Palæontological Society
Alberta
Bulletin

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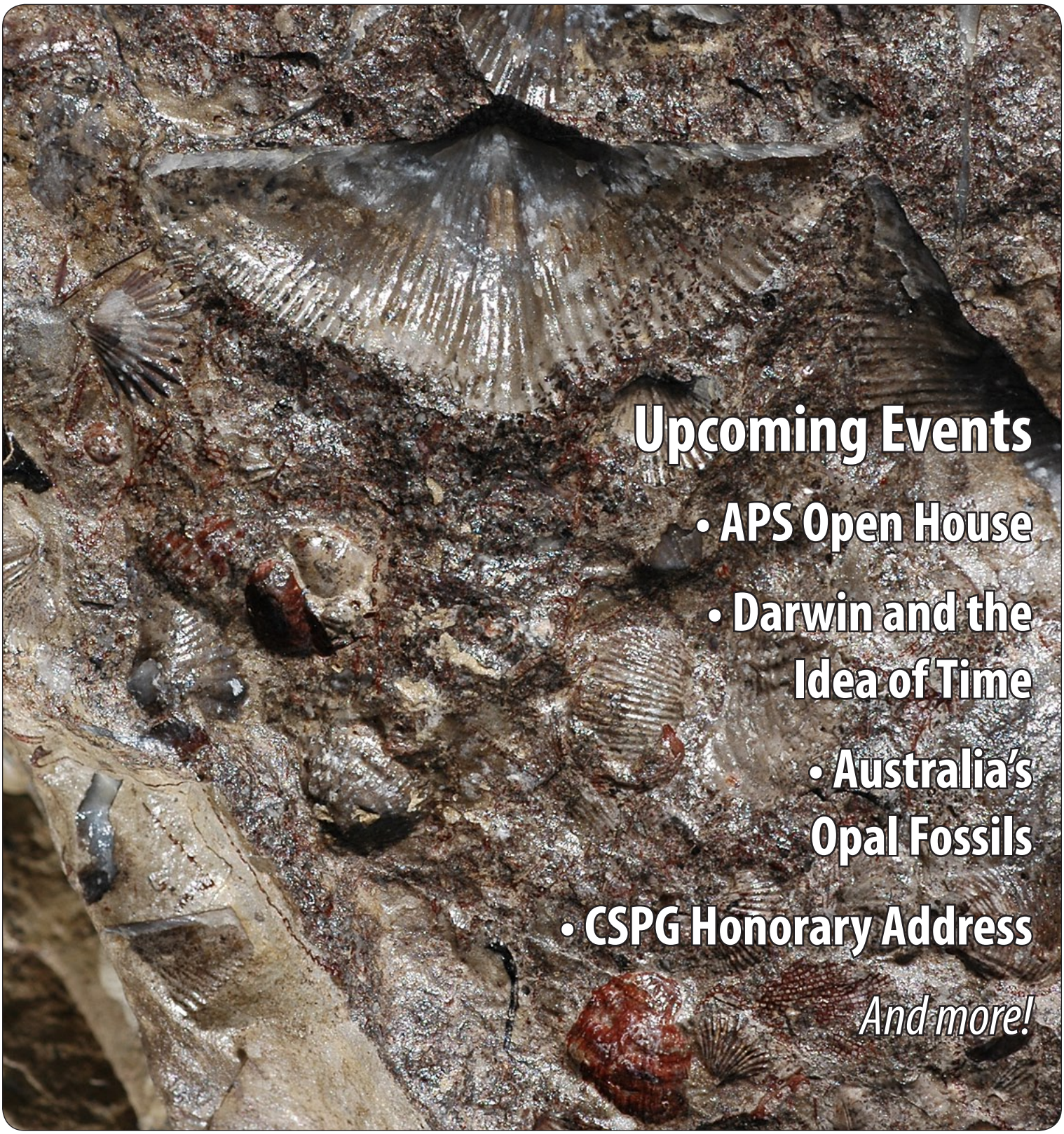

Upcoming Events

- APS Open House
- Darwin and the Idea of Time
- Australia's Opal Fossils
- CSPG Honorary Address

And more!

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

a. Promote the science of palaeontology through study and education.

b. Make contributions to the science by:
1) Discovery 2) Collection 3) Description
4) Education of the general public
5) Preservation of material for study and the future

c. Provide information and expertise to other collectors.

d. Work with professionals at museums and universities to add to the palaeontological collections of the province (preserve Alberta's heritage).

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

Single membership	**$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**,
Mount Royal University (formerly College)**,** 4825 Mount Royal Gate SW, Calgary, Alberta.

Friday, September 18, 2009—Annual Open House and Fossil Clinic (See Page 3).

Friday, October 16, 2009—Dr. Alwynne Beaudoin, Royal Alberta Museum:
Charles Darwin and the Idea of Time (See Page 3).

Friday, October 23, 2009—(Special Presentation) Dr. Elizabeth Smith, University of New South Wales:
Black Opal Zoo: A diverse high-latitude warm climate biota from the Early Cretaceous opal fields of Lightning Ridge, New South Wales (See Page 4).

Friday, November 20 (date tentative, watch website for update)—Topic to be announced.

Friday, December 18—Christmas Social. Topic to be announced.

