

Palaeontological
Alberta *Society*
Bulletin

VOLUME 29 • NUMBER 3

www.albertapaleo.org

SEPTEMBER 2014



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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: 1) Discovery. 2) Collection. 3) Description. 4) Education of the general public. 5) 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

SOCIETY MAILING ADDRESS:

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THE BULLETIN WILL BE PUBLISHED QUARTERLY: March, June, September and December. Deadline for submissions is the 15th of the month prior to publication. Material for the *Bulletin* should be sent to:

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Requests for missing *Bulletin* issues should be directed to the Editor. Send changes of contact information to the Membership Director.

NOTICE: Readers are advised that opinions expressed in the articles are those of the authors and do not necessarily reflect the viewpoint of the Society. Except for articles marked "Copyright ©," reprinting of articles by exchange newsletters is permitted, as long as credit is given.

Upcoming APS Meetings

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

Friday, October 17, 2014—Gregory Funston, University of Alberta.

*The Relationships and Biology of the Caenagnathidae,
a Family of North American Oviraptorosaurs.*

Friday, November 21, 2014—Dr. Duane Froese, University of Alberta.

Ice Age Yukon: Mammoths, Migrations and Extinction in the Northern Refugium.

Friday, December 12, 2014 (Second Friday)—*Christmas Social.*

Watch the APS website for updates on upcoming programs.

ON THE COVER: Bighorn Falls, on the Yahatinda Ranch, plunges over cliff-forming siltstones of the Triassic Sulphur Mountain Formation, Rocky Mountain Foothills, Alberta. Site of the APS August 2014 field trip (see Page 10). Photo by Keith Mychaluk.

President's Message

By Cory Gross

Hello everyone and welcome back for another season of excellent talks and activities with the Alberta Palaeontological Society!

I hope that many of you were able to get out and enjoy the warm weather this past summer. **Wayne Braunberger** organized some great field trips, and if you've never been on one then I would recommend making a point of coming along next year. They are great excursions to some sites that may be more difficult for individual collectors to get out to, with the benefit of expert guides and a nice chance to get to know your fellow Society members.

While our field trips are for members, the APS also does public outreach. At the beginning of August we participated in **Historic Calgary Week** once again, during which I led a group of 80 on "An Ice Age Tour of Nose Hill." In the coming year we're looking forward to meeting even more members of the public at events like the **Rock N' Fossil Road Show** and **Calgary Gem and Mineral Show**, both in October. If you know of any opportunities for outreach, don't hesitate to get in touch with me to let us know!

As we engage more with the public, we are trying to freshen up our image a bit. In addition to new banners, displays and activities, we'd like to step up the contest for a new logo. **Howard Allen** and I have been involved in that committee, having written about it several times in the *Bulletin* (and see Page 5 of this issue). We're prepared to really beat the bushes for entries, with the goal of having our democratic selections before our programming year is through. If you've had an idea or two stewing in your head, now's the time to get it down on paper or pixels to pass along to the logo committee!

Our main activity during the non-summer seasons are our monthly meetings. **Harold Whittaker** has lined up some fantastic speakers with intriguing subjects to speak about. I'm particularly looking forward to our November talk on Yukon's Ice Age megafauna by **Dr. Duane Froese**, since mammoths and sabretooths have become a passion of mine. Harold works hard to ensure that we have a nice breadth of subjects

to satisfy everyone's interest.

We are also hoping to continue the trend of having Society members give short ten-or-so minute talks at each meeting. These brief "appetizers" to the main lecture are a great way to share your trips, explorations, investigations, and pet projects with the rest of us. If you think you might have something to share—and we know you do!—then make sure to speak with Harold. Even if you don't think you'd enjoy doing that, we still encourage you to bring along fossils to each meeting for show-and-tell. It's always great to see so many fascinating things on display! If you're not sure of what something is, that's even better! Somebody might, and a little mystery always livens up a meeting!

The APS is committed to making active contributions to palaeontological science, and there are opportunities for members to become directly involved in the work being done by academics. Consider donating some of your time to sorting microfossils some Saturday this winter! See Page 6 of this *Bulletin* for dates!

