Alberta Palæontological Society Bulletin

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THE SOCIETY WAS INCORPORATED IN 1986
as a non-profit organization formed to:

1. Promote the science of palaeontology through study and education.
2. Contribute to the science by: discovery; responsible collection; curation and display; education of the general public; preservation of palaeontological material for study and future generations.
3. Work with the professional and academic communities to aid in the preservation and understanding of 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

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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

Held in webinar format until further notice.

Friday, December 10, 2021—Taia Wyenberg-Henzler, University of Alberta.
Ontogenetic niche shifts in megaherbivorous dinosaurs of Late Cretaceous North America. (See Page 3.)

Friday, January 21, 2022—Scott Cocker, University of Alberta.
Canada's Maritime mastodons: New ecological insight from ~75,000 year-old dung. (See Page 5.)

Friday, February 18, 2021—Dr. Greg Funston, University of Edinburgh
and **Mark Powers,** University of Alberta.
Exceptional fossil discoveries from the Horseshoe Canyon Formation near Morrin, Alberta. (See Page 6).

COVID-19 has affected our operations. Watch the APS website for updates!
www.albertapaleo.org/meetings.html

ON THE COVER: Alberta fossils! Tabulate corals (*Thamnopora* sp.) and a few brachiopods in dolostone, Upper Devonian Grotto Member of the Southesk Formation, Loder Peak, Rocky Mountain Front Ranges, Alberta. Photo by Howard Allen.

Upcoming Events

December

Friday, December 10, 2021, 7:30 p.m.

WEBINAR—APS members will be notified by email how to register. Or visit **cspg.org**, navigate to ***Upcoming Events/Division E-talks/Palaeontology/*** and follow the instructions. **REGISTER EARLY! Registration ends at noon Thursday, December 9.** APS and CSPG members may register for free. Non-members will be charged $10.00. There are NO meetings at Mount Royal University until further notice.

Dr. Emily Bamforth

Royal Saskatchewan Museum

[*This 15-minute presentation will precede our main speaker,* ***Taia Wyenberg-Henzler****.*]

A rare sea turtle discovery in the marine Dinosaur Park Formation of Saskatchewan

Though relatively uncommon, sea turtles (Superfamily Chelonioidae + Family Protosetgidae + Toxochelys) are an intriguing component of western Canada's Cretaceous marine faunas. Studies of sea turtle diversity patterns within the Late Cretaceous Western Interior Sea suggest, for reasons possibly related to climate, that these animals strongly favoured southern portions of the Western Interior Sea, occurring much less frequently in Canada than in the United States.

In Saskatchewan, sea turtles are represented by just two occurrences of fragmentary material. The first, representing the northernmost occurrence of a sea turtle in North America, is from the Cenomanian Ashville Formation along the Manitoba Escarpment. The second occurrence is from the upper Campanian Bearpaw Formation of southwest Saskatchewan.

In 2016, the first occurrence of a chelonioid sea turtle from Saskatchewan's Dinosaur Park Formation was discovered in a marine bonebed deposit near the hamlet of Herschel. This specimen, RSM P3197.198, represents the largest and most diagnostic chelonioid specimen yet known from Saskatchewan.

When compared to the sparse record of coeval sea turtle diversity from Alberta, it also raises some interesting questions about sea turtle distribution and palaeoenvironmental preferences. The collection of additional specimens from marine sediments of the Dinosaur Park Formation in Saskatchewan may reveal important information on the diversity and palaeoecology of marine turtles in western Canada

Biography

Dr. Emily Bamforth is a vertebrate palaeontologist with the Royal Saskatchewan Museum (RSM), working out of the RSM's T. rex Discovery Centre in Eastend, SK. Dr. Bamforth's research in Eastend focuses mainly on palaeoecology, involving the study of fossil plants and animals, as well as sedimentology and palaeoclimatology, to understand ancient ecosystems. Dr. Bamforth received a B.Sc. in evolutionary biology from the University of Alberta in 2005, with an undergraduate thesis on 38 million-year-old fossil snake hibernacula from Wyoming. She went on to do a M.Sc. in Precambrian invertebrate palaeontology at Queens University with **Dr. Guy Narbonne**, exploring Ediacaran taphonomy and palaeoecology at Mistaken Point in Newfoundland. In 2008 she began her Ph.D. at McGill University with supervisor **Dr. Hans Larsson**, exploring pre-extinction biodiversity trends immediately prior to the K-Pg extinction in Saskatchewan. She earned her doctorate in 2014, the year she began working for the Royal Saskatchewan Museum. Dr. Bamforth has published numerous papers and conference abstracts of Ediacaran and Cretaceous palaeontology. She is the recipient of several academic, teaching and community engagement awards, including the Regina YWCA's 2019 Women of Distinction Award for Science.