ON THE COVER: Alberta fossils—limestone bedding surface with brachiopods, upper Banff Formation (Carboniferous), Canyon Creek, Alberta. The large brachiopod in the upper middle of the photo is 45 mm long. Specimen courtesy of Dan Quinsey, photo by Howard Allen, copyright © 2009.

Upcoming Events

Meeting dates for 2009 and 2010

Year	Month	Board Meeting	General Meeting
2009	Sep	9	18
2009	Oct	7	16
2009	Oct		23 (Special talk)
2009	Nov	18	20
2009	Dec	2	11 (2nd Friday)
2010	Jan	6	15
2010	Feb	10	19
2010	Mar	3	13 - 14 (Paleo 2010)
2010	Apr	7	16
2010	May	5	14 (2nd Friday)
2010	Jun	Break	Break
2010	Jul	Break	Break
2010	Aug	Break	Break
2010	Sep	8	17
2010	Oct	6	15
2010	Nov	10	19
2010	Dec	1	10 (2nd Friday)

September

Alberta Palaeontological Society Open House and Fossil Clinic

Friday, September 18, 2009, 7:30 P.M.
Mount Royal University, Room B108

The September program will be an Open House and Fossil Clinic. Please bring along your summer finds for identification as well as any other items you may need help with. This is an open house and if you are a new member, please visit us. We are available for all your orientation needs.

Scientist and author **Kevin Aulenback** will be in attendance for a book-signing and sales session in support of his newly released book, *Identification Guide to the Fossil Plants of the Horseshoe Canyon Formation of Drumheller, Alberta.* See the ad in the June 2009 *Bulletin* for details. ❑

October

Dr. Alwynne B. Beaudoin

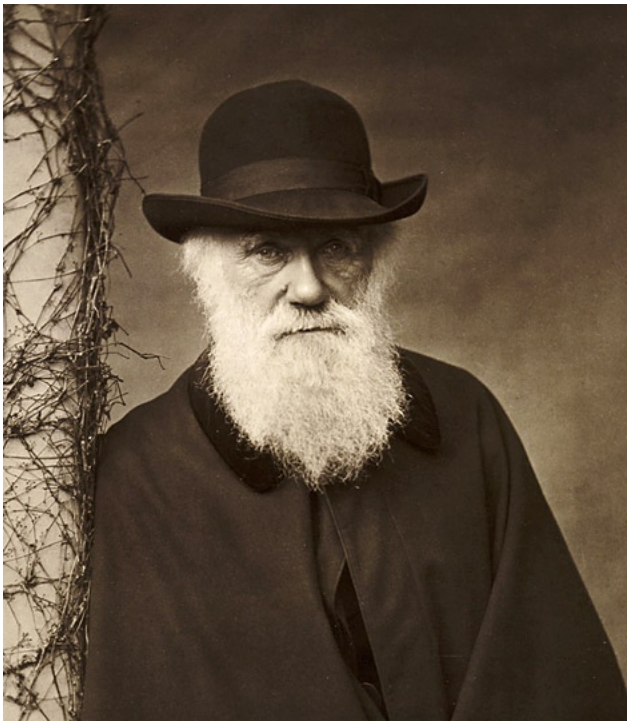
Royal Alberta Museum

Charles Darwin and the Idea of Time

Friday, October 16, 2009, 7:30 P.M.
Mount Royal University, Room B108

This year, 2009, is a milestone for all geologists and bioscientists as we celebrate the 200th anniversary of Charles Darwin's birth and the 150th anniversary of the publication of his best-known book, *On the Origin of Species by Means of Natural Selection*. Arguably the most influential scholar of the 19th century, Darwin's work and ideas are at the foundation of modern research in the natural and Earth sciences.

His participation in the voyage of *HMS Beagle* and the visits he made to localities in South America and the Galapagos Islands were key events in his intellectual development, especially in formulating his ideas about the cumulative effects of small changes through time. Simultaneously, he was himself influenced by the new appreciation of deep time that was emerging in geology. (*continues*)



Portrait of Charles Darwin, about 1880. Image copyright © English Heritage Photo Library, used with permission.

The idea of deep time in relation to Earth processes was articulated by James Hutton in the late 18th century, although it became better known through writings by John Playfair in the early 19th century, and was expressed most persuasively by Darwin's friend and colleague Charles Lyell in his widely-read book on the *Principles of Geology*.

Gradualism in geology became linked to gradualism in biology as Darwin studied and thought intently about the transmutation of species. He understood that small changes can only have big effects if they operate during immense intervals of time. Hence, the assumption of Earth's great antiquity became an important element underpinning Darwin's overall argument. As we shall see, the idea of time runs throughout Charles Darwin's professional life and career.

Biography:

Alwynne Beaudoin is the Head Curator of Landscape Studies at the Royal Alberta Museum. After completing a Ph.D. at the University of Western Ontario, she moved to Alberta to work for the Archaeological Survey in 1986, transferring to the Museum in 1991. Her work concentrates on the investigation of the postglacial landscapes and environments of Alberta, especially as these relate to the province's human history. This research involves the examination of plant remains, especially seeds and pollen, and the analysis of soils and sediments. Much of her time in 2009 has been taken up with activities related to *Darwin200* celebrations. ❑

October — Special Events

Cory Gross

Alberta Palaeontological Society

The Grandfather of the Buffalo: Fossils in the Culture and Beliefs of the Nitsitapii

Tuesday, October 20, 2009, 7:30 P.M.
Fort Calgary Historic Park, 750 9 Avenue SE
Admission: Free!