Thank you to everyone, from amateurs to academics, from the executive to the general membership, young and seasoned alike, for helping to make the APS what it is! And thank you for allowing me to serve you once again as President of the Society. Our 2014–2015 season is going to be great! □

Program Summary

September

Jason Pardo

University of Calgary

Lysorophia, a Poorly-Understood Tetrapod Group from the Late Palaeozoic of North America

Friday, September 19, 2014, 7:30 P.M.

Mount Royal University, Room B108

Lysorophia is a poorly-understood group of fossil tetrapods known from the Late Carboniferous and Early Permian of North America. Some prior workers have noted similarities between lysorophians and modern amphibians, suggesting that lissamphibians may have evolved from lysorophian-like ances-

tors. Jason discussed the history of research on this group, as well as recent work using high resolution x-ray micro-computed tomography (HR-XCT) to study skulls of the lysorophian *Brachydectes newberryi* from the Early Permian of Kansas and Nebraska, USA. He presented a detailed description of the skeletal morphology of these skulls, including fine structure of the braincase. He also discussed new, phylogenetically-informative characters from the braincase and the phylogenetic implications of these characteristics. Restudy of lysorophian anatomy tells an unexpected story about adaptation to terrestrial environments and the origin of burrowing in tetrapods.

Biography

Jason is originally from Pittsburgh, Pennsylvania. He completed his undergraduate education at the University of Colorado in Boulder and recently completed his M.Sc. in Ecology and Evolutionary Biology at the University of Calgary. He is currently a Ph.D. student at the University of Calgary in the Department of Veterinary Medical Science. His research interests include Late Palaeozoic vertebrate evolution, lissamphibian origins and vertebrate craniofacial development. He is actively involved in field work in the Carboniferous-Permian transition in Nebraska, Kansas, and Colorado. □

Upcoming Events

October

Gregory F. Funston

M. Sc. Candidate, University of Alberta

The Relationships and Biology of the Caenagnathidae, a Family of North American Oviraptorosaurs

Friday, October 17, 2014, 7:30 P.M.

Mount Royal University, Room B108

The Caenagnathidae (Dinosauria: Oviraptorosauria) is a family of North American theropods that was poorly known until recently. Although the first specimens were described in 1924, only now have we begun to understand their anatomy and biology.

Although complete specimens are now known from Asia and the United States, Albertan caenagnathids remain a mystery. Isolated fossils representing nearly every element are known, but understanding how they relate to each other taxonomically is difficult. Only two partial skeletons from Alberta have been described and their diagnostic elements do not overlap, making relationships unclear. Many mandibles, phalanges, and metatarsals are known, but vary greatly in morphology and size, and are isolated or fragmentary.

This problem is being tackled from three angles. First, a new specimen, TMP 1993.051.0001, is being described. Uncovered in 1993 and initially mistaken for an ornithomimid, the specimen sat unprepared for fifteen years, until it was finally prepared in 2008. Besides being articulated, the specimen is well preserved and nearly complete, allowing us to unite isolated material.

Another dinosaur, *Elmisaurus*, has long been an enigma. Originally found in Mongolia, specimens from Alberta now appear to be close relatives of the Mongolian form. A slew of new material lets us reevaluate the position of *Elmisaurus* relative to the caenagnathids, and understand relationships within the group.

Finally, by understanding how the cranial skeleton changes throughout development, we can evaluate whether specimens of different sizes and shapes are separate species, or if they are the result of growth and development (ontogeny). Although known from a nearly complete growth series from embryos to babies to adults, oviraptorosaur ontogeny remains poorly studied. In particular, developmental changes of the face and mandible are not fully understood, nor is the effect that ontogeny has on phylogenetic hypotheses. Histological analysis of new caenagnathid material lets us age these dinosaurs, to see if problematic fossils are juveniles. The combination of these three studies is beginning to provide a clearer picture of the relationships of this mysterious group of toothless dinosaurs, and the way they interacted with the environment around them.