Taia Wyenberg-Henzler

University of Alberta

Ontogenetic niche shifts in mega-herbivorous dinosaurs of Late Cretaceous North America

This presentation is based on research conducted by this author during their M.Sc. research into growth-related dietary changes in large-bodied herbivorous dinosaurs from the Late Cretaceous of North America.

Changes in diet during growth and development, called ontogenetic niche shifts (ONSs), are commonly observed in modern animals and were probably just as common in extinct animals. These changes can not only have important consequences for the number and types of ecological interactions between species but also within a species.

A brief overview of ontogenetic niche shifts, previous work on dinosaur community dynamics within the context of Late Cretaceous North America and a summary of the author's research will be presented.

Communities from the Late Cretaceous of North America comprised a variety of dinosaurs including a wide array of >1000 kg herbivores (megaherbivores) including the club-tailed ankylosaurs, "horned" ceratopsids and "duck-billed" hadrosaurids. At least one member of each of these groups is present throughout the entirety of the Late Cretaceous in North America which at the time was divided in two by a large seaway extending from Mexico up through to Alaska. It is the western half of the continent, referred to as Laramidia by palaeontologists, where most dinosaur remains have been recovered. Laramidia is estimated to have been no larger than 7.7 million square km and yet was home to numerous species of megaherbivores that were abundant across the landscape—some species living in herds of comparable size to those observed in modern Africa. Many researchers have wondered how it was possible for so many large megaherbivores to occupy a landmass smaller than Africa, especially given that modern mammalian communities, such as those in Africa, are home to a narrower array of herbivores despite there being more area for them to inhabit.

Work on one of the Late Cretaceous communities, the Campanian Dinosaur Park Formation (~77.0 – 75.5 Ma) of Alberta has indicated that the answer to this quandary may be related to resource partitioning wherein different groups consumed different plants to reduce competition for food. However, this research focused on adult specimens and did not consider the influence smaller dinosaurs (*e.g.* juvenile megaherbivores) played in Late Cretaceous ecosystems. Given that many modern animals that undergo a large change in body size during growth can occupy different roles in an ecosystem throughout their life, undergoing what is known as an ontogenetic niche shift (ONS), it is important to consider how different growth stages of the same species may have fit into our understanding of the ecosystem.

Body mass and histologic growth data collected from specimens from various growth stages and various dinosaur species (including some hadrosaurids), indicate that even dinosaurs with adult body masses of >1000 kg began life weighing no more than a few kg and took several years to approach adult body sizes. This has led several researchers to believe that dinosaurs also underwent ONSs. Despite ONSs being proposed in a variety of dinosaur groups, there is little to no research specifically investigating what ONSs would have looked like in most dinosaur taxa. Here I will be presenting some of the work from my MSc research which focused on characterizing ONSs in hadrosaurids and ceratopsids from Late Cretaceous North America using morphological measurements of the skull, known in modern animals to reflect feeding ecology (*e.g.* diet, feeding behaviour, feeding height) and dental microwear analysis.

Of the variables considered, several changes in the morphology of the skull suggest that megaherbivores selectively fed on low-growing, soft vegetation as juveniles and gradually incorporated tougher, higher growing vegetation as they matured. Support for ONSs in megaherbivores further lends credence to the theory that ONSs were common amongst the Dinosauria and research investigating the potential for and characterizing such shifts in other dinosaur taxa should be undertaken. Such shifts in niche occupation with growth would have important implications not only for our understanding of dinosaur life history but also for the structuring and assembly of dinosaur ecosystems, as juvenile dinosaurs could have been important competitors for smaller dinosaur species.

Biography

Taia has been interested in dinosaurs and made it her mission to study them since the age of two. She is Calgary-raised with a B.Sc. in geology from Mount Royal University. There she was first introduced to dinosaur ecology during a summer job that quickly morphed into a full-fledged research project investigating potential changes in sea level and how these changes in sea level impacted dinosaur community assemblages within the Dinosaur Park Formation in Dinosaur Provincial Park. After graduating in 2018, she began her M.Sc. at Carleton University under the supervision of **Dr. Jordan Mallon** (Canadian Museum of Nature) and **Dr. Tim Patterson** (Carleton University) studying the ecological implications of growth in hadrosaurids and ceratopsids from Late Cretaceous North America. After successfully defending her thesis in June 2020 she moved to Edmonton to pursue a Ph.D. at the University of Alberta under the supervision of **Dr. Corwin Sullivan**. Her Ph.D. research is centred around characterizing feeding behaviour in the large carnivorous dinosaur clade Tyrannosauridae (e.g. *Tyrannosaurus rex*) in greater detail using dental microwear and bite mark analyses.

January

Friday, January 21, 2022, 7:30 P.M.