Traditional Nitsitapii (Blackfoot) territory includes many of modern Alberta's most celebrated palaeontological sites. This wealth in dinosaur bone and ammonite shell became an intriguing and lasting part of their culture, ritual, beliefs and economy. Cory Gross of the Alberta Palaeontological Society presents a talk to the Chinook Country Historical Society on Iniskim, the Grandfather of the Buffalo and the continued significance of fossils for local First Nations. ❑

Dr. Elizabeth T. Smith

University of New South Wales, Australia

Black Opal Zoo: A Diverse High-Latitude Warm Climate Biota from the Early Cretaceous Opal Fields of Lightning Ridge, New South Wales

Friday, October 23, 2009, 7:30 P.M.
Mount Royal University, Room B108

The first comprehensive palaeontological survey of the middle-Albian opal fields of Lightning Ridge, New South Wales, indicates that this is one of the world's most productive near-polar fossil localities.

Fossils preserved as common opal (or "potch") or with a precious opal component, occur throughout the opal-bearing claystones and siltstones of the Griman Creek Formation. Over an area of more than 1,500 km^2, artificial "deposits" brought to the surface by opal miners (mullock, tailing heaps and silt tank residues) are vital repositories of palaeontological data. Excavated sediments contain fossil material even after being processed mechanically and searched for opal by miners. Articulated and associated elements of diverse plants and animals are retrieved when sediments that include the smallest fractions are searched methodically.

Opalized fossils provide evidence of a diverse coastal delta assemblage—luxuriant vegetation communities, freshwater aquatic and terrestrial invertebrates and vertebrates, and marine groups. Invertebrates include up to twenty mollusc taxa, with viviparid gastropods that are among the oldest in the world; and freshwater crayfish. Vertebrate groups are chondrichthyans; anguilliformes; actinopterygian/teleost fish and lungfish; Australia's oldest anuran; ichthyosaurs and freshwater pliosaurid plesiosaurs; crocodylians; pterosaurs; prosauropod, titanosaurid and hypsilophodontid dinosaurs and a *Muttaburrasaurus*, as well as ornithomimosaurid and dromaeosaurid theropods; and at least two ornithoracine birds. Stegosaurids, spinosaurids, abelisaurids and

an alvarezsaurid may be present. The locality has produced an unprecedented array of four or five taxa of monotreme mammals, a possible synapsid and evidence of at least one other mammal group.

Despite the near-polar palaeolatitude (approximately 65° to 70° south), temperate and subtropical biota suggests mild climatic conditions during a period of global warming. High summer rainfall and strong seasonality, cool to very cold winter temperatures and months or weeks of polar twilight or complete darkness indicate a palaeoenvironment without modern equivalent. Endothermy, enhanced optical acuity and electrosensory capabilities in at least three groups that are especially diverse at generic and species level (turtles, hypsilophodontid dinosaurs and monotreme mammals) may be adaptations to extreme climatic conditions. Biological strategies such as burrowing, aestivation, hibernation, seasonal nomadism and migration may have been vital. Warmer summer conditions would attract nomadic herbivores, and possibly synchronized seasonal breeding of crayfish, lungfish, turtles and crocodylians provided an abundant annual food source for aquatic and terrestrial predators, migratory species capable of aquatic hunting, and marine "invaders" of freshwater systems. The fauna is characterized by regional and local endemism, and affinities with ancient southern hemisphere (Pangean) forms, consistent with palaeogeographic isolation in the far eastern provinces of Gondwana.

For more than a century, fossil collection at Lightning Ridge has been incidental to opal mining and untold numbers of opalized fossil specimens have been destroyed during the mining process. Past collections have been imprecise, biased samplings that do not reflect taxonomic diversity, species composition or faunal size range. Recent work by palaeontologists from the University of New South Wales, Sydney, indicates that the full extent of taxonomic diversity and an accurate picture of faunal composition over this vast locality are yet to emerge. Opal mining communities are at last becoming aware of the international significance of the "black opal zoo" and a national public collection of the material is now being established at Lightning Ridge.

Biography

Elizabeth Smith is a Research Associate at the School of Biological, Earth and Environmental Sciences, University of New South Wales, Australia. She is also author of a book called *The Black Opal Fossils of Lightning Ridge.* ❑

November — Special Event

Canadian Society of Petroleum Geologists Honorary Address

Tuesday, November 3, 2009
Pre-event Forum 5:30 p.m.
Speakers 7:00 p.m.
Southern Alberta Jubilee Auditorium
Admission: $10 (advance sales), $15 (at the door, limited availability). Children under 12 free.