Biography

Greg Funston is a Master's student studying the relationships and biology of the Caenagnathidae, a family of North American oviraptorosaurs. The oviraptorosaurs are an odd group of dinosaurs. Although they have evolved from carnivorous ancestors, they have lost their teeth, and developed beaks instead. His undergrad work showed, through

osteology, comparative anatomy, and functional morphology, that caenagnathids were omnivorous. The group shows remarkable convergence with modern birds, and he believes studying them can help us understand why birds became so successful. His current research aims to reconstruct the relationships of the group using new, more complete specimens. In the future, he'd like to refocus on the origin of birds, and see what oviraptorosaurs can reveal about the ecological role of early birds.

Originally from Yellowknife, NWT, Greg completed his B.Sc. (Honours) in Palaeontology at the University of Alberta in 2013. His undergraduate thesis focused on determining the diet of a toothless caenagnathid dinosaur. He has been involved in a number of other projects, including work on brachiopods, troodontid tooth morphology, sexual dimorphism in dinosaurs, and growth and development of caenagnathids.

November

Dr. Duane Froese

The University of Alberta

Ice Age Yukon: Mammoths, Migrations and Extinction in the Northern Refugium

Friday, November 21, 2014, 7:30 P.M.
Mount Royal University, Room B108

During the height of the last glaciation, more than 95% of Canada was covered by glaciers, with the largest ice-free area in Yukon. This area was part of a non-glaciated sub-continental region that extended from northwestern Canada, across Alaska and the Bering Land Bridge, into Asia.

This region was home to a diverse population of grazing megafauna including mammoths, horses, camels, lions and bison. Permafrost in this region preserves the fossils from these animals along with plants and even ancient DNA, and tells us about migrations and population changes. But these changes also raise important questions about what ultimately drove extinction of the megafauna across this region.

In this talk, I will present recent research that outlines how these populations responded to climate over the last several hundred thousand years, and the

events of the Late Pleistocene that ultimately led to extinction.

Biography

Duane Froese finished his Ph.D. at the University of Calgary in 2001 and following post-doctoral work at Simon Fraser University, joined the Department of Earth and Atmospheric Sciences at the University of Alberta in 2003. He was appointed to the Canada Research Chair in Northern Environmental Change in 2009. For more than twenty years he has been leading interdisciplinary research focused on understanding the evolution and impacts of Arctic and subarctic climate on northern ecosystems using diverse approaches ranging from the dynamics of ice age mammals, ancient biomolecules, to geophysical techniques, all focused on the exceptional archives of past environments preserved in Arctic permafrost. He is a recipient of the J. Ross Mackay award and Hutchison medal from the Geological Association of Canada for his contributions to understanding northern environmental change. □

APS Logo Search Deadline Set for November 10

This is the final *Bulletin* reminder that the Society is requesting new logo ideas from the membership (See the March *Bulletin*, Page 6). **A deadline of Monday, November 10, 2014 has been set for submission of ideas.** This deadline will allow time to publish the submissions in the December *Bulletin*. A voting form will be distributed along with the *Bulletin* in December, with a **voting deadline of Friday, January 9, 2015** (one week prior to the Friday, January 16 General Meeting, at which the winning design will be announced). If you have an idea for a logo design, please sketch it out and send it to any member of the Executive (see Page 2). □

Bulletin back issues on Web

A complete archive of *Bulletin* back issues from 1986 to 2013 is available to download as PDF files.
www.albertapaleo.org/bulletinarchive.htm

Dates for Fall 2014 Microfossil Sorting

By Beverley Ulmer

We again welcome everyone back to our microfossil sorting sessions for the Fall 2014 season. We will be sorting matrix provided by **Dr. Jessica Theodore** of the University of Calgary.

Sessions will be held in Room B213 of Mount Royal University from 1:00 to 3:30 P.M. on the following **Saturdays**.

November 8

November 22

December 6

The matrix to be sorted is late Eocene in age, from the Swift Current area of Saskatchewan and is very interesting. All finds will be kept by Dr. Theodore to advance her research.

Those attending should bring tweezers suitable for picking up micro-sized objects under a microscope and a pen to write down their findings. Microscopes are supplied by Mount Royal University. Sessions are family events open to the public and children may attend, with adult supervision.

Sessions are held on a drop-in basis and no signup is necessary, but if you email your intention to attend, we can let you know if a session needs to be cancelled for any reason (such as a winter storm).

