CATALYST

DENVER MUSEUM OF NATURE & SCIENCE MAGAZINE

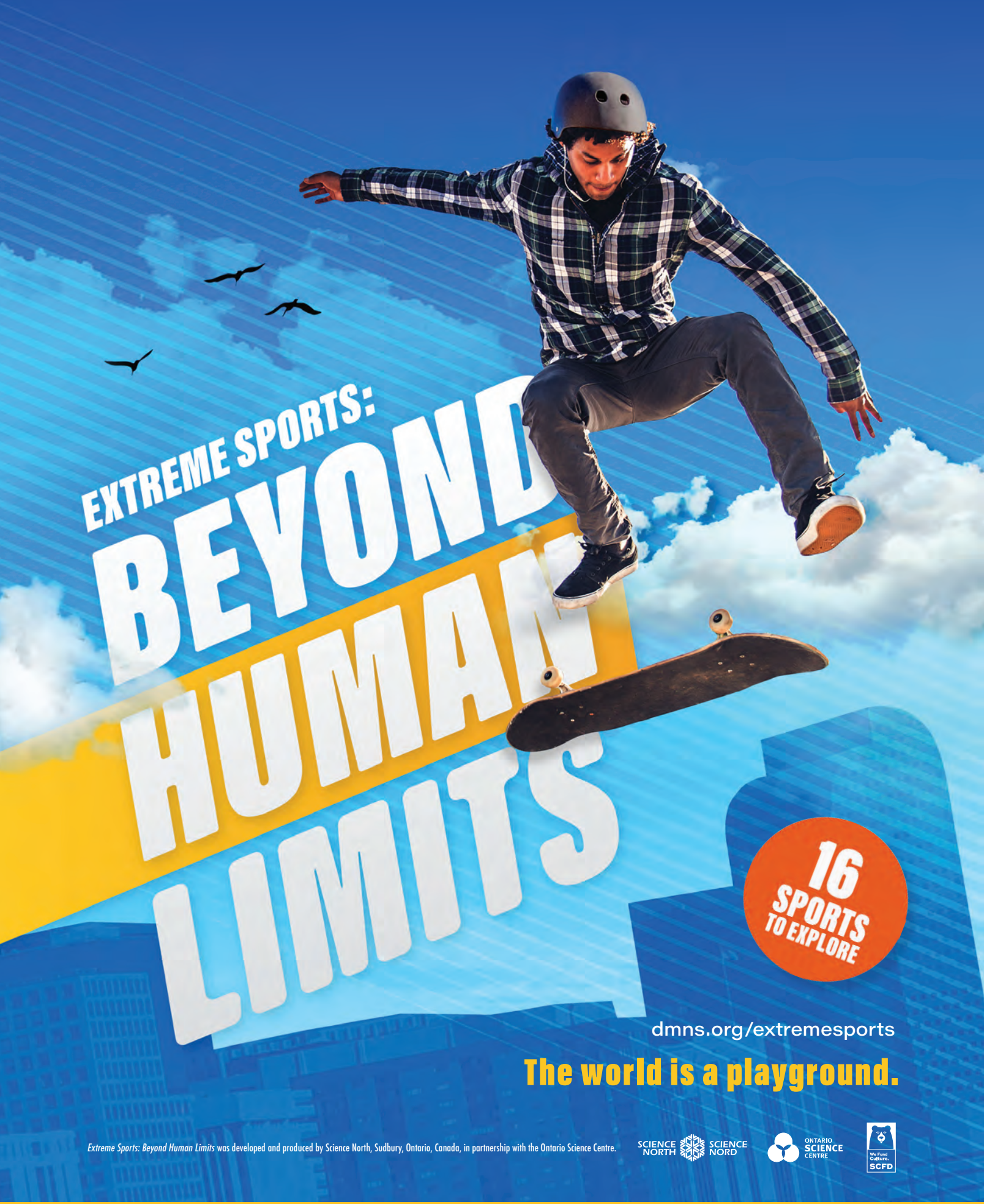
WINTER 2019

INSIDE ///

AFTER THE ASTEROID:
EARTH'S COMEBACK STORY

THE SCIENCE BEHIND PIXAR

EXTREME SPORTS:
BEYOND HUMAN LIMITS



NOW OPEN! FREE FOR MEMBERS!

