Palæontological
Alberta
Society
Bulletin

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ALBERTA PALÆONTOLOGICAL SOCIETY

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

a. Promote the science of palæontology 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 palæontological collections of the province (preserve Alberta's heritage).

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

Single membership	$15.00 annually
Family or Institution	$20.00 annually

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

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UPCOMING APS MEETINGS

Meetings take place at **7:30** P.M., in Room **B108**,
Mount Royal College: 4825 Richard Road SW, Calgary, Alberta

September 21, 2001—Gilles Danis, "Reconstructing the Past"; see details, Page 3.
October 19, 2001—Phil & Peter Benham, "Komodo!"; see details, Page 3.
November 16, 2001—To be announced (Dr. Eva Koppelhus, or Keith Mychaluk)

ON THE COVER: Alberta fossils—a very large blastoid, *Ambolostoma* sp., cf. *A. baileyi* Peck, from the Opal Member of the Mount Head Formation, Lower Carboniferous. Actual length: 47.5 mm, enlarged 3.7 times. Photo by Howard Allen. Have you got a rare, unusual, or spectacular Alberta fossil we can showcase on a future cover? Please contact the Editor!

Vice President's message

by Dan Quinsey

Welcome to the beginning of a new year—a year of fun, involvement, enlightenment, and change.

In this issue, you received the APS Survey. This is our report card. The Board of Directors uses statistics from this survey in the decision-making process. If we do not hear from you, how do we know what you want? Use this forum to let us know how we are doing but most important, if you believe we can do it better, tell us how. Give us your ideas.

The Board of Directors will keep all surveys confidential; only the statistical results will be published in an upcoming *Bulletin*.

Please fill in your survey and mail it today. ❑

Sixth annual Symposium set for January 26, 2002

by Philip Benham

You are invited to contribute a lecture or poster at the APS Sixth Annual Palaeontological Symposium, presented in conjuction with the Mount Royal College Science Department and the Canadian Society of Petroleum Geologists (CSPG) Paleontology Division. The Symposium will contain presentations from a mix of amateur and professional palaeontologists from all over Western Canada. Specific invitations have been sent to staff and students of colleges and universities, natural history clubs, the Geological Survey of Canada, museums, and members of the petroleum industry and the artistic community. Our aim is to showcase palaeontology to the general public and to foster closer relations between the APS and the above groups. The event is free to all participants.

We plan to encourage families to bring fossils to our identification booth. Planning is underway for some palaeontological workshops and other activities. (Watch for details in the December *Bulletin*.)

Advertising for the event will occur through academia, government facilities, museums, the CSPG *Reservoir*, schools and news media.

The Symposium

Our event will run from 10:00 A.M. to 4:00 P.M. on January 26, 2002 at Mount Royal College (lower level), Calgary. The time may be extended depending on the number of presenters. There is no fee to be a presenter in the symposium. If you cannot attend but would like to provide a poster, that can be arranged via mail.

Speakers

Speakers will have 20 minutes, with 5 minutes for questions. The keynote speaker will be given 90 minutes. All forms of multimedia should be available. It is requested that speakers identify their requirements beyond the presence of one slide projector in order to assist with planning and setup. In addition to an abstract, speakers are requested to provide a brief biography for introduction purposes.

Posters/displays

A table and stand with a 4-foot by 8-foot poster board will be supplied to each presenter. The presenter should bring stick pins or tape for attaching posters, though we will try to have some on hand for those who forget. Those who have special requirements (such as electricity) to operate a display or a larger display area should identify these requirements when making a request for space.

Presenters are asked to provide an abstract as per instructions below. We request that poster presenters be set up by 9:30 A.M. the day of the event. During the day a poster session period will be specified; please be available at least during this time for discussion about your exhibit. **The deadline for requesting poster space is January 10, 2002**.

Abstracts

An abstract volume will be printed again this year. Abstracts can be 1 to 3 pages in length (1 page is standard), but exceptions will be made if there are specific requests. Abstracts may include photos and/or diagrams, but it should be noted that the abstract volume will not be printed in colour. Abstracts can be sent to the editor, **Howard Allen** (**editor@albertapaleo.org**) via email, disc, or in printed form. Specific instructions regarding text and graphics formats will be made available to authors (contact the editor).

Documents will be edited for typographical

consistency (typefaces, punctuation, spelling, layout, etc.), but intellectual/literary content will not be altered. A prepress proof will be emailed to the author if requested prior to the deadline. Postal address (and email address if you wish) of the author should be included for insertion in the volume.

Deadline for printed submissions to the abstract volume is December 1, 2001. Deadline for electronic submissions (email, disc) is December 15, 2001.

For more information, contact:

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Visit the APS website for confirmation of meeting times and speakers, and last-minute updates:
www.albertapaleo.org

Upcoming APS programmes

Reconstructing the Past

Gilles Danis
Prehistoric Animal Structures

7:30 P.M., Friday, **September 21**, 2001
Mount Royal College, Room B101

Abstract

The unknown and the mysterious fascinates the human mind. This is most evident with fossils. Some of these ancient life forms are not represented in today's faunas and floras and we can only extrapolate from what we know of modern beings to formulate mental images of them. This exercise has inevitably led to some errors over the years and, in fact, palaeontology has taken on the onus of refining our knowledge and understanding of ancient life. The result is that over the years, we have been able to correct many of our early mistakes after finding more and better specimens of previously poorly-understood life forms.

In my discussion I wish to illustrate the process which has been followed to refine our interpretation of fossil skeletons. I will show early reconstructions both of fleshed-out sculptures and of skeletal mounts and discuss what has been done to make more accurate representations of the animals and the dynamics of motion as it applies to their skeletons.