Email baulmer2010@gmail.com. Online maps of the University campus and visitor parking lots are available at www.mtroyal.ca/AboutMountRoyal/CampusesTours/CampusLocations/interior_map_level2.htm and www.mtroyal.ca/AboutMountRoyal/TransportationParking/ParkingMaps/index.htm.

Thank you for your interest—we look forward to seeing you there! □

Rock 'n' Fossil Road Show October 18

The Fall 2014 Rock 'n' Fossil Road Show, led by the Geological Survey of Canada, will run October 18, 2014 from 11:00 A.M. to 3:00 P.M. at the Calgary Public Library's Thorn-Hill branch at 6617

Centre Street North. APS member **Dan Quinsey** will represent the APS. This free event, showcasing rocks and fossils, encourages members of the public to bring specimens in for identification by scientists and to view displays of Earth-science specimens and research topics. If you'd like to get involved at the APS table, contact Dan: dinodan@shaw.ca. □

Recent Donations by APS Members

By Howard Allen

Three APS members deserve our heartfelt thanks for donations they've made to the Society over the past several months.

A very substantial donation of books by **Bill McPheeters** back in November 2013 (see *Bulletin*, December 2013) resulted in eighty new additions to the APS library. The remainder of the books went into a silent auction at the May 2014 general meeting, raising \$86.00. There are still a number of books remaining, which will be sold at future events.

Founding member **Harvey Negrich** recently donated a number of older APS publications to the APS library, thereby filling in some gaps in our collection. Included were APS field trip guides, a Symposium workshop guidebook and Symposium abstracts volume. Thanks, Harvey!

Phil Benham, our former Programs Director and a long-time member, and his wife **Cindy Guan** are moving to Malaysia later this year to take on an assignment with Shell Oil. We of course wish Phil and Cindy all the best and look forward to hearing of their adventures, which hopefully will include some palaeontology!

During the inevitable pre-move housecleaning job, Phil understandably decided that some of his rocks and books would not be useful in Malaysia, so he donated a number of items to the APS. This included a box of rock and fossil material, five specimens of which were accessioned into the APS fossil collection; the balance will be used for giveaways at public events like the next CRLC show. Also included in the donation was a number of books and magazines, including older GSC publications, which we intend to offer to members at a future general meeting. Thanks a bunch, Phil, and happy days in the sunny south! □

2014 Field Trip Reviews

By Howard Allen

Field Trip 2014-1, July 5. *Palaeosols of the Horseshoe Canyon Formation, Drumheller, Alberta*

Our first field trip of the season took place in the Red Deer River valley. Our leader was Ph.D. student **Annie Quinney**, who studied palaeosols—ancient soil deposits—for her Master’s thesis at the University of Calgary (she is currently working on her Ph.D. at Monash University in Australia). The focus of our field trip, therefore, was the occurrence and identification of palaeosols, deposits that can be difficult to identify and interpret in the rock record. Palaeosols have become a valuable tool for interpreting environmental conditions that prevailed at the time these rocks were deposited. Many of the field trip attendees are geologists working in the energy industry, so we were able to geek-out over lots of excellent geology, which included sedimentary and structural geology and fossils.

We met at a Drumheller donut shop, then headed south to our first field trip stop near the hamlet of Dorothy, on the Red Deer River. The badlands here expose an anomalously thick deposit of bentonite, an altered volcanic ash. There are a number of benton-



Phil Benham provides scale for one of the awesome fossil tree stumps we found weathering out of the Horseshoe Canyon Formation. Photo by Howard Allen.

ite beds exposed in the Cretaceous rocks of the Red Deer River valley. Bentonites contain minerals that can be radiometrically dated, so they are valuable for



Trip leader Annie Quinney (far left, facing camera) describes the Dorothy Bentonite, an unusually thick deposit of volcanic ash in the Late Cretaceous Bearpaw Formation at Dorothy, Alberta, in the Red Deer River badlands. Photo by David Patmore.