WEBINAR—APS members will be notified by email how to register. Or visit **cspg.org**, navigate to ***Upcoming Events/Division E-talks/Palaeontology/*** and follow the instructions. **REGISTER EARLY! Registration ends at noon Thursday, January 20.** APS and CSPG members may register for free. Non-members will be charged $10.00. There are NO meetings at Mount Royal University until further notice.

Georgia L. Hoffman

Alberta Palaeontological Society

Fossil aroid leaves from the late Paleocene Paskapoo Formation

[*This 15-minute presentation will precede our main speaker,* ***Scott Cocker****.*]

Fossil leaves like those of the extant aroid *Lysichiton* (skunk cabbage or swamp lanterns) have been identified from the Paskapoo Formation (late Paleocene, ca. 60 Ma). The geologic setting and associated fossils indicate that, like *Lysichiton*, which grows in British Columbia today, the plants that produced these leaves lived in a permanently wet area at the margin of a floodplain lake. This talk will describe the geologic setting, the leaves, and the associated flowers and seeds, as well as the process of identifying them.

Biography

Georgia Hoffman received her Bachelor's degree in geology from the University of Pennsylvania in 1970 and then came to western Canada where she has worked in exploration, primarily for coal and oil sands. She became interested in plant fossils while working in the coal industry. In 1995, she earned an M.Sc. from the University of Alberta for her work on a late Paleocene fossil flora from the Paskapoo Formation.

www.albertapaleo.org

Scott Cocker

University of Alberta

Canada's Maritime mastodons: New ecological insight from ~75,000 year-old dung

Representing two of the last known mastodons to roam the Canadian Maritimes, a 22-year-old adult and 6-year-old juvenile recovered from the Milford Gypsum Quarry provide unique ecological insight into Nova Scotia ~75,000 years ago. In addition to mastodon skeletons, turtles, frogs, insects and dung were also recovered from the site.

Analysis of dung associated with the juvenile skeleton provided dietary and environmental reconstructions due to preservation of a diverse assemblage of pollen, non-pollen palynomorphs, plant macrofossils, and macroinvertebrates.

The dung contents indicated that the mastodons lived in a spruce-dominated mixed coniferous-deciduous forest interspersed with wetlands. When we think of what dung represents, we may assume that the contents reflect only what was purposefully consumed, which is particularly true for modern day humans. However, in the case of our mastodon, an apparently messy eater, it is the accidental portion of material consumed that provides the most unique insight into Nova Scotia ~75,000 years ago. Freshwater sponges, beetles, and algae were among some of the most unexpected finds. This talk will cover a brief history of the East Milford mastodons, herpetological remains also recovered from the site and finally, the results of our multiproxy analysis of the exceptionally preserved dung.

Biography

Scott Cocker (he/him) is a PhD student in the Permafrost Archives Science Laboratory at the University of Alberta. Scott received a B.Sc. in Geology and Physical Geography from the University of Edinburgh in 2014, with an undergraduate thesis on late glacial beetle fossils from north England. He then moved to Canada to complete a M.Sc. in Quaternary Palynology at Brock University with **Dr. Michael Pisaric**, developing new proxies for reconstructing the presence of megafauna from lake sediments in central Yukon Territory. In 2020 Scott moved to the University of Alberta to complete his Ph.D. under the supervision of **Dr. Duane Froese**. Scott's current research applies new techniques in the

field of ancient DNA to understand the factors that drove the collapse of the mammoth steppe ecosystem ~13,000 years ago. This research makes use of the exceptional preservation of organic material from permafrost in Yukon Territory and Alaska. Scott has been awarded several scholarships to support his research at both Brock University and the University of Alberta in addition to recognition of his community service as a co-founder of Scientific QUEERies, a seminar series dedicated to highlighting the work and experiences of LGBTQ2S+ individuals in STEM.

February

Friday, February 18, 2022, 7:30 P.M.

WEBINAR—APS members will be notified by email how to register. Or visit **cspg.org**, navigate to ***Upcoming Events/Division E-talks/Palaeontology/*** and follow the instructions. **REGISTER EARLY! Registration ends at noon Thursday, February 17.** APS and CSPG members may register for free. Non-members will be charged $10.00. There are NO meetings at Mount Royal University until further notice.

Dr. Greg Funston and **Mark Powers**
University of Edinburgh University of Alberta

Exceptional fossil discoveries from the Horseshoe Canyon Formation near Morrin, Alberta

The Horseshoe Canyon Formation exposed along the Red Deer River valley is one of the richest fossil deposits in the world. One stretch of badlands, spanning from east of Drumheller, north to Dry Island Buffalo Jump Provincial Park, has produced some of the most complete dinosaur skeletons known, alongside widespread fossil-dense bonebeds. Nonetheless, this area is sometimes overshadowed by the overwhelming abundance of fossil discoveries in Dinosaur Provincial Park to the southeast.