DEAR MEMBERS,

The past few weeks at the Museum have been absolutely extraordinary since we announced a significant scientific discovery made by Museum curators Dr. Tyler Lyson and Dr. Ian Miller, along with colleagues from our own earth sciences team and across the country. It's not an understatement to say we now better understand the birth of the modern world we live in today. And the groundbreaking science began with an unexpected discovery right in our own backyard!

Thanks to Tyler and Ian's research at a site named Corral Bluffs, near Colorado Springs, our understanding of how mammals evolved and came to thrive after the asteroid impact and extinction of the dinosaurs is snapping into focus. Their peer-reviewed research paper was recently published in *Science Magazine*, one of the world's top academic publications.

The discovery has received international press attention and can be explored by everyone, everywhere in a variety of ways, including an experience at the Museum, a *NOVA* documentary streaming online, and a dedicated website. Turn to pages 6–9 to learn more.

The Museum couldn't have reached this milestone alone, however. We extend our appreciation to the Colorado Springs community and the State of Colorado; our collaborators on the related experiences, Tangled Bank Studios, NOVA, WGBH Boston, PBS, D+i Creative, and MOD Marketing; the City of Colorado Springs, Nor'wood Development Group, Waste Management, and the private landowners; and the generous funders for this project.

This November marks my 15th year as President and CEO, and this is among my proudest moments during my time here. Tyler and Ian are part of our incredible Science Division, and I never cease to be amazed by the work this team does—day in and day out—to add to our understanding of the natural world and engage the community in science in ways that are meaningful to them.

In this season of gratitude, I extend my thanks to the entire team of Museum staff and volunteers for their inspiration and commitment, and to you and all of our members for your steadfast support that boosts all we do. Best wishes for a safe and happy holiday season.

George Sparks, President and CEO
president@dmns.org

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CONTENTS

2 IN THE KNOW
4 FEATURED EXHIBITION
6 MUSEUM INSIDER
10 GET INVOLVED
12 DISCOVER SCIENCE

FIND IT @ DMNS.ORG

- New Science Division website, dmns.org/science
- Print-at-home tickets for surcharged exhibitions, Planetarium and IMAX shows, lectures, and programs
- Reservations for members events
- Visiting tips and curated plans
- Membership renewals and purchases
- How to donate

Join Our Community:

Photo by Rick Wicker

ON THE COVER

From the paleontology collections

More than 1,000 exquisite fossils of reptiles and mammals unearthed near Colorado Springs, Colorado, were key to solving a 66-million-year-old mystery: how life rebounded after a massive asteroid impact wiped out 75 percent of species. Turn to p. 6.

