ROM

Friends of Palaeontology

Issue 1, Fall 2021

Message from the Chair

First of all, thank you very much for your membership. We could not support ROM curatorial or explore the wide world of palaeontology without you. Since the group's renaissance in 2020, we've heard your feedback, explored the online sphere and been regaled by experts in the field via the power of remote technology.

In 2021 and thanks to your generous support, we were also able to help support the launch of the Dawn of Life Gallery. First with funding for an acquisition in the Vertebrate Collection and with financial and in-kind donations for the Invertebrate Collection.

The rest of the year is jam-packed with more field expert talks, volunteer opportunities and, of course, interaction with the community. All is outlined in this, our inaugural issue. We hope you enjoy it.

Thank you,

Marlowe Andreyko

Chair of the Friends of Palaeontology

Figure 1 Burgessochaeta setigara from the Burgess Shale B.C. © Royal Ontario Museum, 2007.

Dawn of Life Gallery

Update from ROM Department of Palaeontology

The Dawn of Life team is hard at work preparing for the opening of this much anticipated new permanent gallery. Behind the scenes, the ROM is in the final stages of mount-making and documentation for more than 1,000 fossil specimens, models and artifacts that will be on display in this gallery. In August, the first major stage of construction in the Willner Madge Gallery, Dawn of Life (the former Bronfman Hall) wraps up. The initial set of display cases are set to be delivered from Scotland in mid-September, with arrival and installation of the remaining display cases soon after. And then, of course, all the specimens get installed. It will be very exciting to finally see the culmination of all those years of hard work finally come to fruition!

Over the past few months, a number of talented artists, many of whom call Ontario home, have created dozens of original pieces for the gallery – everything from individual organism reconstructions to large immersive murals. The amount of brand-new palaeoart that will be on display in this gallery will perhaps be one of its most surprising features. Filming for the Dawn of Life's video features is currently underway, with ROM staff practicing all recommended health precautions while traveling to and working onsite at several of Canada's fossil-focused UNESCO World Heritage Sites. These are just a few of the recent highlights for this busy team as opening day draws closer.

We look forward to welcoming everyone into the hall beginning December 4th this year!

FOP supports the Dawn of Life Gallery

Acquisition of late Cretaceous mammal jaws for the Gallery

Part of the story of how our meek early relatives survived the K-Pg lies in our excellent teeth, brought forward by our clade in **Didelphodon** and related animals. Thanks to your support, they will now be part of the Dawn of Life Gallery.

Upcoming: Support for Burgess Shale website for Dawn of Life

The importance of the Cambrian Explosion to history of life on Earth cannot be overstated. To benefit in visualizing these oft alien-looking creatures, we have given financial support and will aid in data transfer for the website refresh.

Collection highlights

Every issue, we put a spotlight on submissions from members and from the curators. If you are interested in providing a submission for the next issue, feel free to email us at fop@rom.on.ca.

Onychonycteri

Member submission by Gerald Pollack, secretary of Friends of Palaeontology.

Bats are characterized by two special abilities: flight and echolocation. A long-standing question is how these arose during evolution: flight first followed by echolocation? Echolocation first then flight? Or both together?

The skeleton of **Onychonycteris finneyi**, a cast of which is in the Green River Formation case, provides evidence that primitive bats could fly but not echolocate. At about 50 million years old, it is among the earliest bat fossils known.

Several features, besides its age, show that it was indeed primitive. The proportions of the bones in its limbs are unlike those of modern bats but similar to those of modern climbing mammals, and unlike modern bats, which have retained claws on only one or two of the fingers, **Onychonycteris** has claws on all five. It thus probably spent much of its life climbing trees. But its long finger bones, which support the membranous wings, it's breastbone, and other skeletal features show that it could fly, although probably not as well as modern bats.

Figure 2 Skeleton of Onchonycteris finneyi. © Royal Ontario Museum. Gift of the Louise Hawley Stone Charitable Trust.

What about echolocation? CT scans of its skull show that it lacked specializations for both hearing and vocalization that are associated with echolocation. So, this important fossil provides evidence that flight came first, and echolocation evolved later.

Collection highlights continued

Anomalocaris

Submitted by Jean Bernard Caron, Richard M. Ivey Curator of Invertebrate Palaeontology

Anomalocaris was an arthropod. That means it was a very distant relative of today's spiders, insects, shrimp, and lobster. It had two eyes on its head that bulged at the end of stalks on either side of its face. Its head also featured two barbed limbs in front of its mouth. Along its length, on each side of the body, there were a series of overlapping flaps. These flaps likely undulated in a wave-like motion, helping to make it a strong swimmer. This combination of size, excellent vision, speed, and those spiky front limbs made Anomalocaris a formidable predator. It had a round mouth with 32 overlapping plates. The plates formed a circle and had sharp structures that pointed inside the mouth like teeth. With this toothy mouth Anomalocaris could have snatched trilobites with its sharp claws and crushed them into its mouth. Trawling the seas, it also may have stirred up mud with those front limbs and mashed mushy meals like worms.