Every year the CSPG Honorary Address Committee brings a guest speaker to Calgary. The Committee attempts to identify topics that are topical and interesting to their members, the geoscience community and the general public. The 2009 CSPG Honorary Address in association with the Canadian Society of Exploration Geophysicists (CSEG) and the Association of Professional Engineers, Geologists and Geophysicists of Alberta (APEGGA) will hold the talk on Tuesday, November 3, 2009 at the Southern Alberta Jubilee Auditorium. It will celebrate three anniversaries: the 200th year of the birth of Darwin, the 150th anniversary of the publication of *The Origin of Species* (which brought to light the natural selection theory), and a local anniversary, the 100th year since the discovery of the Burgess Shale in Yoho National Park.

This year's topic focuses on a fundamental understanding for all geoscientists in the petroleum industry as we study and use species assemblages for identifying different and changing environments. When environments change, species will either move towards a more habitable environment, evolve to live within the changing environment, or die. The environment in which a species lives is a strong driving force which drives the need to change or evolve; these could include a position on or around mountain ranges, sediment transport within rivers, or being located on a tropical island.

This year's evening session will begin with doors opening at 5:30 p.m. to the public. As in the past, our always popular lobby displays will feature many vendors and a silent auction. The silent auction will be raising funds for the CSPG's outreach efforts. There will also be a cash bar. The talk starts at 7:00 p.m. sharp, so you should be able to have your children home by 9:30. Tickets are for sale on-line at **www.ticketweb.ca**, $10 for all; kids under 12 are free. A limited number of tickets will be available for sale at

the door for $15 on the day of the talk.

This is a great way to introduce friends and family to the fascinating and diverse world of geology. We hope to see you all there. Any questions can be directed to Alex Wright (**alex.wright@darianresources.com**), Linden Achen (**linden@achenresources.com**) or Alyssa Middleton of the CSPG (**amiddeton@cspg.org**).

This year, the Honorary Address will feature two guest speakers:

Brian Keating

Director of Conservation Outreach, Calgary Zoo

Islands of Time: Adaptation of Life to Local Environments

We are pleased to announce our keynote speaker is Brian Keating, Director of Conservation Outreach from the Calgary Zoo. Keating will present his talk "Islands of Time: Adaptation of Life to Local Environments". This journey will bring the audience to remote and local Canadian landscapes, showing that when environments change, or do not change, it has a direct impact upon species and environmental characteristics and relationships. Keating will transport us from Papua New Guinea, Borneo, Madagascar, the Galapagos, and through Canada, reviewing biodiversity as we go.

Dr. Paul Johnston

Mount Royal University

A Visual Tour of the Burgess Shale

Our second speaker is Dr. Paul Johnston, Professor in the Earth Sciences Department at Mount Royal University and guide with The Burgess Shale Geoscience Foundation in Field, British Columbia. The audience will be granted a visual tour of the super-rare biotic assemblage that has been found in the Cambrian-aged shale. This find represents a huge range of species that were unheard of prior to its discovery. The preservation of soft tissues during fossilization has preserved species never thought to have existed, and which could be the super-duper grand-infinity-squared-grandparent of a species living today. ❑

Rock 'n' Fossil Road Show set for October 17

This year's fall Road Show, a collaboration of the Calgary Science Network, the Geological Survey of Canada and the Alberta Palaeontological Society, will be held October 17 (Saturday) at the Nose Hill branch of the Calgary Public Library, 1530 Northmount Drive, NW. The event is free and the library opens at 10:00 A.M. For the latest updates, visit **www.calgarysciencenetwork.ca/events.html** (be aware of the date conflict with the Gaffney Symposium, below). ❑

Gaffney Turtle Symposium October 17–19

The September 7 deadline for early registration has now passed, but you still may register, albeit at the regular fee of $125—space is limited, so it's best to register early. A separate fee of $75 is being charged for the October 19 (Monday) field trip to Dinosaur Provincial Park.

The Symposium includes two days (Saturday and Sunday) of lectures and poster sessions, as well as various associated social activities. A tentative list of about forty lecture topics and fourteen posters was compiled as of this writing, but it was too large to include here. For a detailed schedule of speakers and posters, contact the symposium organizer, Dr. Donald Brinkman, **don.brinkman@gov.ab.ca**. For general information and an online registration form, visit **www.tyrrellmuseum.com/research/gaffney_turtle_symposium.htm** ❑

Fossils in the News

Edited by Chris Marion

ScienceDaily (online) June 3, 2009

Change in mammal diet traced in teeth

FLORIDA—Differences in how plants process carbon dioxide through photosynthesis result in distinct carbon isotope ratios that are recorded in the teeth of herbivores. Similarly, tooth enamel records oxygen isotopes from ingested water that give insights into climate. Carbon and oxygen isotopes within tooth enamel of a range of mammals were examined to determine changes in the diet of the animals, with low carbon isotope ratio values reflecting a browsing diet of shrubs and trees and a higher ratio typical of a grazing diet of grasses. Isotopes can also be sampled across the growth axis, giving results on a yearly scale. In this particular study, the authors examined fossil teeth from mammals at two sites in Florida, representing two different time periods: a glacial period at about 1.9 million years ago, and an interglacial at about 1.3 million years ago. Sampled were teeth of pronghorns, deer, llamas, horses, and mammoths, amongst others.