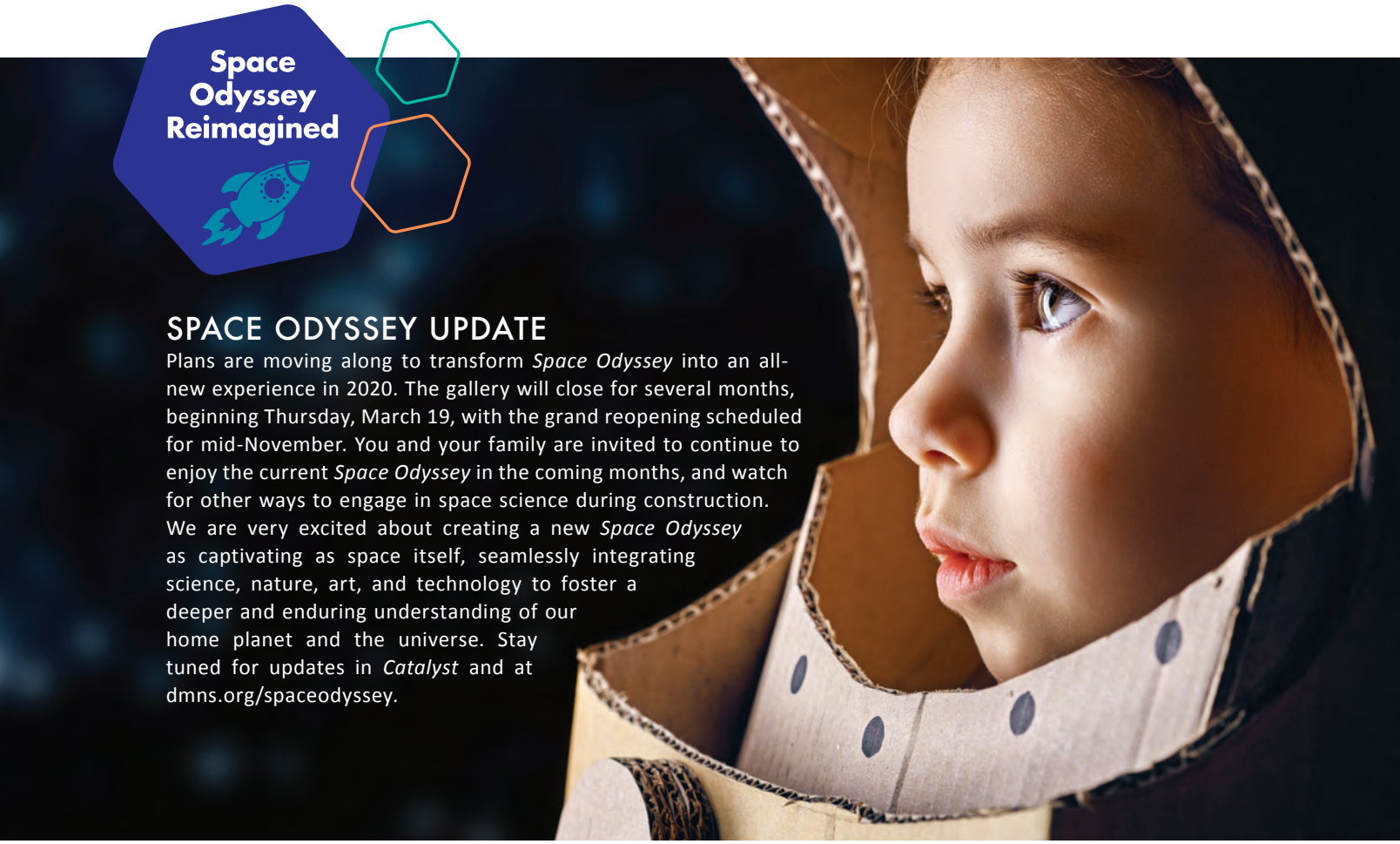
HOLIDAY VISITING TIPS

We're looking forward to seeing you and your guests at the Museum this holiday season! The Museum will be open every day through New Year's Day, except December 25. Here are a few tips to help you plan your trip:

- Avoid ticketing lines and guarantee your spot in *The Science Behind Pixar* and in the IMAX Theater by purchasing tickets in advance at dmns.org.
- If you receive Flex Tickets, move them to "ready to use" in your eCard and be guaranteed entry to *The Science Behind Pixar,* even if it's sold out! Flex Tickets are a special benefit for Giving Club members. Learn more on p. 10.
- Have your membership card/ecard ready for scanning. Please use our free WiFi at DMNS-Guest for optimal eCard function.
- Parking is at a premium during the holidays. Allow extra time for parking and consider carpooling or alternative transportation. Our rideshare partner Lyft offers new users $5 off three rides when you use the code DMNSNEW.
- Weekday late afternoons and weekend early mornings tend to be less busy.

NEW FRIDAY EVENING HOURS COMING IN 2020

The Museum will be open until 10 p.m. on Fridays beginning January 17. General admission will be free for members as you enjoy your Museum favorites. Special temporary exhibition and IMAX tickets as well as food and drink will all be available for purchase. We look forward to kicking off the weekends with you!



SPACE ODYSSEY UPDATE

Plans are moving along to transform *Space Odyssey* into an all-new experience in 2020. The gallery will close for several months, beginning Thursday, March 19, with the grand reopening scheduled for mid-November. You and your family are invited to continue to enjoy the current *Space Odyssey* in the coming months, and watch for other ways to engage in space science during construction. We are very excited about creating a new *Space Odyssey* as captivating as space itself, seamlessly integrating science, nature, art, and technology to foster a deeper and enduring understanding of our home planet and the universe. Stay tuned for updates in *Catalyst* and at dmns.org/spaceodyssey.

The Art of the Brick®
Nathan Sawaya

CALLING ALL YOUNG LEGO BRICK LOVERS

The global sensation *The Art of the Brick* is coming to the Museum next summer, featuring the original artworks of Nathan Sawaya, the internationally famous LEGO® brick artist. The young people in your life are invited to share their talent and show how LEGO bricks build endless possibilities.

The Museum is running a special LEGO brick building contest for local youth, and the winning creations will be displayed with this blockbuster exhibition. The required theme is nature and science. Entries must be received by Friday, April 24. Get all the contest information and official rules at dmns.org/brick, where you'll also find a link to buy your tickets for the exhibition now. (Hint, hint—tickets to *The Art of the Brick* would make a great holiday gift.)