Discussion with trip leader Annie Quinney at an excavated palaeosol at the base of “Coal 0” in the lower Horseshoe Canyon Formation, East Coulee. Photo by Jeff Davis.

constraining the absolute ages of rocks in the sedimentary strata. Most of these bentonite beds are tens of centimetres thick at most, but the the Dorothy Bentonite has a maximum thickness of 13.5 m!

Annie outlined a hypothesis (Lerbekmo, 2002) that the Dorothy Bentonite was the result of a plume of volcanic ash originating from a volcano in the Flathead area of southeastern BC. The plume of ash was blown northeast toward the Dorothy area, where ash particle properties and perhaps local atmospheric conditions caused the ash particles to coalesce rapidly and fall *en masse* into the Bearpaw Sea in a narrow area that was exposed millions of years later by the Red Deer River.

From Dorothy, we backtracked north to the village of East Coulee for our second stop. The rocks here record the transition between the marine shales of the Bearpaw Formation and the overlying Horseshoe Canyon Formation, a thick series of continental beds deposited in near-shore river and estuary channels, shoreface deposits, coal swamps, ponds, etc. Coal seams are used as stratigraphic markers over a wide area and are numbered from the bottom upward

(“Coal 0”, “Coal 1”, “Coal 2”, etc.). Some of these seams are thick enough that they were mined early in the last century by coal companies, and by a multitude of “mom-and-pop” operations. As a result, there are coal mining relics scattered all over the valley and we saw evidence of this in the form of weathering narrow-gauge rails and other rusting metal objects.

Our guide Annie excavated palaeosol horizons for us to examine, pointing out subtle but diagnostic features such as root traces, slickensides (polished shale surfaces) and particular greenish grey colours. A good place to look for palaeosols is beneath coal seams—which is logical, because coal is the remains of plants that would have been rooted in the underlying soil.

We spent some time exploring the general area and saw several well preserved fossil tree stumps that had weathered out of the Horseshoe Canyon Formation. This is—of course—also dinosaur country and we saw specimens of their bones weathering out of the rocks.

By time we’d had enough of East Coulee it was getting on to noon, so we repaired to the Willow Creek



Dr. Emily Bamforth poses with another big fossil stump, high above the village of East Coulee. Photo by Howard Allen.



Keith Mychaluk gives his interpretation of dinosaur bones found weathering out of a bed in the Horseshoe Canyon Formation. Photo by Jeff Davis.

Hoodoos, a well-known tourist magnet, where we enjoyed our bag lunches in the blazing sun.

Our final stop of the day was Horsethief Canyon, north of Drumheller, which exposes a broad expanse of badlands on the Red Deer River. A parking area and scenic viewpoint gives visitors a breathtaking panorama of badlands topography. We scrambled down into the canyon to examine another exposure, this one stratigraphically higher in the Horseshoe Canyon Formation. Again, Annie excavated a small section that allowed us to see and learn more features of palaeosols.

Palaeosols being a relatively new and unfamiliar topic to many



Keith shows off a dinosaur vertebra embedded in an ironstone nodule. Photo by Howard Allen.



Dinosaur vertebra (light brown) in cross-section, embedded in a dark brown ironstone nodule. Photo by Howard Allen.

of us (even the geologists), Annie was subjected to more than the usual amount of discussion—or interrogation as it may have seemed—as we tried to come to grips with this interesting topic. This field trip was eagerly anticipated by the geo-geeks and Annie's leadership more than met our expectations. We have Annie Quinney and field trip coordinator **Wayne Braunberger** to thank for a great day of learning and looking at rocks.

Reference

Lerbekmo, J.F. 2002. The Dorothy bentonite: an extraordinary case of secondary thickening in a late Campanian volcanic ash fall in central Alberta. *Canadian Journal of Earth Sciences*, vol. 39, p. 1745–1754.



Yahatinda panorama with Bighorn Falls. The grassy upland area is underlain by the recessive weathering Jurassic Fernie Formation which tends to become vegetated quickly, exposed only along rapidly eroding streambanks. Photo by Howard Allen.

Field Trip 2014-2, August 16.
Bighorn Creek/Yahatinda, Alberta

The second and final field trip of the summer was organized to examine Jurassic rocks and fossils at Bighorn Creek, on the Yahatinda Ranch, in the foothills of the Rocky Mountains.