This is a very special specimen. ROM Curator Jean-Bernard Caron calls it the "Mona Lisa" of the ROM's Burgess Shale collection. It's the most complete specimen of Anomalocaris known to date. Although it died out millions of years ago, the fascination with this strange shrimp of Canada continues.

Figure 3: Anomalocaris specimen preserved on two separate shale pieces in mirror image © Royal Ontario Museum, 2013.

In the News

Evidence for nocturnal predatory dinosaurs

Two papers in Science provide evidence, based on inner-ear structure and eye morphology, that some therapods used highly sensitive sight/hearing to hunt at night.

Nocturnal hunters

Support for a theory about the origin of eukaryotic cells

Eukaryotic cells have internal membrane-bound compartments that enclose various functions, such as a nucleus, where DNA is housed, and mitochondria, which are responsible for generating energy. A recent proposal that eukaryotic cells arose from primitive ancestors that surrounded bacteria — which evolved to become mitochondria — with extensions of their membrane has received support from the discovery of archaons, among the most primitive of life forms, with numerous extensions.

Evolution of eurkaryotes

Why are there so few mid-sized meat-eating dinosaurs?

Dino communities with large meat eaters have relatively few species and, lacked mid-sized dinos. Statistical analyses suggest that this is because the mid-sized niche is occupied by immature individuals of the same species, crowding out competitors.

Teenage dinos shape ecosystem

Canadian Arctic fossils may be the oldest animal ever found; study suggests.

Ontario researcher thinks 890-million-year-old fossils may be ancient relatives of sponges.

CBC article

Nature article

Dinosaur senescence: a hadrosauroid with age-related diseases brings a new perspective of “old” dinosaurs

Non-traumatic, non-contagious evidence of extensive bone pathology in the Late Cretaceous hadrosauriform Gobihadros mongoliensis are correlated with advanced age and may give new insight into the oft ignored and rare occurrence of senescent dinosaurs.

Article in Nature

Palaeontoethics: A new concept about old issues in the Earth sciences

“Surprisingly, our literature search indicates that a generally accepted and precise definition of ethics in palaeontology as a concept is missing... The term palaeontoethics proposes a clear, precise and unambiguous definition of what ethics in palaeontology means, in line and consistent with the definition of geoethics, which will ultimately benefit research, practice and education in palaeontology”.

Article from Springer Nature

Fungus may have invaded the land in the Ediacaran

Evidence in pyritized fungus-like microfossils preserved in the basal Ediacaran Doushantuo Formation of China (~635 Ma) may be first good evidence of fungus invading the land.

Article in Nature Communications

How much trouble did Boltysh, the Chicxulub crater’s little brother, cause in a post K-Pg world?

Theories range from implicating to exonerating this smaller Ukrainian impact in the mass extinctions around the beginning of the Cenozoic.

Article on Science Mag website

Smithsonian Magazine’s top ten dinsosaur discoveries of 2020

Smithsonian top 10 top 10

Of interest at other institutions

American Museum of Natural History, New York City, USA

Official website

Scroll down to Fossil Halls

Canadian Museum of Nature, Ottawa, Canada

Official website

The Field Museum, Chicago, USA

The Field Museum

Houston Museum of Natural Science, Houston, USA

Official website

Coming up

Expert Talks

Testing trade-offs in the fossil record: Socio-sexual vs. natural selection in the evolution of duck-billed dinosaurs

Thomas Dudgeon, M.Sc., Ph.D. Student

Department of Ecology and Evolutionary Biology, University of Toronto

Date: Thursday November 18th, 2:00 PM

The Zoom link will be sent by email to all members.

Volunteer opportunity

Help with Burgess Shale website data transfer

Dr. Jean Bernard Caron will need our help transferring 135+ specimens to the refreshed Burgess Shale website. Work is scheduled to start as early as mid-September. This is content management work and requires a modicum of computer savvy. Training will be provided. Join the ranks of those that have already offered their services! Contact fop@rom.on.ca if interested.

Annual General Meeting

Date: Monday November 22nd 2:00 PM

The Zoom link will be sent by email and posted on DMV News and My Calendar.

About this publication

The Friends of Palaeontology newsletter is published once a year by the executive committee members of the group, to support and inform our members of upcoming events.

Executive

Chair: Marlowe Andreyko Secretary: Gerald Pollack

Join us or donate

Interested in exploring how the mysterious creatures of the past are being uncovered by the ROM? Friends of Palaeontology is a group within the ROM Department of Museum Volunteers (DMV) and is open for anyone to join. Please contact us at fop@rom.on.ca

Friends of Palaeontology
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Contact FOP: fop@rom.on.ca
Become a ROM member

Friends of Palaeontology is organized by the ROM's Department of Museum Volunteers to provide support for the Museum. ROM is an agency of the Government of Ontario.

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