CAST A SHADOW

A whimsical new exhibit called "Shadow Play" is displayed in North American Wildlife Hall on Level 2, near the large moose-caribou diorama. The experience explores how cultures around the world create shadow puppets in different ways. You can try it for yourself by playing with light and shadow to make projected animal figures with your hands.

Also on Level 2, North American Indian Cultures Hall is showcasing a new look in the entry area and elsewhere. An engaging introductory video and dynamic map projections bring the space to life and set the stage for what you'll see inside. A portion of the gallery was revamped to reflect Native peoples offering personal perspectives about their own cultures. Later this year, the Zuni Map Art by Ronnie Cachini, featured in the December 2018 edition of *Catalyst*, will go on display in the Peoples of the Southwest section of the gallery. Make a point to include these new features during your next Museum visit.

GET READY NOW FOR SUMMER DAY CAMPS

It's never too soon to be ready for the Museum's very popular Summer Day Camps. As a member, you have the benefit of advance registration, this year starting on Tuesday, January 28. If you are not receiving emails from us about summer camps and other Museum insider information, please send your name, member number, and email address to members@dmns.org. Get ready with a schedule at-a-glance and registration information at dmns.org/summercamps. Upgrade to the Giving Club level and receive the earliest access, on Monday, January 27! See p. 10 for details.

SAVE THE DATE FOR GIRLS & SCIENCE

Girls & Science, presented by the Museum and CBS4, is set for Saturday, March 7. This popular event uses an innovative career fair model where girls meet women working in STEAM industries. Girls and their families are invited to meet women mentors and explore the many diverse opportunities a future in science, technology, engineering, arts, and math can bring. This day is all about igniting a passion for science—so try it on, test it out, and play. Free admission for members!

THE SCIENCE BEHIND PIXAR

You can practically feel the buzz of creativity as you walk into *The Science Behind Pixar*. The immersive exhibition explores how Pixar Animation Studios brings their beloved films and characters to life. Guests put their ingenuity to work as they try their own hand at what it takes to develop Pixar's magical films.

Pixar films are an international sensation with a fan base of all ages, so film buffs young and old will enjoy this exhibition. The experience is also a unique way to get kids interested in science, technology, engineering, art, and math or broaden their passion for these topics. "You need to have different approaches for a lot of kids who may not be interested in typical ways of learning, and speaking to them through film can be productive," said Dr. Ka Chun Yu, the Museum's curator of space science. "In order to make these movies happen there is an immense amount of skill. Both the activities and video profiles of the Pixar artists, animators, computer scientists, and actors show that it takes all sorts of skills and artistry to make film."

Each section in *The Science Behind Pixar* focuses on a step in the filmmaking process, giving you a hands-on perspective of Pixar and its production pipeline.

MODELING: Character design starts with artists who create sketches and clay sculptures called maquettes to get each character just right. A digital modeler then creates a virtual 3D model of the character, sometimes digitally scanning the maquette. The final model is a virtual digital wireframe of points and the edges that connect them.

RIGGING: Riggers create rigs, or the virtual bones, joints, and muscles for models. Rigs specify the relationships between body parts so that bending a knee will raise the foot, but not move the hands. A good rig allows the animators to create poses easily and efficiently. Without the right controls, the model won't move the way it should. Too much flexibility makes posing the model too time consuming.

SURFACES: The way something looks tells a story. What is it made of? Is it new or old? Well cared for or neglected? After a virtual 3D model is created, a surfacing artist constructs its appearance with computer programs called shaders. They determine the way light scatters off the surface so it looks shiny, transparent, and smooth (like glass) or dull and rough (like rust).

SETS & CAMERAS: Movies need more than just characters. The setting of each scene and the way each image is framed convey the context, story, and emotion. Set designers are architects. They build virtual environments from the ground up. Every pebble, tree, and building helps turn the storyboards into a believable world. Camera artists use virtual cameras to shape what is shown on screen. They choose the composition, camera movement, and lens type to support the story.

To develop the desired look for Queen Elinor's emerald dress in the film *Brave*, the Pixar art department took real matte silk fabric samples and painted metallic colors onto the fabric, adding other subtle embellishments. Shading artists replicated the look in the computer.

ANIMATION: Pixar animators bring a story to life, posing characters to act out each scene. Animators start by creating key frames that mark out important positions in a movement. They then use a computer program to describe how the object moves between the key frames so the resulting animation conveys the desired emotions.