Biography

Gilles Danis graduated with a BA at the University of Laval in 1965. He started his career under Dr. Dale A. Russell, mounting dinosaur skeletons at the Canadian Museum of Nature. In 1979, he moved to Alberta at the insistence of Dr. Phil Currie to head the mounting program at the Provincial Museum in Edmonton and later the Royal Tyrrell Museum in Drumheller. In 1989, Mr. Danis started Prehistoric Animal Structures (PAST), a company that specializes in the technical aspects of palaeontological work. Since 1969 Mr. Danis has reconstructed over 400 mounts of various specimens ranging from the tiniest insect in amber to the impressive type specimen of *Seismosaurus hallorum*, presently being worked on in the PAST shop.

Komodo! The Mythology and Evolution of a Dragon

Philip (and Peter) Benham
Senior Geologist, Shell Canada Ltd.

7:30 P.M. Friday, **October 19**, 2001
Mount Royal College, Room B101

Abstract

Ever since their discovery on a remote Indonesian Island in 1912, the Komodo dragon (*Varanus komodensis*) has provoked the imagination of adults and children alike. The largest dragons are over 3 m long and all are armed with sharp claws, teeth designed for rending chunks of flesh and a saliva rife with bacteria toxic to their prey. Advertised in tourist brochures as living dinosaurs, these large monitor lizards are more closely allied to snakes and extinct marine reptiles such as mosasaurs. Even so, the Komodo dragon may serve to clarify the debate on aspects of dinosaur physiology such as whether dinosaurs were warm blooded.

V. komodensis is restricted to a few islands in the

vicinity of Komodo but the monitor lizard has a much larger worldwide distribution. Their fossil remains can be found in Eocene strata as far north as Ellesmere Island. The talk will cover the varanid evolutionary path, modern biology of the Komodo and myths and legends associated with monitor lizards. Come find out what Marco Polo, Alfred Wallace, King Kong, pygmy elephants and the Komodo Dragon have in common.

Biography

Philip Benham graduated from UBC (B.Sc.) in 1987 and MUN (M.Sc.) in 1992. His fieldwork ranges from the Queen Charlotte Islands and Tatshenshini/St.Elias Mountains in BC to Bylot Island in newly created Nunavut. He joined Shell Canada Ltd. in 1994 where he was involved in development of the Jumping Pound West and Wildcat Hills Fields. He is currently on Shell's Mackenzie Delta (Niglintgak) development team. Peter Benham is in Grade 5 at St. Rupert Elementary School. He proposed the original venture to Komodo on which this talk is based.

Christmas Social and Palaeo Photo Contest slated for December meeting

by Philip Benham

Last year's event drew a good crowd and lots of great photos. In holiday fashion everybody left well fed. Given the response we plan to have a second photo contest this year.

Our **December 14** general meeting will consist of a potluck dinner at 7:30 P.M. sharp, followed by a palaeo slide show contest with prizes for the winners.

The contest categories are:

1) Prepared specimens
2) Fossils in the field
3) Scenic shots
4) Palaeo-humour

Please label each slide or print with the following:

1) Your name
2) Contest category (see above)
3) Slide title
4) Photo location (if relevant)
5) Geological information (such as formation or age of fossil)

Photos without the first three items labelled will not be eligible for the contest. Labelling allows us to sort and identify them when placing in the photo carousel.

As each slide comes up the contributor may stand and give a brief comment on their photo with the understanding that the palaeo-humour may take slightly longer to set the stage.

Entries will be limited to 10 per member, so be selective (don't bring your whole photo album).

We would like to express a strong desire for pictures to be in slide format for ease of group viewing. Prints will, however, be accepted as part of the contest.

The cost of conversion from print to slide varies. Last year:

Saneal Cameras (at several malls) charged $2.50 per slide.
London Drugs charged $3.00
Japan Camera (at several malls) charged $5.00
Photo Express Centre (1721 Centre Street N) charged $5.00, or $2.00 each for 16 or more.

If people want to give me prints at the November general meeting and prepay $2.00 per copy I can take a bunch of photos to Photo Express. I'll cover the GST as long as there aren't several hundred prints submitted!

The APS requests the privilege of using the winning entries to generate a fund raising product for the club.

The APS Social Director will be coordinating the potluck portion of the evening. Any questions regarding the contest can be directed to me by phone or email.

APS Program Director
Philip Benham
Phone (403) 691-3343
programs@albertapaleo.org

PARKING NOTICE!

Due to recent construction at Mount Royal College, parking and access to the East entrance (lower level, closest to our meeting room) are no longer available.

You must now park and enter at the West entrance (upper level) and take the stairs or elevator to the lower level.

2001 Field Trip reports

Cranbrook area, British Columbia (June 23 – 24)

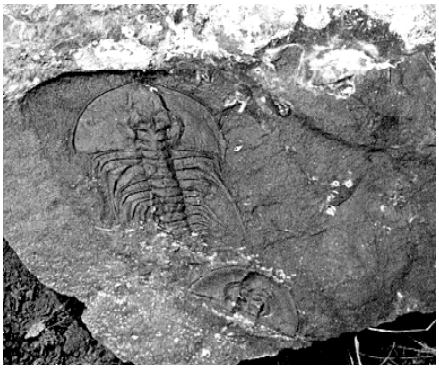
by Les Adler

Nearly thirty people assembled at the ABC Restaurant parking lot at Cranbrook, on Saturday morning, June 23. Our guide, APS member **Guy Santucci**, associated with the Rocky Mountain College of Cranbrook, has spent many years hiking and examining rock outcrops around southeastern British Columbia. Guy visits Calgary periodically and has joined us on field trips in Alberta.