In recent years a number of reinvigorated surveying efforts, most notably those of the University of Alberta, have focused on the Morrin Bridge area, which has led to many incredible finds. One of the key sites excavated by the student-led crew from the University of Alberta was a rich microsite full of normally rare troödontid teeth, the only eggshell known from the Horseshoe Canyon Formation, and several embryonic dinosaur bones.

One of the most surprising discoveries at this site was a small foot claw (1 cm in length) of an embryonic tyrannosaurid—the largest terrestrial carnivores of all time. In studying this claw and a lower jawbone from Montana, speakers Mark and Greg were able to describe the first ever embryonic tyrannosaur bones, opening a new window into the early lives of tyrannosaurs.

Other discoveries around Morrin include the first high-fidelity hadrosaur trackway from the Horseshoe Canyon Formation, an associated tyrannosaur skeleton, and a juvenile *Edmontosaurus regalis* skeleton in a resting position. The latter is a small individual, in a size category not well represented among *Edmontosaurus* bonebeds or known skeletons. This discovery helps to fill in a gap in our knowledge of hadrosaur ontogeny, which has implications for the diversity of Late Cretaceous ecosystems and the uniformity of their faunas across ancient North America. The juvenile skeleton is also in a position rarely observed for dinosaurs in Alberta—a crouched, belly-down position rather than lying on its side in the class "death pose." Its unusual position, and the characteristics of the rocks in which it is preserved (river channel deposit) suggest it was mired and buried rapidly. An abundance of coal surrounding the feet of the specimen supports this hypothesis.

Together, these discoveries in the Morrin Bridge area have a major impact on our understanding of the Horseshoe Canyon Formation and its ecosystem, with broader implications for dinosaur palaeobiology, ecology, and behaviour. This highlights the importance of exploring this area: each year, new sites providing a wealth of information are discovered, supporting ongoing research, and providing a steady stream of fantastic fossils.

Biographies

Mark Powers is a Ph.D. student at the University of Alberta specializing in evolution and systematics. He was born in Calgary and grew up in Eckville, Alberta. Passion for palaeontology came from conquering his fear of dinosaurs after his mother took him to see Jurassic Park in theatres at the tender age of two. Despite a general interest in animals, he has always been infatuated with dinosaurs. His interests focus on predator-prey relationships with an inkling toward predators. He completed his undergrad, specialization in palaeontology, with distinction at University of Alberta and started a master's in 2017 with **Dr. Philip Currie**, studying the snouts of dromaeosaurid "raptor" dinosaurs and their biogeographi-

cal significance. He finished his master's degree in the summer of 2020 and began a Ph.D. with **Dr. Michael Caldwell** in the fall of that year. He is currently studying Cenozoic snake evolution, radiations and dispersal, focusing on the large-bodied and widespread madtsoiids.

Greg Funston is a Canadian palaeontologist working as a Royal Society Newton International Fellow at the University of Edinburgh. His research interests lie in the way that animals grew and how ecosystems evolved over millions of years. Following his lifelong dream to be a palaeontologist, he completed his Ph.D. at the University of Alberta in Edmonton, focusing on the anatomy and evolution of toothless dinosaurs. This took him across the world, from the badlands of Alberta, to the Gobi Desert of Mongolia. He has now transitioned to research on fossil mammals, with a focus on their growth and development.

Program Summary

November

Cory Gross

Alberta Palaeontological Society

Telling Calgary's prehiSTORY: Behind the 2021 Historian in Residence exhibit

Friday, November 19, 2021, 7:30 P.M.
Presented online in webinar format

[*This 15-minute presentation preceded our main speaker,* ***Dr. Jon Noad****.*]

Cory Gross, 2021 Calgary Public Library and Heritage Calgary Historian in Residence, shared behind-the-scenes stories about the creation of the *Calgary's prehiSTORY* exhibit at Calgary's Central Library. See **Vaclav Marsovsky**'s review of the exhibit in this *Bulletin*.

Biography

Cory Gross is a professional educator with 20 years of experience in the field of museums and heritage. He studied geology at Mount Royal University and from there transferred into the Museum and Heritage Studies program at the University of Calgary. Cory was awarded his Bachelor of Arts with Distinction in 2005. In 2010 he was awarded a Masters of Theological Studies from Lutheran Theological Seminary, Saskatoon. He has previously worked at the Glenbow Museum, Calgary Zoo, Fort Calgary, and Heritage Park, runs his own Earth science education company, Sandstone Prehistoric Safaris Calgary, and currently serves as President and Public Outreach Coordinator for the Alberta Palaeontological Society. Most recently, Cory was the 2021 Historian in Residence for the Calgary Public Library and Heritage Calgary.