SIMULATION: While animators focus on acting, simulation programmers create motion that makes scenes feel alive and believable. Some simulations—hair, fur, and clothing—respond to the way a character moves. Other simulations re-create natural phenomena, such as fire or water. Programmers start with the underlying physics, but they balance believability with the artistic needs and the time it takes to run the simulation.

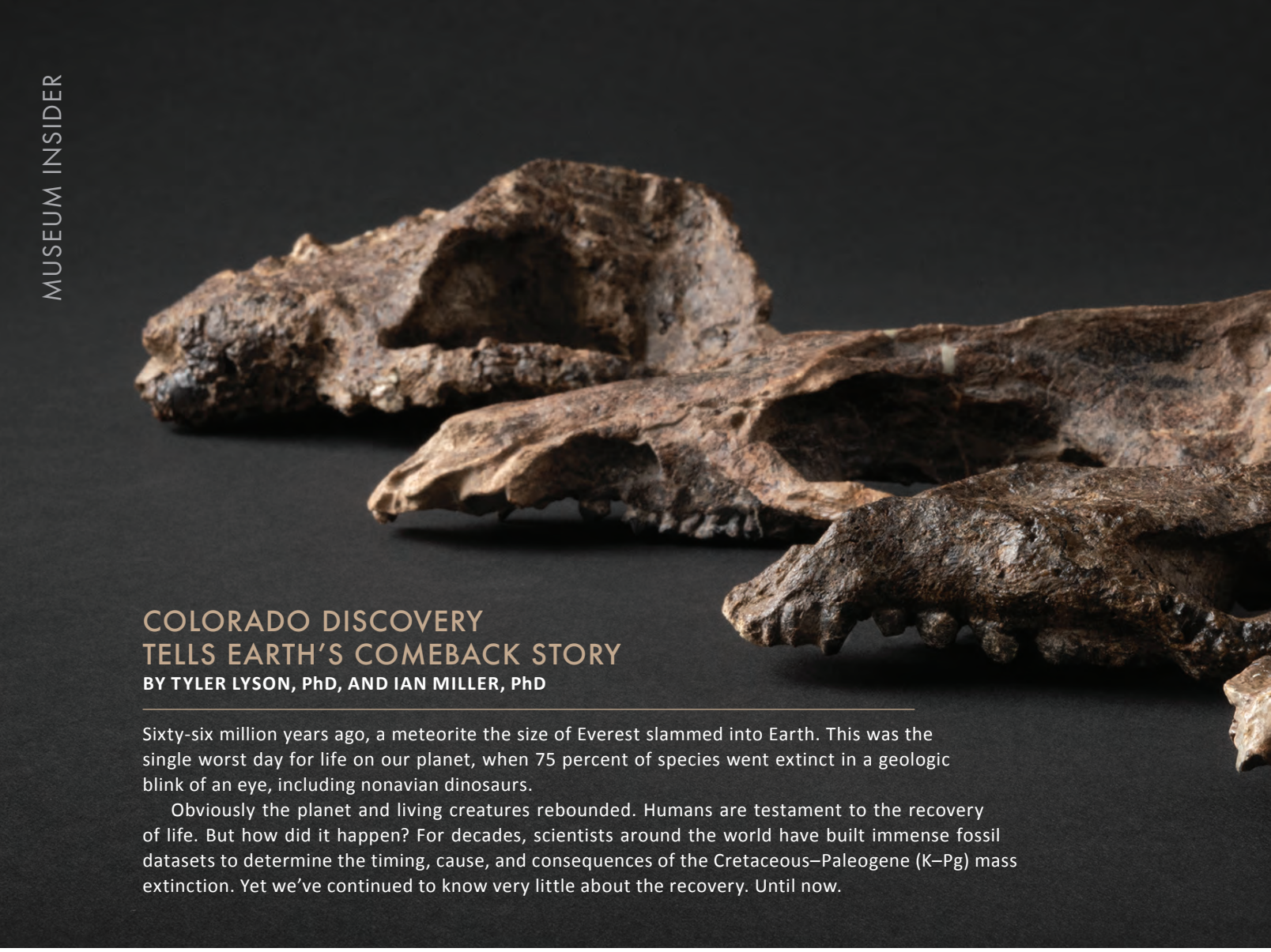
LIGHTING: Lighting is an essential part of telling a story. Light shows you where to look and enhances the emotional feel of each scene. Pixar's lighting designers have the additional task of defining virtual lights in the computer. The color, position, and intensity of each light needs to be programmed to achieve the desired artistic effect.