See *Ancient mammals shifted diets as climate changed* **www.sciencedaily.com/releases/2009/06/090602204255.htm**

ScienceDaily (online) June 1, 2009

Wintering in the High Arctic darkness

ELLESMERE ISLAND, Nunavut—Also working with carbon and oxygen isotopes from the teeth of three mammals (*Coryphodon*, a bronthothere, and a small ancestor of today's tapir) living on Ellesmere Island 53 million years ago, researchers from Colorado were able to show that the high arctic mammals did not migrate or hibernate. Rather they wintered in darkness in a mild climate of lush swampy forest by switching their diets from flowering plants in the summer to twigs, leaf litter, evergreen needles and fungi in the winter. This ability to live in the high arctic year-round would have helped with their dispersal across the vast distances of the land bridges connecting the continents.

See *53 million-year-old high arctic mammals wintered in darkness* **www.sciencedaily.com/releases/2009/06/090601140932.htm**

National Post (online) May 16, 2009

Grande Prairie welcomes yet more new dinosaur species

GRANDE PRAIRIE—Remains of 73-million-year-old hatchling hadrosaurs and shed *Troödon* teeth found near Grande Prairie show the presence of the predator at that latitude and confirms that hadrosaurs were nesting in that part of the continent. The hatchlings possibly represent a new species of hadrosaur that might have reached 10 m in length. The authors, University of Alberta student Tetsuto Miyashita and Italian grad student Frederico Fanti, also document other new dinosaurs, freshwater fish, and reptile finds in a study that was published in the May issue of *Palaeogeography, Palaeoclimatology, Palaeoecology*.

See *Possible new dinosaur species found in Alberta* **www.nationalpost.com/news/story.html?id=1604193**

Peace Country Sun July 2009

Dinosaur centre may be moving forward soon

GRANDE PRAIRIE—The River of Death and Discovery Dinosaur Centre at Pipestone Creek near Wembley, Alberta, which has been in the planning process for a few years, is closer to becoming a reality. Jack O'Toole, chairman of the centre's committee, and paleontologist Paul McNeil, who also works as a science instructor at Grande Prairie Regional College, are excited to give the public a chance to see a working bone bed in action and to learn about the region's past. The centre is expected to attract 40,000 to 50,000 people a year.

See **http://peacecountrysun.com/ArticleDisplay.aspx?e=1590492**

CBC News (online) June 30, 2009

Dinosaur-age bones from Yukon

PEEL RIVER, Yukon—The discovery of 65-million-year-old bones as well as ancient plants in the Peel River area has Yukon palaeontologist Grant Zazula and Royal Ontario Museum Associate Curator of vertebrate paleontology David Evans grinning. The bones belong to a hadrosaur and either a crocodile or

a turtle. Although ice-age critters are aplenty in the Yukon, dinosaur bones have been elusive: only three other bones, as well as some trackways, are known from the terrritory.

See *Dinosaur-age bones unearthed in Yukon's Peel River area* **www.cbc.ca/technology/story/2009/06/30/yukon-dino-bones.html**

ScienceDaily (online) June 23, 2009

Early primate skull a beautiful find

WINNIPEG—CT scans of the skull of a 54-million-year-old primitive primate have enabled researchers from the University of Winnipeg and the University of Florida to make a mould of the brain of the first traceable ancestors of modern primates. The intact skull is 3.8 cm long, and the 1,200 cross-sectional X-ray images unexpectedly showed that the animal relied on smell more than sight.

See *54-million-year-old skull reveals early evolution of primate brains* **www.sciencedaily.com/releases/2009/06/090622171359.htm**

More fossils in the news

Check the internet for these stories:

National Geographic—*First proof: ancient birds had iridescent feathers* **news.nationalgeographic.com/news/2009/08/090826-iridescent-fossil-feather.html**

CBC—*Part-time palaeontologist discovers crocodile remains* **www.cbc.ca/technology/story/2009/08/25/mb-prehistoric-crocodile-manitoba.html**

BBC—*Ink found in Jurassic-era squid* **news.bbc.co.uk/2/hi/uk_news/england/wiltshire/8208838.stm**

BBC—*Runway found for flying reptiles* **news.bbc.co.uk/2/hi/science/nature/8209505.stm**

Calgary Herald—*Drumheller in running for dino capital of the world* **www.calgaryherald.com/travel/Drumheller+running+dino+capital+world/1864089/story.html**

Drumheller Mail—*Tyrrell competes in second dino poll* **drumhellermail.com/index.php?option=com_content&view=article&id=7869:tyrrell-competes-in-second-dino-poll&catid=13:headline-news&Itemid=156**

CBC News—*Bay of Fundy back in 7 Wonders contest after Alberta park disqualified* **www.cbc.ca/canada/calgary/story/2009/06/16/nb-bay-fundy-7-wonders-423.html**

National Geographic—*Pterosaur's wing, "hairs" unlike any living animals'* **news.nationalgeographic.com/news/2009/08/090804-pterosaurs-wings-fossil-hairs.html**

Science Daily—*Fossilized dung balls reveal secret ecology of lost world* **www.sciencedaily.com/releases/2009/07/090716093524.htm**

CTV News—*Remains of ancient toothed whale found in California* **www.ctv.ca/servlet/ArticleNews/story/CTVNews/20090813/whale_california_090813/20090813?hub=SciTech**