Guy selected four areas to visit during these two days, showed specimens of what can be collected, provided maps and invited us to visit his home for a barbecue later on Saturday.

We drove about 480 kilometres on a circuit to collect at four locations, frequently driving long distances to reach spots on very rough roads with many potholes, in uninhabited country, with the risk of flat tires and no facilities within sight. The rocks and roads trend north to south with the fast-flowing Bull River, the occasional spectacular waterfall, and mountain ranges up to 2,800 metres above sea level along the east side of the Rocky Mountain Trench, a major physiographic feature of the North American continent. Some twenty-five geological formations range from Precambrian to Pleistocene in age.

The remainder of Saturday morning was spent driving along the Bull River from Fort Steele to a fossil site directly on the roadside, easily reached on foot with no climbing involved. Some specimens were loose, completely weathered clean and with no need for further processing. Other specimens had to be pried loose from the surrounding rock. This richly fossiliferous outcrop is part of the marine, late Middle Devonian Harrogate Formation with mainly brachiopods such as *Atrypa* and *Emanuella*; also corals including *Favosites* and *Alveolites*. There was also one gastropod found.



***Olenellus* sp. (Lower Cambrian) from Fort Steele. (Photo by Cindy Evans)**

APS members demonstrating their sincerity at the Fort Steele trilobite beds. Put your backs into it, men! (Photo by Cindy Evans)

After lunch we went for another rough, long drive and reached a spot to the north on the same road, east of Whiteswan Lake Provincial Park. The rock was a black siltstone in the Glenogle Formation (Ordovician Period), rich in graptolites, with several genera present. The material did not appear to be as diverse as that at the Glenogle type locality; it was also somewhat rougher in appearance. The trick to obtaining worthwhile specimens from this rich spot was to have the rock split along the bedding planes which are in a different direction to the rock cleavage. Many of the graptolites were nicely preserved and easily identified. Everybody obtained several specimens. We returned to Cranbrook along paved highways and reached Guy's home about 8:00 P.M.

On Sunday morning, June 24, we again assembled at the ABC parking lot and proceeded to the Fort Steele trilobite beds about 24 kilometres north of Cranbrook, in the Lower Cambrian Eager Formation. Again, everybody obtained specimens.

Our APS notes provided for this field trip gave copious diagrams on the two main trilobites which occur here, *Olenellus ricei* and *Wanneria dunnae*. The vast majority of specimens were cephalons

from moulting; only one or two complete specimens were found. There is a large excavation at the top of the hill where you can dig with heavy equipment. The very hard rock is surrounded by huge piles of broken, discarded pieces. Previous collectors have left much material behind. I did quite well scavenging and came away with fossil worms and a burrow in which the trilobites moulted.

The afternoon trip was an adventure due to the fact that there had been heavy rain overnight. The bridge at Morrissey Creek, southwest of Fernie, had been washed away and the water in the creek was much deeper and flowing much faster than expected. We attempted to build our own bridge, but this was quickly washed away. Most members waded the creek in water up to their thighs to reach an area rich in Cretaceous Period fossil ferns. After high-grading this material, and visiting nearby abandoned coke ovens, we returned to Calgary with a diverse collection of fossils to display to visitors. Thanks, Guy!

Fish Creek Provincial Park, Calgary (July 14)

by Mona Marsovsky

Thea Green, an archaeology student (Master's level) at the University of Calgary, showed ten APS members a couple of the archaeological sites near the Bow Valley Ranch Visitor Centre at Fish Creek Provincial Park. First, we visited one of the first settler's houses in the Calgary area which had numerous uses over the years (blacksmith shop, garage, storage shed). Next, we hiked a short distance to view a bison pound site, currently under excavation. In the trees, halfway down the valley wall, ancient natives had driven herds of bison into fenced enclosures. The natives then killed and butchered the animals for food. The University of Calgary has found three distinct ages of bison kills, ranging from 4,500 to 1,000 years old. The top layer, only a few centimetres deep, looked like a bone bed, crowded with a thick layer of bison bones. The deepest layer (approximately 2 metres) has yielded fragmentary and fragile remains.

Bison kill bone bed exposed in an excavation at Fish Creek Park. (Photo by Keith Mychaluk)

After the tour, Thea took us to the visitor centre to show us some of the artifacts collected, including projectile points and cooking tools.

We would like to thank Thea Green for the very informative tour. Public tours were conducted by University of Calgary staff, from May 15 to August 15 of this year. They expect to conduct tours again next year. Check out **www.fp.ucalgary.ca/pubarky/** for more information.

Grande Cache, Alberta (July 21 – 22)

by Mona Marsovsky

Our July field trip destination was the Smoky River open-pit coal mine near Grande Cache, Alberta. Dinosaur trackways have recently been identified in the Early Cretaceous Gates Formation (100 million years old, early Albian), which is exposed in the mine. Twenty-one APS members, plus fifteen residents of Grande Cache, jumped on a tour bus at the Grande Cache Tourism and Interpretive Centre at 9:00 A.M. on Saturday, July 21. The bus was sponsored by **Gerry Verstraten** of Misty Mountain Apartments in Grande Cache. We were very fortunate to have **Richard McCrea** of the University of Alberta lead the tour. Richard has studied these trackways for several years, as part of both his M.Sc. thesis and current Ph.D. research.

Strip mining of the coal exposed the tracksites found 1 to 2 metres below the #4 coal seam. The coal mine sprawled over a large, mountainous, heavily forested area. At the first stop (W9 mine), in the pouring rain, we viewed a quadruped's (nodosaur?) trackway on a steeply tilted bed. A small

section of the trackway had been removed by the Royal Tyrrell Museum to protect it from potential damage by future mining work and erosion.