Dr. Jon Noad

Professional Geologist and Consulting Palaeontologist

Extraordinary modes of fossil preservation

Friday, November 19, 2021, 7:45 P.M.
Presented online in webinar format

Only a tiny fraction of animals are preserved as fossils, with the most common mode being permineralization, where crystals grow in pore spaces within the hard parts of the animal. However, there are a variety of extraordinary modes of fossilization, which can be subdivided into five categories: fossils preserved in thin, fine grained, layered sediments; cemented fossils and those preserved in nodules; fossils encased in amber, tufa, tar and ice; peculiar forms of mineralization; and replacement of soft parts by metals such as pyrite and gold.

Examples provided range from famous fossil sites to little known examples from around the world. Common themes involved in exquisite preservation of ancient life include the importance of changes in relative sea level, early cementation and anoxic conditions. Several of the featured fossils are extraordinarily valuable either due to the forms of mineralization (gold, opal) or their uniqueness (*Archaeopteryx*, mummified Ice Age mammals and more). Our audience was astounded by the fossil treasures on display.

Biography

Jon has been working in mining, marine geology and latterly in oil and gas since 1998. After 20 years of hydrocarbon exploration and production he decided to set up his own consultancy—Sedimental Services—and now he runs field trips, teaches courses, logs core, manages site surveys as a qualified Professional Geologist and Consulting Palaeontologist of Alberta. He is happy to take on anything geological. ❑

Calgary's prehiSTORY exhibit

Article and photos by Vaclav Marsovsky

Age of Dinosaurs display with real fossils and scale models.

Display area overview, on the fourth floor of Calgary's new downtown Public Library.

It is not often that fossils are publicly exhibited in the City of Calgary. A new temporary public exhibit appeared this fall* on the fourth floor of the Public Library in downtown Calgary. The title and theme of this exhibit is—as you see it—"A Story of Calgary's Prehistory."

The focus is on the link between fossils and Calgary's history. The display includes fossils dating from the Cambrian to the Pleistocene. There are over fifty fossils on display; they come from the APS collection, the APS public outreach collection and from a few private collections.

APS President **Cory W. Gross** is the organizer and the author of the display. Cory is the 2021 Historian in Residence under the auspices of both the Calgary Public Library and Heritage Calgary. He is also an APS Life Member and our Director of Public Outreach.

As Cory puts it, "Over its history Calgary has been a tropical coral sea, a swampy coast teeming with dinosaurs, and a frigid glacial wasteland."

The display includes the fossils, scale models of various animals, identification labels and signage with explanations. A vertical diorama of a Devonian reef features prominently. The "Sandstone City and Life After Dinosaurs" display includes a number of fossil leaves in Paskapoo (Paleocene) sandstone and the story of the sandstone being used as a building stone in many parts of Calgary. One table is dedicat-

* The exhibit was due to close at the end of December; due to the timing of *Bulletin* publication, it may be gone by the time you read this.

"Sandstone City" display with plant fossils in Paskapoo Fm./Porcupine Hills Fm. sandstone, Calgary's iconic early building stone.

ed to Cretaceous fossils from dinosaurs, turtles and crocodiles; and marine fossils such as ammonites. Another table represents the Ice Age.

The display includes professionally printed and informative signage, age-appropriate to both children and adults.

The exhibit can be viewed whenever the library is open; there are no restrictions. The display will remain in place to at least the end of 2021. ❑

Marine fossils from the Late Cretaceous Bearpaw Formation which underlies much of southern Alberta, including Calgary.

Devonian reef diorama—a reconstructed portion of an Alberta stromatoporoid reef with some representative fossils.

Fossils in the News

Sponge-like fossils discovered in Northwest Territories may be evidence of oldest animal on Earth—Fossils found in 850 million-year-old rocks in northern Canada appear to be similar to structures seen in much more modern sponges. **https://nationalpost.com** [search "sponge-like fossils"]. ❑