RENDERING: The virtual scene is set—the characters are shaded and posed, the lights and camera are in position, and the simulations are ready to run. But no one knows what it looks like until the rendering process turns all that data and programming into an image we can see. Pixar generates low-resolution renders for work in progress and high-resolution renders for the final film before it goes out into the world to be enjoyed for years to come.

MEMBERS TIPS

- *The Science Behind Pixar* will be open daily through the holidays, except December 25.
- Timed tickets are required for all members and guests. Purchase your tickets at dmns.org or at 303.370.6000 (daily, 9–5). Afternoon is the best time to call.
- The complimentary admission tickets you receive with your membership may be upgraded for admission to *The Science Behind Pixar*.
- Giving Club members may use their Flex Tickets for free admission to *The Science Behind Pixar* through their ecard or online Museum account. Find out more about upgrading your membership to the Giving Club on p. 10.
- Weekday late afternoons and weekend early mornings tend to be less busy in our temporary exhibitions. School groups generally visit during weekday mornings. Parking can be challenging during popular times, so please consider this when you plan your visit and exhibition entry.
- Members receive a 10 percent discount in the Pixar gift shop.
- Find out more at dmns.org/pixar.

Produced by
Museum of Science.



COLORADO DISCOVERY TELLS EARTH'S COMEBACK STORY

BY TYLER LYSON, PhD, AND IAN MILLER, PhD

Sixty-six million years ago, a meteorite the size of Everest slammed into Earth. This was the single worst day for life on our planet, when 75 percent of species went extinct in a geologic blink of an eye, including nonavian dinosaurs.

Obviously the planet and living creatures rebounded. Humans are testament to the recovery of life. But how did it happen? For decades, scientists around the world have built immense fossil datasets to determine the timing, cause, and consequences of the Cretaceous–Paleogene (K–Pg) mass extinction. Yet we've continued to know very little about the recovery. Until now.

An extraordinary discovery near Colorado Springs by scientists from our own Denver Museum of Nature & Science reveals in striking detail how life recovered. The research, published in one of the world's top academic publications, *Science Magazine*, paints a crystal clear picture of the first million years after the impact. The story is told through an exceptional record of fossil plants and animals along with a precise understanding of the age of the rocks—a paleontological trifecta. For the first time, the scientific community has an unprecedented opportunity to assess the biotic recovery of an entire ecosystem following Earth's last mass extinction.

A LIGHT BULB MOMENT CHANGES HISTORY

A comprehensive study of the recovery of life has been exceedingly difficult and often just out of scientific reach because the fossil record from immediately after the mass extinction has consisted of mere fragments—broken turtle shells, isolated crocodilian armor, and a rare isolated mammal tooth or partial jaw. While plants have a somewhat better fossil record, the data have never been tied to the animals. Undeterred, scientists have tried to squeeze every bit of data from every scrappy fossil from this critical interval of time.

A monumental breakthrough occurred in 2016 when the Museum's paleontologist Dr. Tyler Lyson and paleobotanist Dr. Ian Miller concentrated their efforts in an area called Corral Bluffs, near Colorado Springs. They believed this locale in the Denver Basin was a good prospect because a few incomplete vertebrate fossils and abundant fossil plants had been found in the past.

As is common for fossil hunting throughout the American West, the pair began looking for fossilized bone. They picked up only a handful of fragments. Gradually, Lyson became convinced they were perhaps not seeing what was right in front of their noses. He recalled his experience with South African colleagues in the deserts of the Karoo Basin,

These fossil skulls from Corral Bluffs, Colorado, illustrate how quickly mammals grew in the first million years after the massive asteroid impact. In geologic time, this was an incredibly rapid rebound. A comparable increase in mammal body size will not occur for another 30 million years. From front to back: *Loxolophus* sp. (EPV.132501), *Carsioptychus coarctatus* (EPV.95283), *Eoconodon coryphaeus* (EPV.130976), and *Taeniolabis taoensis* (EPV.95284). There was a 100-fold increase in body size compared to the tiny survivors of the asteroid.

Photos by Rick Wicker

where the key for finding fossils was not searching for bone fragments but for a certain rock called a concretion. Concretions generally form around an organic nucleus and come in a variety of shapes, sizes, and chemical composition. These rocks also sometimes preserve amazing fossils. This is a completely different approach for paleontologists who search for animals and plants that lived on land.