A spectacular anticline and syncline, which effectively doubled the width of a 4 metre-thick coal seam, was the focus of the next stop. The heavy rain continued, as bemused bighorn sheep watched our bus make its way up roads that looked more like rivers as the day progressed. We then stopped to view one of the two clam beds (*Murraia naiadiformis*) exposed in the mine. These clams lived in a brackish water environment, which was of the same age as the dinosaur tracks. The W3 mine site had both large theropod and nodosaur tracks, as well as an impressively large area of "dinoturbation" (where dinosaurs had trampled the ground). This was also an excellent plant fossil locality. APS members found imprints of *Ginkgo*, *Nilssonia*, *Pityophyllum*, *Pterophyllum* and *Coniopteris* leaves. The leaves closely resembled those found during the June 1998 APS field trip to Grassy Mountain near Blairmore, Alberta (Kootenay Formation, Jurassic-Cretaceous).

The W2 mine site had bird tracks, nodosaur tracks and tracks from both large and small theropods (over 10,000 total tracks at this site!) APS member **Geoff Barrett** found a small bird track on a slab, which was added to Richard McCrea's collection. Richard also found another bird track (Canada goose size) on a slab. Two partial dinosaur footprints on small slabs were also collected. This site also yielded more fossil plant material. At 2:30 P.M., the bus headed back to the Visitor Centre. The town hosted a free BBQ for the tour participants at the Fireman's Pit after the tour. Luckily, this event was held under cover, as the rain continued.

On Sunday, the originally planned events were postponed due to flooding on the local rivers.

The APS would like to thank Richard McCrea for leading the tour, Gerry Verstraten for sponsoring the bus, and the town of Grande Cache for its wonderful hospitality. We wish the town the best of luck in opening the site to the general public/tourists next year. Watch the town's website for updates: **www.town.grandecache.ab.ca** ❑

[*Thanks to Keith Mychaluk for assistance in editing geological details –ed.*]

Fossils in the news

Tumbler Ridge Observer, August 21, 2001

Dinosaur boys do it again

by Charles Helm

TUMBLER RIDGE, BC—Last year they discovered an important dinosaur trackway in Flatbed Creek just below Tumbler Ridge. This year they were part of a team that mapped that site and contributed to a valuable palaeontology discovery,

Dinosaur hunters Mark Turner (left) and Daniel Helm with the trackway in Flatbed Canyon, near Tumbler Ridge. (Photo by Charles Helm)

one of just a handful of its kind in the world.

Mark Turner (11) and Daniel Helm (9) spend much of their spare time each summer looking for dinosaur prints. They know that the rock beds near this beautiful, isolated northeastern BC community are just the right age to harbour tracks of this kind. Finally their patience paid off when they found a series of four depressions in the bedrock of Flatbed Canyon while tubing down some rapids. Soon they had visiting palaeontologists confirm what they suspected: they had discovered a dinosaur trackway!

Dr Phil Currie, curator of dinosaur research at the Royal Tyrrell Museum of Palaeontology, then put them in e-mail contact with Ph.D. student Richard McCrea, western Canada's dinosaur trackway expert. The boys laboriously uncovered another four tracks and took careful measurements. These and their photographs allowed McCrea to calculate that this dinosaur was two metres high at the hip and was ambling along at about two kilometres per hour. They also found a geologist who could tell them that the rocks were part of the Dunvegan Formation, about 95 million years old.

McCrea comments: "I was intrigued. This would be the first well-preserved, intact trackway ever discovered in this formation. I had to come out to see for myself." This is what the boys had been waiting for for a whole year.

As soon as Rich arrived from his home in Edmonton, the team set to work August 15, uncovering and discovering new prints, until they had a total of 26. Rich's trained eye spotted fainter handprints in front of each footprint. This meant that the dinosaur was walking on all fours. Rich was able to identify the prints as belonging to the ichnogenus *Tetrapodosaurus*. These were almost certainly made by a member of the group of armoured dinosaurs known as ankylosaurs. Such prints are rare worldwide but are not uncommon in western Canada.

Rich continued: "The trackway alone would have made the trip worthwhile. This is without doubt the finest trackway yet discovered in rocks of this type." But there was more to come…

Moss had previously clothed much of the bedrock surface, but the recent floods had removed most of it. While Mark and Daniel were occupied with the trackway, Rich decided to measure the angle of tilt of the rocks. He needed a level place to lay down his compass, and chose a lighter knoblike projection in the flood-exposed rock. Suddenly he realized that this was not just ordinary rock. There in front of them were some well-preserved dinosaur bones embedded in the rock, just metres away from the trackway, and on the same rock surface!

The boys were ecstatic and McCrea could barely hide his excitement. He enthused: "There are possibly half a dozen places in the world where dinosaur prints and bones occur together. The conditions needed for their formation are usually so different, that you almost always find one or the other, not both. This is something I never expected to see."

Dinosaur bones embedded in the trackway bedding surface. (Photo by Charles Helm)

Next day they were back, carefully removing the bones from the rock using plaster of Paris, and transporting them back to their vehicle, to begin the journey to the Tyrrell Museum, where they will be formally analysed, and will hopefully yield many more secrets. A diligent search of the surrounding area revealed no further bones or tracks.

The trackway is suitable for guided tours, good news for the economy of Tumbler Ridge, a town seeking to diversify its economy. And what of the apprentice-palaeontologists Mark and Daniel? They're already back at it, searching for the next tracks, or bones, or even something bigger, in the wilderness canyons and on the alpine peaks around Tumbler Ridge. ❑

APS member finds Quebec fossil trove

by Steven Coombs (copyright, © 2001)

The fossils of Barachois, Quebec were discovered in December 1999. The very first fossils to be found were the remains of countless crinoids on a rock about 100 metres away from the main site, which was eventually found in the following spring. It has produced a lot of fossil remains of different organisms.