Stanley Glacier, Kootenay National Park, BC

Review of Field Trip 2021-4, August 21

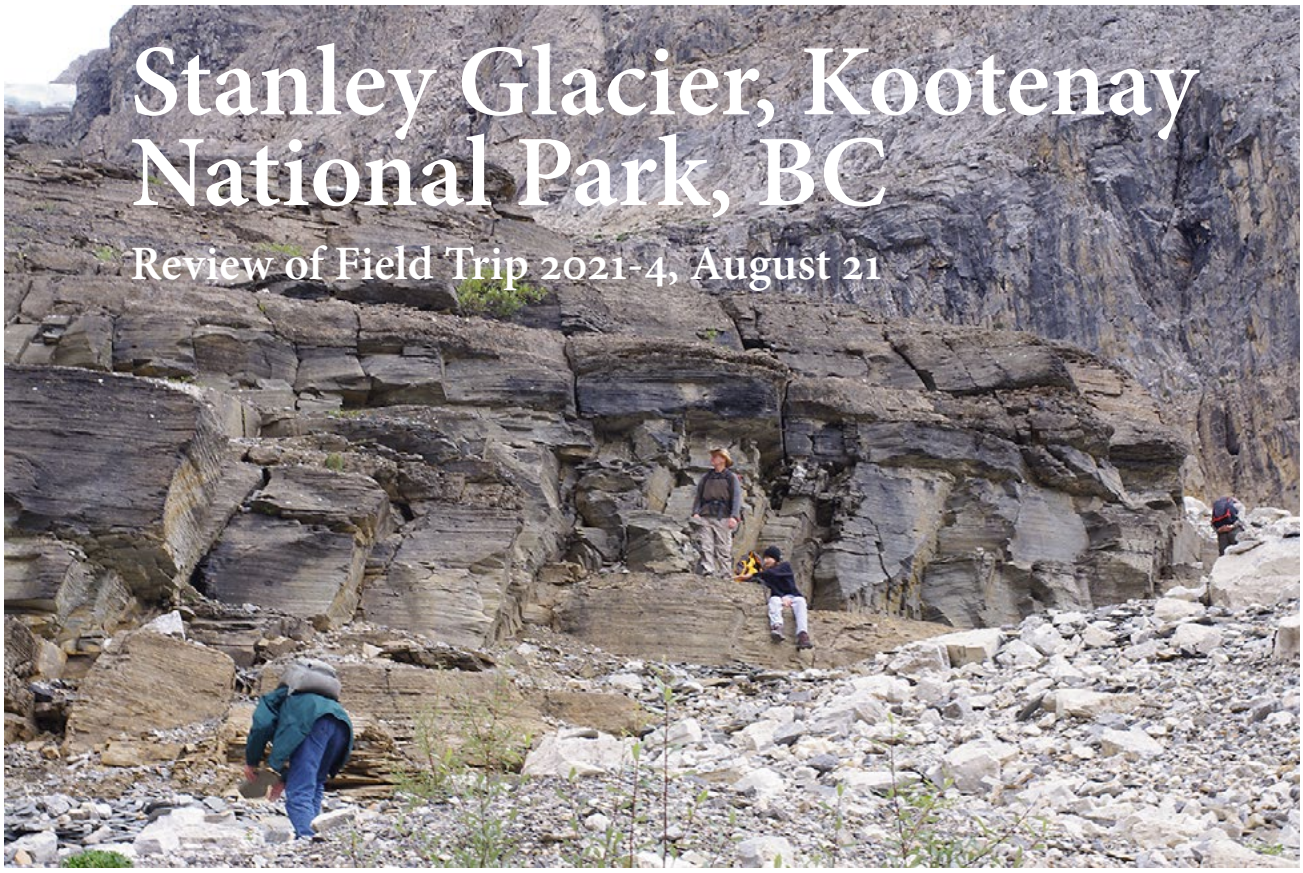


Figure 1. APS members examine an exposure of the Stephen Formation below Stanley Glacier. Photo by Vaclav Marsovsky.

By Vaclav Marsovsky

Thirteen APS members gathered in the parking lot for the Stanley Glacier hike on the morning of August 21. The trip was led by **Dr. Chad Morgan**, a recent Ph.D. graduate from the Geoscience department at the University of Calgary. Chad's Ph.D. research program included work on the Stanley Glacier fossil beds. His thesis, due to be publicly available this fall (2021) is titled *Quantitative trilobite biostratigraphy of the Middle Cambrian and microfacies analysis of the Middle Cambrian Stephen Formation* from the University of Calgary (**https://prism.ucalgary.ca/handle/1880/113644**).

He and **Keith Mychaluk** put together a wonderful field trip guide complete with photos of fossils likely to be found which were very useful as an identification key—in addition to simply asking Chad.

Before we started the hike, Chad unrolled his massive geological maps on the asphalt pavement to explain the geological context, the history of the Cordillera and the formations.

The day was cool and the sky overcast, which was good for us as the hike has considerable vertical gain.

It took 3.5 hrs to reach our lunch spot, a good place to rest, with a beautiful view of the glacier-carved hanging valley. Surprisingly, the air was clear that day. It had been obscured by smoke from forest fires coming in from British Columbia for most of the summer. But we were lucky.

During the hike up the trail, we made many information stops. Most memorable for me was the discussion about the formations we were looking at on the mountain across the valley, Mt. Whymper. These same formations repeat themselves along the trail as we ascended the slope below Stanley Peak, but are easier to see across the valley.