National Geographic—*"Mighty"* T. rex *mostly picked off youngsters?* **news.nationalgeographic.com/news/2009/08/090811-t-rex-dinosaurs-bully.html**

Science Daily—*Bipedal humans came down from the trees, not up from the ground* **www.sciencedaily.com/releases/2009/08/090810162005.htm**

Science Daily—*Naming evolution's winners and losers* **www.sciencedaily.com/releases/2009/07/090729092536.htm**

Science Daily—*Discovery raises new doubts about dinosaur-bird links* **www.sciencedaily.com/releases/2009/06/090609092055.htm**

Science Daily—*Discovery of elephants' oldest known relative* **www.sciencedaily.com/releases/2009/06/090626084425.htm**

BBC—*How the turtle's shell developed* **news.bbc.co.uk/2/hi/science/nature/8142664.stm**

National Geographic—*Armadillo-like crocodile fossil found* **news.nationalgeographic.com/news/2009/07/090708-armadillo-crocodile-brazil.html**

BBC—*Oldest dinosaur burrow discovered* **news.bbc.co.uk/earth/hi/earth_news/newsid_8144000/8144199.stm**

Science Daily—*Mummified dinosaur skin yields up new secrets* **www.sciencedaily.com/releases/2009/07/090707203728.htm**

Science Daily—*Reexamination of* T. rex *verifies disputed biochemical remains* **www.sciencedaily.com/releases/2009/07/090729103737.htm**

Science Daily—*Scary ancient "spiders" revealed in 3D models, with new imaging technique* **www.sciencedaily.com/releases/2009/08/090804211128.htm**

Science Daily—*Fossil tooth of extinct rodent species discovered: Oldest find within this genus* **www.sciencedaily.com/releases/2009/07/090728083707.htm**

BBC—*Aquatic deer, ancient whales* **news.bbc.co.uk/earth/hi/earth_news/newsid_8137000/8137922.stm**

Science Daily—*Triple fossil find puts Australia back on the dinosaur map* **www.sciencedaily.com/releases/2009/07/090703070846.htm**

CBC News—*Three dinosaur species discovered in Australia* **www.cbc.ca/technology/story/2009/07/03/science-australia-dinosaur.html**

BBC—*Australia discovers new dinosaur* **news.bbc.co.uk/2/hi/asia-pacific/8224279.stm**

BBC—*New dinosaurs found in Australia* **news.bbc.co.uk/go/em/fr/-/2/hi/science/nature/8131915.stm**

BBC—*Megafauna demise blamed on humans* **news.bbc.co.uk/2/hi/science/nature/8112885.stm**

Science Daily—*Social competition may be reason for bigger brain* **www.sciencedaily.com/releases/2009/06/090622152041.htm**

Science Daily—*Largest carnivorous dinosaur tooth ever found in Spain* **www.sciencedaily.com/releases/2009/06/090622103904.htm**

National Geographic—*Giant prehistoric elephant discovered* **news.nationalgeographic.com/news/2009/06/090622-indonesia-elephantfossil-video-ap.html**

National Geographic—*Rabbit-size elephant ancestor found: Oldest known* **news.nationalgeographic.com/news/2009/06/090623-rabbit-elephant-oldest.html**

BBC—*Evolution faster when it's warmer* **news.bbc.co.uk/2/hi/science/nature/8115464.stm**

Science Daily—*New fossil tells how piranhas got their teeth* **www.sciencedaily.com/releases/2009/06/090625201822.htm**

Science Daily—*Ancient climate change: When palm trees gave way to spruce trees* **www.sciencedaily.com/releases/2009/06/090617131356.htm**

Science Daily—*Sands of Gobi desert yield new species of nut-cracking dinosaur* **www.sciencedaily.com/releases/2009/06/090617104905.htm**

Science Daily—*Beaked, bird-like dinosaur tells story of finger evolution* **www.sciencedaily.com/releases/2009/06/090617171816.htm**

BBC—*Mammoths survived late in Britain* **news.bbc.co.uk/2/hi/science/nature/8106090.stm**

BBC—*Ancient crustaceans produced enormous sperm, scientists find* **news.bbc.co.uk/2/hi/science/nature/8107515.stm**

Science Daily—*Sudden collapse in ancient biodiversity: Was global warming the culprit?* **www.sciencedaily.com/releases/2009/06/090618161150.htm**

Science Daily—*Latest in technology looks into some old bones* **www.sciencedaily.com/releases/2009/06/090612202952.htm**

BBC—*Sea gives up Neanderthal fossil* **news.bbc.co.uk/2/hi/science/nature/8099377.stm**

Science Daily—*Fossil teeth of three-toed browsing horse found in Panama Canal earthworks* **www.sciencedaily.com/releases/2009/06/090608125103.htm**

Science Daily—*Fossil bone bed helps reconstruct life along California's ancient coastline* **www.sciencedaily.com/releases/2009/06/090608131144.htm**

CNN—*Scientists close to recovering ancient whale fossil* **www.ktvu.com/news/19696823/detail.html**

Science Daily—*Prehistoric whale discovered on the west coast of Sweden* **www.sciencedaily.com/releases/2009/06/090605110420.htm**