The site was named July 27, 2001, by the amateur palaeontologist Steven Coombs, who found this wonderful fossil trove. The site is now known as "Coombs Quarry" or in French as "Le Quarrie de Coombs."

What is a fossil? A fossil is the remains of plants or animals, preserved in the rocks of the Earth's crust. Before any organism is preserved in the rocks it has to fossilize first. Fossilize means to change into a fossil or petrify. Many fossils are very old; some are just thousands of years and some millions of years, but there are even fossils from billions of years ago, such as bacteria and algae.

The Earth is a wonderful place of secrets locked inside the very surface we walk on; as humans we sometimes don't bother looking, but some who are interested want to know more, and some even become professionals in this field. The ones who do are palaeontologists—scientists who study prehistoric life, by studying the fossils that are left behind.

Barachois, Quebec, Canada is situated on the east coast of the Gaspésie, between Gaspé and Percé. It is a town which does not have too many people, but it's quiet and peaceful, and a very good place to hunt for fossils.

The only type of rock in which you would find fossils is sedimentary rock, which is composed of fragmentary material deposited by wind or water. The primary type of fossil-bearing sedimentary rock found in Barachois is sandstone, a rock consisting chiefly of quartz and feldspar sand cemented with silica, lime or clay. In these rocks you find the remains of many types of animals, some of which still have representatives in the animal kingdom today. The age range for these fossils is estimated to be between 385 to 390 million years old, or Early Devonian (within the Gaspé Belt). At that time, Barachois was basically a marine environment with plenty of life, and some pretty strong currents, by the evidence. Those currents helped to feed the animals and plants below by carrying in other food animals such as plankton.

The Barachois rocks contain the remains of crinoids, also known as "sea lilies." There are also the remains of two types of corals, including rugose coral—known as "horn coral," and tabulate coral, which would form huge reefs, similar to modern reefs. One tabulate coral species found so far is *Favosites favous* (Goldfuss, 1826). Remains of brachiopods, which have some relatives alive today, are quite abundant at the site. Trilobites are represented by only one species, *Synphoroides biardi* (Clarke, 1907). There are also the remains of two species of gastropods (one spiral-shaped and the other snail-shaped).

Rarer fossils include sponges, which form reefs like corals; and bryozoa and graptolites, which are both preserved as plant-like fossils.

The rarest fossils to be found are the remains of early fishes which are in fact the first vertebrate animals to be found. There is also a rumoured find of an eurypterid, which shares a close relationship with trilobites, but I have not seen the actual specimen. I hope to get more information on this rumour—it could just be some other type of animal—if I do, I'll be sure to share the information with you all! ❑

[*Steven Coombs is a 17-year-old high school student in Barachois, Quebec, and a new member of the Society. Steven has produced two web pages:*

"Barachois Fossils"
http://www.geocities.com/barafossils
and "Steven's Dinosaurs"
http://ca.geocities.com/steven16_84 *– ed.*]

Bookmark our website!

www.albertapaleo.org

Fossil impressions at Mistaken Point, Newfoundland

by Fred Lewis (copyright, © 1999)

Six hundred and twenty-million-year-old fossils! Does that get your attention? It did mine. These fossils are older than the Burgess Shale, fossils found in British Columbia, Canada, which have received much publicity over the past few years. On a recent visit to Newfoundland, I was introduced to these 620 million-year-old fossil imprints.

At breakfast, overhearing my conversation on fossils, the manager of the Trepassey Motel and Restaurant, in Trepassey, asked "are you aware of the Mistaken Point fossils, nearby?"

She showed me a short thesis written by M.M. Anderson, Department of Biology and Geology, Memorial University of Newfoundland. Then, as our time was rather tight and the site difficult to find, she offered to obtain a guide for us.

Shortly we were introduced to Ted Winter, a recently retired high school teacher.

Apparently, one look at our tourist attire did not impress him for the trip ahead. He decided to borrow a friend's four-wheel-drive truck. We followed a paved road, a gravel road, then into four-wheel-drive on what was an excuse for a road; after a hike for another kilometre, we finally waded through a narrow stream of very cold water, for a total of 27 kilometres.

The fossil bed covers a 5 kilometre area of the Mistaken Point coastline, 20 metres from the edge of the Atlantic Ocean. The old seabed is now on a slant of some 20 degrees and slippery when wet from the ocean spray and moss close to the edge.

This tip of the Avalon Peninsula south of St. John's is Precambrian rock where, 620 million years ago, early life was emerging. The multicelled fossil sea-fans and sea-pens are preserved in extremely hard, silicified reddish-brown mudstone with many large and small fractures.

The impressions vary in size from 30 to 60 centimetres in length, consisting of some 20 different kinds of animals that lived in the deep waters. All of these creatures were soft bodied, with no skeleton framework. The closest animals today are jellyfish and sea anemones. Some of the fossil impressions resemble fern fronds.

All this area is under the protection of the Canadian government; the only collecting permitted is by making latex impressions, which can then be cast and painted to provide realistic samples.

Presently Dr. G.M. Narbonne, with a team of geoscientists from the University of Waterloo, ON, are doing just that. The impressions will determine the wear and tear of erosion over the past four to five years. Studies such as this could determine plans for protecting this section of Canadian history for the future.

***Ptendinium?* at Mistaken Point, Newfoundland. (Photo by Fred Lewis)**

Fossil impressions similar to these are found in other parts of the world, notably Russia and Australia. They are studied as Ediacaran organisms, named for the Ediacara Hills of Australia, where they were first discovered in the 1950s.