Lyson picked up a knobby, whitish-colored concretion, similar to the one pictured here. With a single, well-placed crack of his rock hammer, Lyson split open the concretion and saw the cross-section of a complete mammal skull staring back at him. He was completely stunned. In a frenzy, Lyson and Miller began gently cracking open concretions right at their feet, and in no time found four more complete mammal skulls. Paleontologists go whole careers without finding one complete mammal skull from this time period; Lyson and Miller found four in half an hour!

The code for finding complete fossils from this interval had been cracked.

UNEARTHING A TROVE

Lyson and Miller and their excavation team of staff, volunteers, teen interns, and research associates spent about 10,000 hours in the field at Corral Bluffs, working through blazing sun, torrential rain, and even snowstorms. Close to 1,000 vertebrate fossils have been unearthed, from the skull that cracked the case—*Carsioptychus coarctatus*, an early "proto" hoofed animal about the size of a large pig—to skulls and skeletons of other mammals, turtles, and crocodilians, including many new species. They also found the most complete specimens of many known species from this time period.

Miller and the team excavated 65 fossil plant localities and collected more than 6,000 fossil leaves. A particularly exciting moment occurred when Aeon Way-Smith, a Teen Science Scholar interning with Miller, cracked open a fossil rock containing the oldest bean pod ever discovered! This fossil turned out to be very significant because it provided an important clue about food sources for the animals.

A team of experts from around the world, representing a wide range of disciplines, quickly assembled to bring the science to life. Lyson and Miller enlisted the best fossil preparators in the country to meticulously remove the fossils from the concretions, which can take 75 to 250 hours depending on the size of the skull. They also tapped into the wealth of expertise in the Museum's own Fossil Prep and Digital Research Labs. Other collaborators built an age model of the

Courtesy Rich Barclay

area, used to specifically date all of the rocks themselves and the fossils within and determine their placement relative to the mass extinction event. For three years, the science team unearthed, collected, prepared, curated, and analyzed 50,000 fossils of animals, plants, and tiny grains of pollen. They put the story together one piece at a time, with one incredible discovery after another. From the field to the lab to the data analysis to the newly published paper, this new science has brought the dawn of the modern world into focus.

HOW EARTH CAME BACK

The discoveries at Corral Bluff set the scene for the first one million years after the asteroid impact:

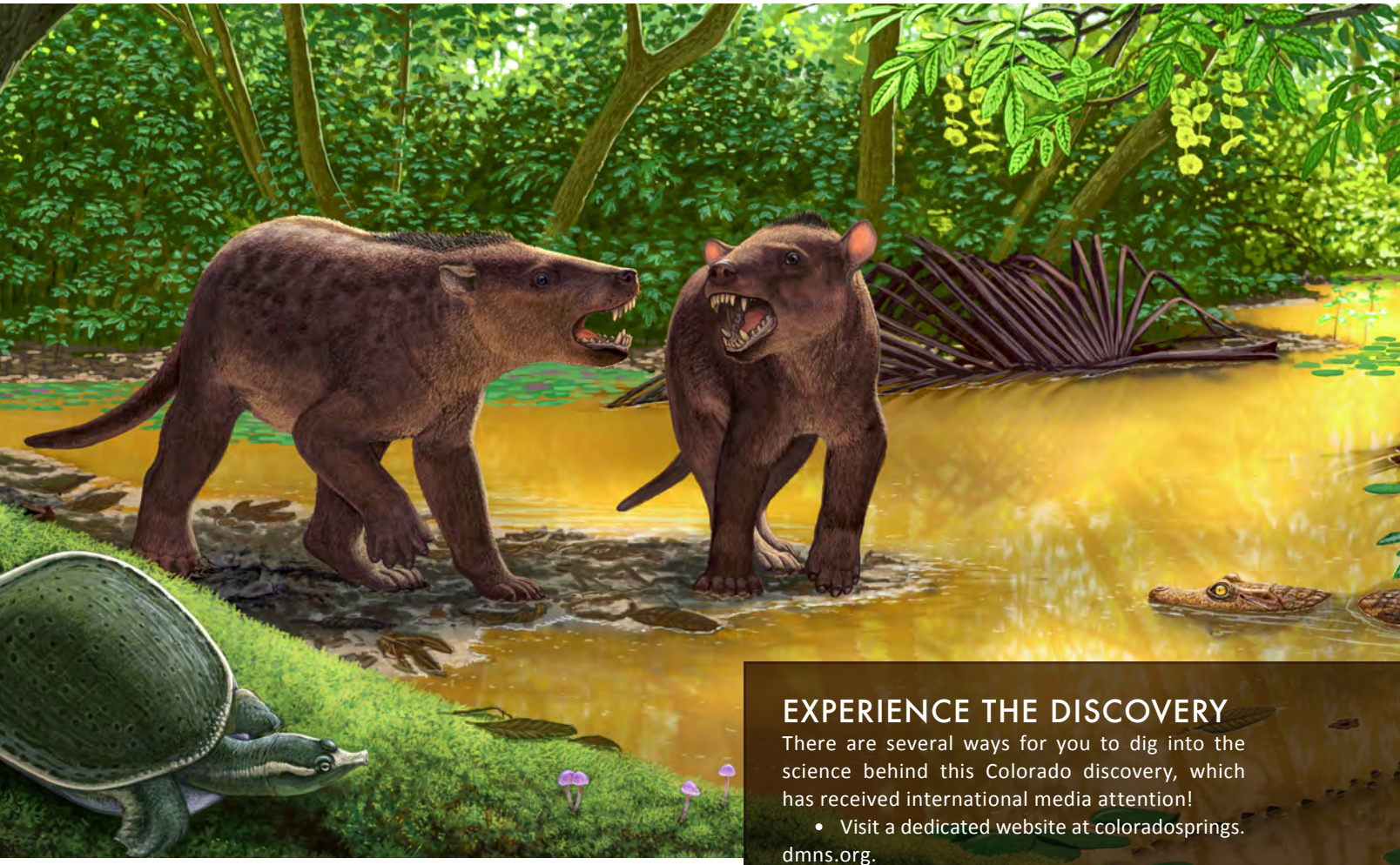
In the aftermath, ecosystems are completely devastated and extinction occurs everywhere on the planet, on land and in the sea. All large animals are wiped out. The biggest animal to survive the mass extinction is a soft-shelled turtle weighing about 200 pounds; the largest surviving mammal weighs less than a pound.