The other memorable stop was a botanical stop. At a point about half way up, the trail transitions from a spruce/pine/fir forest across a narrow band of alpine tundra to an unvegetated boulder field. In this alpine tundra, the ground is covered by a plant called the mountain avens (Figure 2). This is a dwarf shrub, an angiosperm, which flowers in July during the few frost-free days each year. The flowers were long gone by August 21 but the leaves were still green. The plant is known scientifically as *Dryas octopetala*. This plant

Figure 2. White mountain avens, *Dryas octopetala*, blooming in late June. Photo by Howard Allen.

is the indicator genus for the Younger Dryas climate reversal, a return to glacial conditions around 12,900 to 11,700 years ago. This plant was identified by its pollen in lake sediments in Scandinavia which was then used for naming the climate cycle. The lake sediments showed a transition from a warmer and more humid forest to dry, cooler tundra. Everyone should read-up about the Younger Dryas, about how quickly it came on and left, the theories about what caused it and the extreme cooling. Some research indicates that the Younger Dryas was a phenomenon of the northern hemisphere only, while the southern hemisphere didn't experience the same cooling. Yes, climate change can be complex.

Now back to Cambrian fossils. The fossils we came to see occur in the Middle Cambrian, Stephen Formation, approximately 505 million years old. The sea would not have been very deep, the animals lived within a depth where sunlight reached the bottom. The exposure (Figure 1) is limited in size here, unlike the similar Burgess Shale locality in Yoho National Park. Few fossils can still be seen in the bedrock, but mostly we found them in the talus slope below the outcrop (Figure 5).

Figure 3. *Sidneyia inexpectans*, a large arthropod, part and counterpart. Photo by Vaclav Marsovsky.

Figure 4. Sponge spicules (arrows) on a slab of Stephen Fm. rock. Photo by Keith Mychaluk.

Just like in the Burgess Shale in Yoho National Park to the northwest, soft body part preservation is found here at Stanley Glacier. The fossils are usually preserved as black or brown stains and you have to be lucky that the rock fractures on a plane where the fossil occurs. The trilobites are preserved with some surface texture, the benefit of having hard body parts. Most of the fossils that we found were quite small, only a couple centimetres across, but there were a few giants also. The largest fossil we found on that day was *Sidneyia inexpectans* (Figure 3), thought to be an arthropod with appendages and antennae which was about 15 cm across. (See photo included with this article). Most of the fossils we found were trilobites (Figure 6), perhaps because they were the

Figure 5. Looking for fossils in the talus below the Stephen Formation outcrop. Photo by Vaclav Marsovsky.

most abundant animal living here in the Cambrian sea or because they were the most likely to become fossilized with their hard body parts. Second most

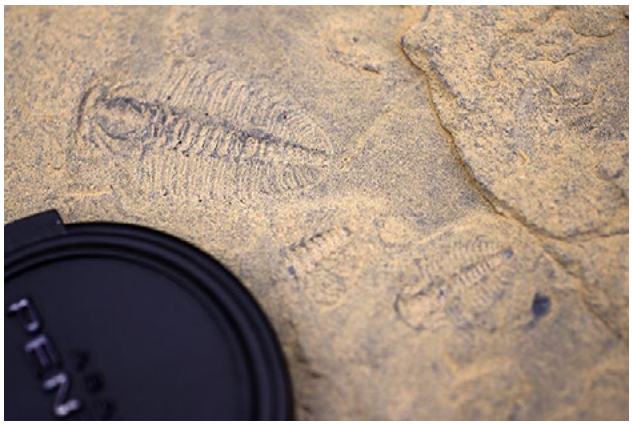


Figure 6. Trilobites, *Bathyuriscus rotundatus*. Photo by Vaclav Marsovsky.

common, perhaps, were sponge spicules (Figure 4), made of silica, also a hard body part. They are found as individual spicules, which collectively would have comprised a network forming the wall of a cone-shaped Cambrian sponge.

In addition to the fossils discussed above we found trace fossils (burrows), worms and several different orders of trilobites.

The Royal Ontario Museum (ROM), under **Dr. Jean-Bernard Caron**, have also collected from the Stanley Glacier fossil beds. Their group has since moved over to the Marble Canyon locality.

Dr. Caron's article, *New Burgess Shale–type assemblage from the "thin" Stephen Formation of the southern Canadian Rockies* was published in 2010 in Geological Society of America journal and can be downloaded for free from: **https://www.researchgate.net/publication/228535120_A_new_Burgess_Shale-type_assemblage_from_the_thin_Stephen_Formation_of_the_Southern_Canadian_Rockies**

A website with information on all the Burgess Shale fauna, including 3D illustrations of what these animals may have looked like in life, has been published by the ROM: **https://burgess-shale.rom.on.ca/en/fossil-gallery/list-species.php**. ❑

Alberta Palaeontological Society

Paleo 2022

25th Annual Symposium

Saturday, March 19, 2022, 9:00 A.M. to 4:00 P.M.