These fossils are so important in Canadian history that Mistaken Point is being considered as a World Heritage Site. It is presently proclaimed as

an ecological reserve.

The photograph above is typical of the fossils available. To date I am having difficulty determining who discovered the site and named the fossils. If anyone has information on this subject I would appreciate hearing from them.

To the dedicated fossil enthusiast, Newfoundland and Mistaken Point are well worth a visit.

Note: data from the government of Newfoundland and a publication of the Geological Society of America contributed to this article. ❑

[*This article was first published in* MAPS Digest *(Mid-America Paleontology Society), in February 1999. –ed.*]

The Urban Fossil Collector

by Dan Quinsey

In the June *Bulletin*, I posed the question: "If you could ask the Urban Fossil Collector any one question about fossils or dinosaurs, what would it be?" Overall response was light; however, here are a couple of good questions:

Q: Is there a good easy-to-use finish to protect dinosaur bones and trilobites such as *Olenellus* found in shale? –Wendy.

A: I have tried several finishes and have found Flecto Varathane water-based satin finish for interior surfaces in an aerosol can the best for these items. It dries fast and leaves no yellow or white pockets on your specimen. As usual, test this product on a less desirable specimen to make sure you are satisfied with the results before finishing your good specimen. Being a water based product, you can usually tell what your specimen will look like by wetting it with water. Make sure it is completely dry before applying finish. Of course, this is only one of many good products available.

A youngster from my street asked this next question one evening while we were discussing fossils and dinosaurs:

Q: What is the oldest fossil? – Schuyler.

A: This question could have many answers depending on the perspective of the expert. However, since a fossil is evidence of life, microfossils will have to be considered. The earliest microscopic-scale fossils, which seem to be remnants of clumps of cells, have been found in Western Australia from about 3500 million years ago. Additionally, bubbles in 3500 million-year-old Australian rocks contain gases that have been studied as possible samples of actual ancient air. More discoveries are sure to be made in the coming years.

E-mail questions for the Urban Fossil Collector to Dan Quinsey, **quinseyv@cadvision.com** Answers will be published in upcoming issues. ❑

Reviews

The Dragon Seekers

How an Extraordinary Circle of Fossilists Discovered the Dinosaurs and Paved the Way for Darwin

by Christopher McGowan
Perseus Publishing, Cambridge, MA
(2001) ISBN 0-7382-0282-7, 254 p.
CDN$39.50

Mary Anning…Gideon Mantell…William Buckland…Richard Owen…getting sleepy?

As students of palaeontology, we run into these names every time we open a popular dinosaur book; indeed, some even mutter about the paper wasted on recanting, *ad nauseam*, the same old stories that we could all recite in our sleep.

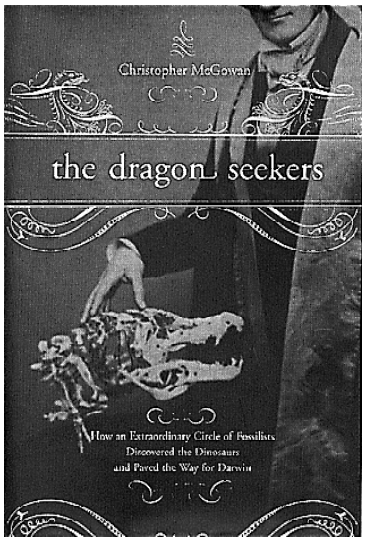
From this perspective, yet another book recounting the adventures of these 19th-century English pioneers might at first glance seem to be as worthy of our attention as the daily installment of *Rex Morgan M.D.* on the funny pages.

But *The Dragon Seekers* really is worth a second look. The author, Chris McGowan, is well known to many of us as a respected ichthyosaur expert at the University of Toronto and the Royal Ontario Museum. He has written several popular books, including *Dinosaurs, Spitfires, and Sea Dragons* (1991).

As a palaeontological "insider," McGowan is able to inject genuine enthusiasm about his subject, and it shows in the pages of this book. A big plus is the fact that he actually spent time researching the lives of these characters—not by cobbling together all the old second-hand accounts, but by actually starting from scratch, tracking down personal letters, diary entries and contemporary newspaper reports. What results is an engaging and frequently surprising account that gives humour, humanity, and a good flash of colour to the traditionally dreary, sepia-tone history we thought we knew. McGowan paints his characters so well that I began to regard Mantell and Charles Lyell as "kindred spirits."

One example of the surprising insights we gain is the fact that there were actually *two* Mary Annings! Mary Anning "Junior" was the woman who made important discoveries of marine reptile skeletons, but she shared the same first name with her mother, who also sold fossils in Lyme Regis, years before her daughter, resulting in historical confusion over the longevity of "her" career. Another revelation: the story about Gideon Mantell's wife discovering the first *Iguanodon* tooth while she waited for her husband to attend a patient really is too good to be true.

Although we've always had a vague sense that Mantell, Buckland, Lyell, Anning, Conybeare, Hawkins and Darwin were relative contemporaries, and that they obviously would have known of one another, I was surprised to learn how well acquainted they really were—to the extent of joining one another on field trips and domestic visits, carrying on extensive mail correspondence, and sometimes even some back-biting gossip, which shows up in diaries of third-party acquaintances. They really were a "circle of fossilists" as the book's subtitle suggests.



One of the members of this circle, Thomas Hawkins, has received short shrift in many previous historical accounts. Hawkins was a bizarre character who appears to have lived much of his life with a screw loose. McGowan tackles him with obvious delight, and the accounts of Hawkins' outlandish antics— from his fudged fossil mounts (which, upon being sold to the British Museum, ignited a national scandal reminiscent of the recent *Archaeoraptor* fiasco), to his physical assault on a houseguest who had swiped his bowl of strawberries—had me laughing out loud, and marvelling that all these incidents were actually recorded for posterity. The text is peppered with such historical treats—like poet Percy Shelley's complaint to a friend that a mineralogy lecture he attended was "about stones!—stones, stones, stones! nothing but stones!"