The ranch is operated by Parks Canada for training and boarding horses used by the Parks warden service in the mountain national parks. It's a very



Eight decades of pent-up aggression is unleashed as Life Member Les Adler shows a rock who's boss. Photo by Howard Allen.

popular venue for equestrians, who camp nearby and ride throughout the area (www.pc.gc.ca/eng/pn-np/ab/banff/activ/cheval-horse/YaHaTinda.aspx).

Eleven participants met at the Mountaineer Lodge on the Forestry Trunk Road, west of Sundre. Leader **Wayne Braunberger** took us westward in a convoy some 23 km to our target. All day, rain clouds vied with the sun for control of the weather, which was a mixed blessing: the gravel roads were often damp enough to keep down the clouds of dust that typify summer driving in this region, but some people were caught in a soaking downpour at the end of the day.

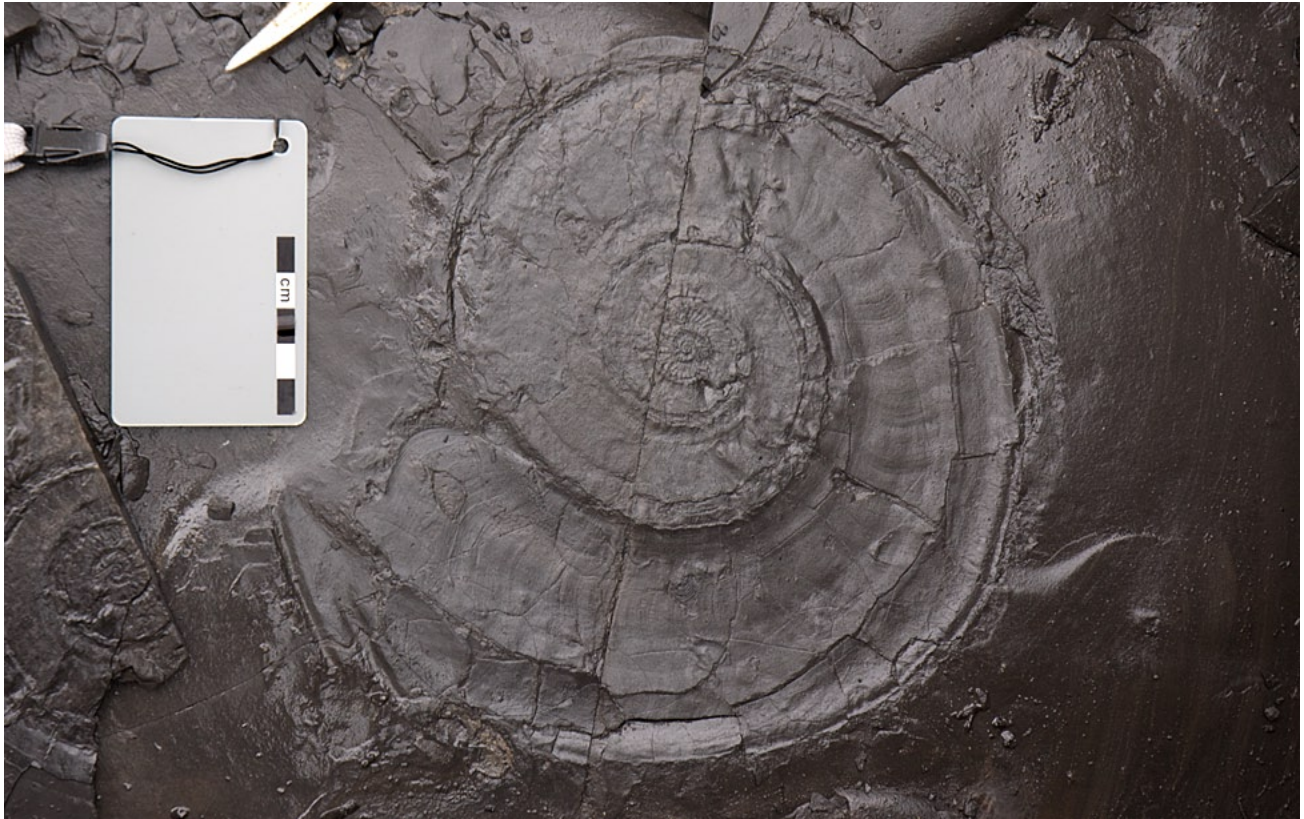
Thanks to plate tectonics and erosion, the road into the area crosses the McConnell Thrust fault and passes up-section through a whole stratigraphic col-