BBC—*Early rocks to reveal their ages* **news.bbc.co.uk/2/hi/science/nature/8080126.stm**

BBC—*Dinosaur skulls sold at auction* **news.bbc.co.uk/2/hi/americas/8078827.stm**

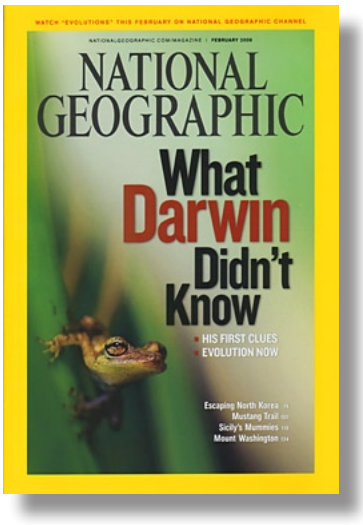
Science Daily—*53 million-year-old high arctic mammals wintered in darkness* **www.sciencedaily.com/releases/2009/06/090601140932.htm**

[*Thanks to the ususal suspects: Mike Dooley, Georgia Hoffman and Phil Benham, for sending links.*] ❑

Latest APS bylaws available

Members may obtain a copy of the final, government-approved APS bylaws, as approved by our membership on May 15, 2009. The bylaws are included in the *Information Handbook for Members*, which may be downloaded from the APS website (**www.albertapaleo.org**, click "Member's Guide" on the left side of the home page). Printed copies may be obtained by contacting the Membership Director, Vaclav Marsovsky (**membership@albertapaleo.org**, 403-547-0182). ❑

Reviews
and Condensations



The Darwin Bicentennial
National Geographic, February 2009, p. 34–73.

Condensation by Les Adler

Three time lines are provided in the coverage, with notes, diagrams, photographs and sketches from various contributors. Writer David Quammen discusses "Darwin's First Clues," followed by "Modern Darwins" by writer Matt Ridley. A copy of this issue will be placed in the APS library.

The legacy of an idea

Darwin's insights into evolution were astonishing, given how little was known about genes and the means of inheritance. It took almost a century to find common ground between evolutionary theory and genetics.

Timeline 1, 1859–1940: Darwinism

- 1859: Darwin published *The Origin of Species* igniting intense controversy over the role of natural selection in evolution and the challenge his theory posed to religion, morality and social tradition.
- 1871: Darwin published *The Descent of Man* showing how higher human faculties such as intelligence and morality could have evolved by natural selection in ape-like ancestors.
- 1882: Darwin died. Evolution was now generally accepted but not the notion that mankind descended from apes. Many of his ideas were challenged.
- 1906: Radioactive measurements reveal that the Earth is billions of years old, allowing time for evolution by natural selection.

Timeline 2, 1865–1940: Genetics

- 1865: Gregor Mendel, a Moravian monk demonstrates that "factors" (now known as genes) in pea plants do not blend together in successive generations but are inherited independently. His experiments were mostly ignored.
- 1892: August Weismann postulates that an internal structure in chromosomes is responsible for the inheritance of traits.
- 1900: Mendel's experiments were rediscovered but they did not support Darwin.
- 1910–1915: Thomas Hunt Morgan and colleagues link genes to inheritance, and map their locations on chromosomes from fruit fly studies.
- 1920s: Population geneticists Ronald Fisher, J.B.S. Haldane and Sewell Wright show how small, favourable mutations can spread through a population.

Timeline 3, 1940–2009: The Modern Synthesis

- 1940: Biologists, population geneticists, palaeontologists and field naturalists reach an accord of reinvigorated Darwinism.
- 1953: Francis Crick and James Watson discover the double-helix structure of DNA showing how genetic information is passed from one generation to the next.
- 1960s–1970s: Fossil discoveries by the Leakeys

and Donald Johanson in the Great Rift Valley of east Africa climax in 1974, including "Lucy," a 3.2 million-year-old hominid, allowing an accepted species to be placed at the base of the human lineage.

• 1970s: Niles Eldridge and Stephen Jay Gould challenge the modern synthesis. Richard Dawkins' *The Selfish Gene* and E.O. Wilson's *Sociobiology* trigger intense debate.

• 1970s–2009: Peter and Rosemary Grant study finch populations in the Galapagos Islands to show that evolution through natural selection can take place in real time.

• 1977: Carl Woese redefines the tree of life by classifying the genetic similarities of organisms into three domains: Bacteria, Archaea and Eukarya.

• 2003: Sequencing the human genome is completed, underscoring human and chimpanzee genomes descending from a common ancestor.

• 2009: Mechanisms are being studied which can switch on and off during development, which control genes.

Darwin's First Clues

Maps of the *Beagle*'s journey, photographs of areas visited, of fossils and of present-day life forms Darwin encountered, 1831–1836, enhance these notes. 2009 marks the anniversary of the most incendiary book in the history of science and the 200th anniversary of the mild-mannered man who wrote it. He provided a powerful theory for how evolution could occur through purely natural forces, liberating scientists to explore the complexity of life. Darwin would be overjoyed to see how much he did not know and how much scientists have yet to learn.