This book is by no means perfect; there are some minor problems with the layout: I had al-

ready read two or three chapters, wishing there was documentation of reference sources, etc., when I happened to flip through the back of the book and discovered that there was, in fact, a set of the very endnotes I was wanting, but they're not flagged in the main text. The book is well illustrated with contemporary portraits of the characters and engravings of fossil specimens and country scenes. Most are well reproduced, but some could have used a bit of PhotoShop work—the caption to a period scene at Lyme Regis (which McGowan borrowed from the British novelist John Fowles—an avid amateur palaeontologist and historian in Lyme) asks us to "notice the bathing machines on the beach" but the picture is so muddy—at least in the copy I had —that all one can make out is vague blobs in silhouette.

I also had trouble on an intellectual level with some of McGowan's reasoning, particularly his interpretation of the creationist logic of Buckland and some of his pals. While excavating a cave on the coast of Wales, Buckland uncovers a "human female skeleton," mere inches from where a mammoth skull had been dug up. According to McGowan, this proximity of human and extinct animal bones was anathema to Buckland's creationist logic: "Imagine his astonishment. Here were human remains, seemingly in a fossil state, lying alongside those of antediluvian creatures. But how could this be? It was a well established and sacred truth that humans, the pinnacle of God's creative powers, appeared on the Earth *after* [McGowan's italics] the demise of these creatures."

I re-read this passage several times, trying to figure out why Buckland should have been bothered by this. I eventually concluded that McGowan and I must have heard different Bible stories back in Sunday School. The story I remember had Noah building an ark and rounding up two of every animal, along with his own family. After forty days and forty nights of rain, the Great Flood drowned all the "sinners" along with the animals that missed the ark. Presumably they would all be buried together in the same flood deposit. So from this perspective, why shouldn't a diluvianist like Buckland expect to find humans and extinct animals lying side-by-side in the same sediments? It seems to me that the very opposite case would be harder to explain in diluvianist terms: *i.e.,* why are different types of fossils usually found at different stratigraphic levels, with human remains in the uppermost beds, if they were all buried together by the same Great Flood? (Indeed I've read more than one modern creationist tract flailing away at this very problem.) It may well be that I've received a faulty version of the Bible stories (or perhaps a different version than was circulating in the mid-1800s); but I suspect that a lot of other readers would share my interpretation, and would be equally befuddled by McGowan's explanation.

"…stones! —stones, stones, stones! Nothing but stones!"

–Percy Shelley

A similar head-scratcher appears several pages later, with the discovery of a mammal jaw—along with *Megalosaurus* bones—in Mesozoic rocks. Again, McGowan thinks this should be a major problem for Buckland and the creationists: "The discovery was a major anomaly because it did not fit in with the accepted scheme of things. God had created different creatures at different times, beginning with the lowliest of animals, like fish, which first appeared in the older rocks. Life progressed through to the amphibians and reptiles, which first appeared at a higher level, to the mammals, which did not appear until later in the sedimentary series. The last mammal to appear in this continuous chain of beings was the human species, the last and greatest of God's creative works. So how could the presence of a mammal be explained in such ancient rocks?"

In this case, I have to think it really is McGowan who is reading things from a funny angle. Sure, the "Creation" supposedly proceeded in an orderly progression, but *there are still fishes, and amphibians, and reptiles alive today*. We all know this, as Buckland certainly did. Maybe they were "created" in sequence, but no creationist suggests they existed exclusively of each other—all the fishes didn't die out to make way for amphibians, which didn't all die out to make way for reptiles (and remember: as far as Buckland and company were concerned, dinosaurs *were* reptiles). Why couldn't a mammal

jaw be found together with reptile bones in Mesozoic sediments, just like a mammal jaw could be found next to a reptile bone—or a fish bone—today? The only implication this discovery might have for a creationist would be that the mammals were "created" a little earlier than previously thought. McGowan writes: "Buckland did not offer any explanation at the time, and was quite content just to report the find…" But what's to explain? Why shouldn't Buckland be content? How did the discovery of contemporaneous mammal and reptile bones contradict Buckland's creationist convictions?

As I suggested earlier, if this is a problem with my own interpretation of creationist logic, then it is, I think, a problem that other readers will have, and one that McGowan might eventually wish he had clarified better. (I hope Chris McGowan doesn't find himself quoted in some "creation science" pamphlet as a booster of creationist logic!)

In colouring the setting and context of the Victorian period, McGowan's narrative occasionally gets sidetracked by historical anecdotes. Some of these, like Gideon Mantell's efforts to defend victims of the nightmarish British judicial system, are interesting tangents that add much to the development of the characters. Others are simply dead-ends, and one suspects that McGowan, finding these tidbits during his research, just couldn't resist leaving them out of the story.

At one point, our attention is abruptly diverted for more than a page by the description of a steam-engine competition—complete with performance statistics, names of the contestant engines and details of the winning design. We finally get back to the main story via a slightly ironic segue: "Lyell may have watched all this with a certain amount of detachment…He was interested not in how industrial forces were changing the landscape, but in how natural forces…could be used to interpret the past." In another instance, we're told that Richard Owen and one of his chums paid a visit to the studio of the painter, J.M.W. Turner—but so what?

In a later chapter, McGowan reveals that during a dark and stormy night at Buckland's home, Westminster Deanery, a section of wainscotting crashed down, revealing the presence of a hidden passage behind one wall, and "a similar hiding place…behind one of the walls in the library." But that's it—no punch-line—end of story.