Nose to the outcrop is the only way you'll see fossils in the Fernie Formation. Photo by Howard Allen.

umn of formations from Middle Cambrian to Cretaceous. Most of the rocks are spectacularly exposed on the steep mountain slopes on either side of the road. Luckily (for geologists), they were cleared of obscuring vegetation by a relatively recent forest fire.

Our goal was to examine the Jurassic Fernie Formation, a marine unit comprising mainly black,



The biggest ammonite we saw all day, from the Red Deer Member of the Fernie Formation. Structural geologists won't be blamed for noticing a small amount of dextral strike-slip displacement along the large fracture in mid-image. Photo by Howard Allen.

organic shales that contain a rich invertebrate fauna, dominated by ammonites. The ammonites are invariably preserved as flattened impressions on the surfaces of shale slabs. Our group saw a good number of these, as well as a few belemnites—squid-like organisms—and small clams and scallops.

A sketchy horse trail allows convenient access to

the Jurassic shale beds exposed along Bighorn Creek. The trail offers fine views of the picturesque Bighorn Falls, dropping over a vertical exposure of Triassic siltstone beds of the Sulphur Mountain Formation.

The Jurassic rocks begin just above the falls, exposed in cutbanks of the creek. The creek was running higher than usual for this time of year due to recent rain. This hindered easy access to the more distant exposures along the creek, but we found plenty to interest us in the nearer exposures.

Those who are easily amused (such as the author) enjoyed searching the cobble bars of the creek, a glorious smorgasbord of geological specimens sampled from the surrounding region by ice-age glaciers and concentrated in the stream bed for our viewing pleasure.

Our group for the most part enjoyed a fine outing, despite the uncertain weather and a vehicular mishap, and we thank Wayne for arranging and leading the trip. □



Arnold Ingelson's young nephew was so excited about seeing the Red Deer Member of the Fernie Formation that he travelled all the way from California just to provide scale for this fine outcrop. Photo by David Patmore.



Pair of ammonites exposed on a slab of Red Deer Member (Fernie Formation) shale, Bighorn Creek. Photo by Howard Allen.

Fossils in the News

Thanks to Phil Benham, Georgia Hoffman and David Frishman for sending links—ed.

CBC News (online), August 14, 2014

New pterosaur species discovered at fossil colony in Brazil

More than 50 skeletons of large-crested Cretaceous pterosaur found in bonebed. www.cbc.ca/news/technology/new-pterosaur-species-discovered-at-fossil-colony-in-brazil-1.2736178. Open-access paper at www.plosone.org/ (search *Caiuajara*).

The Economist (online), August 30, 2014

Making an impression: An ancient jellyfish shows its muscles

Fossil of an Ediacaran jellyfish-like animal from Newfoundland preserves oldest-known muscle fibres. www.economist.com/node/21614094/. Open-access paper at rsps.royalsocietypublishing.org/ (search *Haootia*).

CBC News (online), July 7, 2014

Biggest flying bird ever gets identified from fossil

Oligocene seabird fossil, *Pelagornis*, found in South Carolina, had wingspan to 7.4 m. www.cbc.ca/news/technology/biggest-flying-bird-ever-gets-identified-from-fossil-1.2698978.

Science (online), August 5, 2014

First Venezuelan dino provides clues to dinosaur evolution

Laquintasaura venezuelae is the first dinosaur found in Venezuela. Small, dog-sized ornithischian of Early Jurassic age ate plants and maybe insects. news.sciencemag.org/ (search *Laquintasaura*).

BBC News (online), September 11, 2014

Spinosaurus fossil: "Giant swimming dinosaur" unearthed

New fossils from Morocco suggest the giant Cretaceous carnivore *Spinosaurus* was a swimmer. www.bbc.com/news/science-environment-29143096. □