Darwin's journey aboard the *Beagle* is one of the best known and mythological episodes in the history of science. As the legend goes, he visited the Galapagos archipelago in the eastern Pacific Ocean and noticed that many of the species of finches were distinguishable by differently shaped beaks, suggesting adaptations to particular diets and also that the giant tortoises, island by island, carried differently shaped shells. According to legend, Darwin concluded that Earth's living diversity of life forms had arisen by an organic process of descent with modification and that natural selection is the mechanism. Actually, the Galapagos stopover was a brief anomaly near the end of an expedition devoted mainly to the surveying of the South American coastline.

Darwin was a 22-year-old Cambridge graduate invited on to the voyage as a dining companion to an aristocratic captain, Robert Fitzroy. As the voyage proceeded he thought of himself as the naturalist. (His professors who recommended him were correct.) His particular theory didn't triumph until 1940 after it became successfully integrated with genetics. Darwin's first real clue toward evolution came from an abundant trove of fossils that he found on a beach in northern Argentina, of possible armadillos and giant sloths at Punta Alta, extinct Pleistocene giants of 12,000 years ago. He discovered at least four species of sloths, an extinct horse, and scutes. Thirty miles further north he discovered more species of fossil mammals. There is only tenuous evidence of Darwin's thinking process.

Darwin kept his ideas to himself for twenty years before being forced by Alfred Russel Wallace to have his theory published. His book was a sellout success immediately. It's the most significant single scientific book ever published; people venerate it, people deplore it.

Modern Darwins

Today scientists can confirm that the Galapagos finches did indeed descend from a single ancestral species by DNA studies established by Watson and Crick. Arhat Abzhanov of Harvard University and Cliff Tabin of Harvard Medical School have pinned down the very gene ("BMP4") responsible for some of these beak shapes. Hopi Hoekstra, also at Harvard, has traced colour differences in Gulf Coast of Florida mice, due to a single letter change in a single gene during the last 6,000 years. David Reznick has tracked changes in guppies. Another set of examples comes from some 2,000 species of cichlid fish that evolved in the lakes and rivers of Africa's Great Rift Valley. Simon Kisher of the University of Oxford studies the same gene, "FOXP2" in humans and in birds.

Palaeontologist Neil Shubin of Chicago discovered a 375 million-year-old fossil from Canadian Arctic rocks, *Tiktaalik roseae*, a fish with land animal features. This fossil's genes are lost in the mists of time. Researchers have studied a living proxy, a primitive bony fish, called a paddlefish of the Polyodontidae family of the Mississippi River watershed to show that the pattern of gene expression that builds the bones in its fins is much the same as the one that assembles the limb in the embryo of a bird, a mammal or any other living animal. It is only switched on for a shorter time in fish.

Final statement: Mendel's legacy, stated in 1866 like Darwin's of 1859, has never been more alive. ❑

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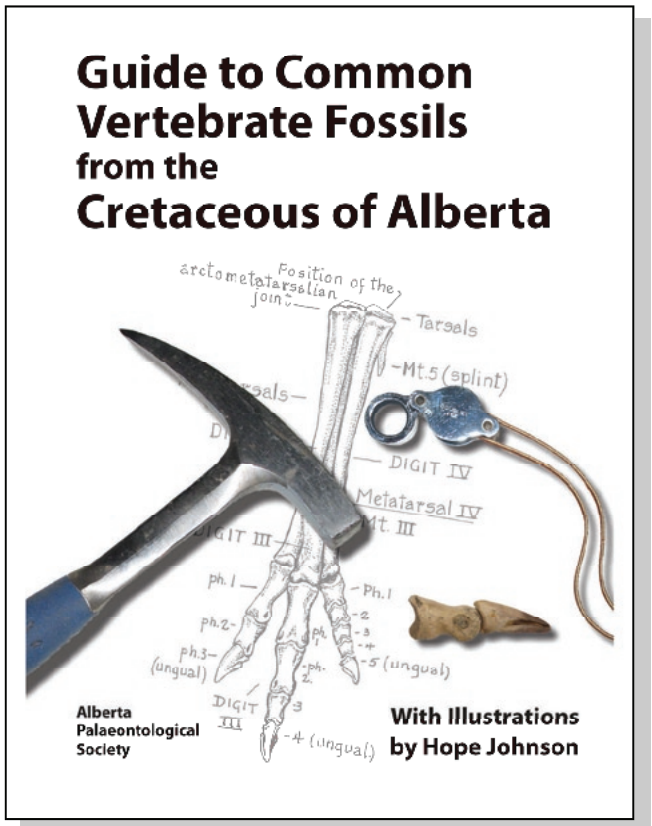
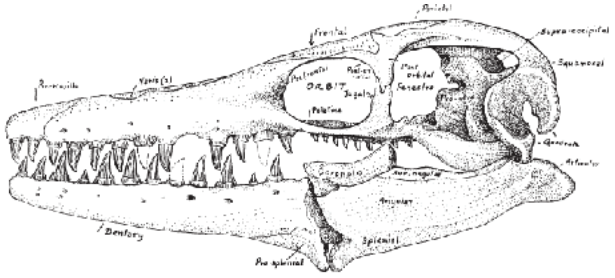


Hope Johnson's illustrations are the inspiration for this publication. Her passion for nature and contributions to the science of palaeontology have brought Alberta's natural history to life.



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