
Fund Raising	659.00	T-Shirts	1154.85
Lawyer and Insurance	0.00		
<hr/>		<hr/>	
Subtotal Revenues	6133.30	Subtotal Expenses	6598.06
Add:		Add: Expenses paid in 2001 for 2002 year	
Revenue Received in 2001 for 2002 year		PO Box Rental for 2002 77.04	
Symposium Donation for 2002	950.00		
Membership Fees for 2002	1070.00		
Symposium Abstract Ad	25.00		
Subtract:			
Revenue received in 2002 for 2003 year			
2003 Memberships Fees	1355.00		
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TOTAL REVENUES	6823.30	TOTAL EXPENSES	6675.10

Excess of Revenues over Expenses = \$148.20

Values Current to December 31, 2002

Inventory is worth \$2,988.00

*Treasurers: Howard Allen, Mona Marsovsky
Audited by Mona Marsovsky, Howard Allen and Norine Fortier*