This year, for the first time, the annual Alberta Palaeontological Society Symposium will be held in a virtual format. The 2020 and 2021 Annual Symposia, to have taken place at Mount Royal University, were cancelled due to the COVID-19 pandemic. Although the COVID situation will again preclude an in-person event, the Society felt it was important to host a meeting in 2022. The meeting will be held on one day only, Saturday March 19, 2022.

Paleo 2022 is presented in conjunction with the **Canadian Society of Petroleum Geologists**, Palaeontological Division.

To register for Paleo 2022, please email your registration request to: **symposium@albertapaleo.org**. State that you will be attending the Paleo 2022 On-line Symposium. There is no charge for participating. The symposium is open to the public, to any person of any age, to APS members or non-APS members as long as you register. **The deadline for registration is March 16, 2022**.

Questions?

If you require more information or have questions about the Symposium, send your question via email to: **symposium@albertapaleo.org**

You will be sent a link to join Paleo 2022 in advance of the Symposium.

Six presenters will give talks at 9:00, 10:00 and 11:00 A.M.; 1:00, 2:00 and 3:00 P.M. Each presentation will be 30 minutes in length followed by a 15-minute question-and-answer period. We will have a 15-minute break before starting the next session. The order of the speakers will be determined in January and made available to participants.

Also, updates will be provided on our website: **www.albertapaleo.org/meetings.html**.

Featured speakers

Dr. Grant Zazula, Yukon Palaeontology Program: ***The life of Zhùr: a mummified Pleistocene wolf pup from the Yukon permafrost.***

Dr. Robert MacNaughton, Geological Survey of Canada: ***Using new fossil data to solve old stratigraphic problems around the Ediacaran-Cambrian boundary, Mackenzie Mountains, Northwest Territories.***

Dr. Caleb Brown, Royal Tyrrell Museum of Palaeontology: ***Tyrannosaur intraspecific behaviour.***

Dr. Ryan McKellar, Royal Saskatchewan Museum: ***Sources of Canadian Cretaceous and Paleocene amber in the Prairie Provinces.***

Dr. John-Paul Zonneveld, University of Alberta: ***Thriving in chaos: Development and proliferation of coral reefs in a tectonically active, high sedimentation setting***.

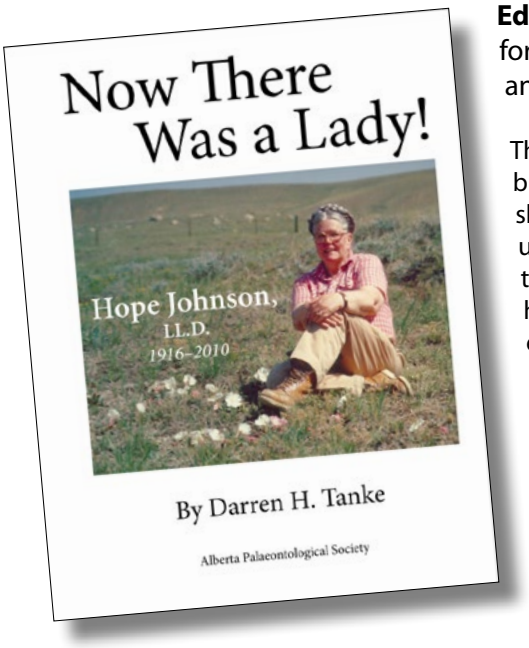
Darren Tanke, Royal Tyrrell Museum of Palaeontology: ***Successful efforts to relocate lost 100+ year old dinosaur quarries in the badlands of southern Alberta.***

We hope to see you at Paleo 2022!

Now There Was a Lady!

Hope Johnson, LL.D. 1916–2010

By Darren H. Tanke



Edited and published by the Alberta Palaeontological Society with forewords by palaeontologist Dr. Philip J. Currie, artist Allan C.J. Jensen and geologist, museologist, naturalist and writer, David A.E. Spalding.

The 2010 passing of Hope Johnson marked the end of an era for Alberta's vertebrate palaeontology communities. Her death affected other disciplines, too, as she travelled in many circles within the province for 65 years. How many among us can truly say they never knew her personally, saw her art work, or learned to identify Alberta prairie plants, or Late Cretaceous bones and teeth through her fossil identification books? During much of her middle and later life, and especially during the late 1950s to 1980s, Hope was a well-known and respected powerhouse in the Albertan amateur and professional vertebrate palaeontological communities. She was also heavily involved in the naturalist and visual arts communities as well as charitable organizations. This book focuses on her extensive activities in Alberta vertebrate palaeontology and provides examples of some of her fossil and botanical drawings and paintings.

Coil bound, 283 pages; extensively illustrated in black and white, with 30-page colour section showcasing Hope Johnson's art. Includes index.
ISBN 978-0-9811101-1-0

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