The final chapter is an interesting epilogue, bringing us up-to-date on recent marine reptile discoveries in Mary Anning's happy hunting ground of south Dorset. APS members will be pleased to see that many of these finds are being made "by those who are not employed as palaeontologists…"

On balance, I found *The Dragon Seekers* to be a very readable and entertaining (albeit expensive) little book. I would be glad to own a copy. Even those who simply love the 19th-century "Englishness" of a Thomas Hardy or H.G. Wells story would find much to enjoy in this book. Its few faults don't detract from its great value to those of us who take an interest in the history of science—especially our favourite science.

– Howard Allen

The proof is in the plumage

by Mark Norell, images by Mick Ellison
Natural History, July/August 2001, p. 58 – 63

Mark Norell is curator and chairman of the American Museum of Natural History's Division of Paleontology. He discovered the first embryo of a carnivorous dinosaur in Mongolia. He analyzes the new fossil birds and dinosaurs emerging from northeastern China. Mick Ellison is the principal artist in the Division of Paleontology.

Known as the Jehol biota, ancient plants and animals near the boundary of the Jurassic and Cretaceous periods are embedded in fine-grained sediments that preserve details of the veins of leaves and insect wings, skin patterns, and the filaments of feathers. The Jehol fossils are enveloped in grey volcanic ash that was deposited on the bottoms of shallow lakes. The most abundant fossils are arthropods; rarer fossils include dinosaurs, turtles, pterosaurs, lizards and early mammals.

In the 1990s, prototype birds were found; they are more closely related to modern birds than is *Archaeopteryx* from Bavaria, but more primitive than birds alive today. Proto-birds such as *Confuciusornis* had the same kind of feathers as modern birds with long tail feathers reminiscent of tropic birds and birds of paradise.

Found in 1996, *Sinosauropteryx* was the first non-bird whose fossil included feather-like struc-

tures. Other small dinosaurs with feathery appendages—*Caudipteryx*, *Protoarchaeopteryx*, *Beipiaosaurus* and *Sinornithosaurus*—provided evidence supporting hypotheses that birds are the living descendants of theropod dinosaurs, that birds are not the sole feather-bearing creatures, and that feather-like structures preceded flight and hence did not evolve in connection with it.

A fossil was needed that unambiguously showed a non-avian dinosaur with feathery body covering. A dromaeosaur, a relative of *Velociraptor*, NMGC 91, exists with the head, tail and much of the body covered with small fibres with other parts of the body covered with tufts or sprays of filaments. The specimen is on loan to the New York museum until the end of August, 2001 and is featured in this magazine. It appears to be a different species from the known *Sinornithosaurus*. It is a theropod dinosaur that looks like a bird. It is a delightful experience to see the illustration and the half-dozen photographs. *– Les Adler*

Hot times in the Bighorn Basin

by Scott L. Wing, Illustrations by Utako Kikutani. *Natural History*, April 2001, p. 7, 48 – 54.

Scott L. Wing is a curator in the department of paleobiology at the Smithsonian National Museum of Natural History at Washington, DC and has been collecting fossils in the Bighorn Basin almost every year since 1972. He has also collected fossils on three other continents.

The Bighorn Basin is roughly 10,000 square kilometres of badlands, sage-brush flats and irrigated fields. This part of Wyoming contains the world's best record of a period 55 million years ago when the Earth experienced an episode of rapid global warming. The basin was formed during the late Paleocene and early Eocene epochs as mountains were pushed up on all sides. Year after year, flood after flood, layers of sediment accumulated until in some areas the pile was more than 9 kilometres deep, burying and preserving the remains of countless organisms. In the past few million years this part of the North American continent experienced renewed uplift, the climate became colder and drier and rapid erosion exposed fossils. Fossil sites are located using global positioning systems and data is entered into computers at night and notebooks during the day.

There are fossil pollen grains by the millions, leaves with insect larvae, mammal teeth, and bones of tortoises, turtles and alligators.

Rocks tell of soil types of the past and the dimensions and courses of ancient river channels. Coal deposits show where the flood plain was especially wet and the rock colours show where plant fossils probably occur. Flashing gypsum crystals attract the fossil hunter's attention. Taken together, all the evidence yields a picture of the environment and life of the basin such as the great variety of trees: sycamore, poplar, walnut, hazelnut and Katsura (*Cercidiphyllum*). Areas of grassland seen today were absent. On the wetter floodplains were *Metasequoia*, *Glyptostrobus*, alder, palms, cycads, tree ferns, gingers, magnolias, laurels and *Hibiscus*. Today's plants with smooth-margined leaves are more diverse in warmer climates. Plants with toothed or jagged leaf margins, such as elms or birches, make up a larger proportion of the species in cooler areas. The larger the leaf the more quickly it heats up and loses water. The sizes and shapes of fossil leaves indicate past levels of precipitation and temperature. The estimated mean annual temperature in the Bighorn Basin during the Paleocene and early Eocene epochs varied from about 10° to 20° C. The ground never froze.

Also, the ratio of the two oxygen isotopes ^{16}O and ^{18}O, trapped in fossil mammal teeth and soil minerals, can be used to interpret temperature.

The rapid warming may have been due to enormous quantities of methane gas being released from the sea floor. The author discusses theories related to the current global warming.

Many types of fossils are illustrated and identified, which tell a story about how plants, animals and whole ecosystems respond to long-term shifts in global climate. *– Les Adler* ❑

[*Congratulations to Les on winning a Gem and Mineral Federation of Canada "First Level Award" for his book reviews in the* Calgary Lapidary Journal. *– ed.*]