On the scorched landscape, a blanket of ferns, proliferating in sunshine where there were once shaded forests, quickly turns barren dirt into fields of green. They pave the way for a handful of other plants and the planet revegetates. Although the world is green again, this ecosystem has little diversity and endures for hundreds to thousands of years.

The field of ferns gives way to low-diversity forests, often completely dominated by palms. This weird palm world lasts for approximately 300,000 years. Within this palm-dominated forest is the first major jump in mammalian size—an increase in body mass of 12 times, from the rat-size survivors to a raccoon-size trailblazer.

Within 300,000 years after the mass extinction, the forests start to regain their diversity, and walnut trees begin to provide a potentially energy-rich food source for mammals. There's a shift in mammals, from small omnivores to much larger herbivores tipping the scales at about 70 pounds, an incredible 30 times compared to the rat-size survivors. Legumes appear 700,000 years post-extinction. These "protein bars" provide a substantial food source for even larger herbivorous mammals, up to 100 pounds. At this point there is a 100-fold increase in body size compared to the tiny survivors of the asteroid.

Earth's creatures have emerged from our planet's darkest hour and are beginning to thrive. Literally everything alive today can trace its ancestry back to the survivors of the asteroid impact, including humans.



EXPERIENCE THE DISCOVERY

There are several ways for you to dig into the science behind this Colorado discovery, which has received international media attention!

- Visit a dedicated website at coloradosprings.dmns.org.
- Stream a *NOVA* documentary at pbs.org/wgbh/nova/video/rise-of-the-mammals.
- See some of the fossils that rewrote history! Check out a new pop-up experience on Level 1 of the Museum called *After the Asteroid: Earth's Comeback Story*. It is free with admission.

WHAT'S NEXT?

What's exciting about science is that it never ends. While there are 16 authors on the initial research publication, many more will work on the project in the years to come. There is still much to figure out, including why the concretions are so abundant in this particular locale. The Museum team continues to actively prospect and dig for more fossils. The Corral Bluffs landscape has fast erosion rates, so every rainstorm uncovers more concretions with fantastic fossils inside. Concretions awaiting preparation will provide ongoing data to analyze and publish, continuing to impact the way we understand the recovery from the last great mass extinction.

In the meantime, the findings at Corral Bluffs will go down as one of the many great discoveries made by scientists at the Denver Museum of Nature & Science. The asteroid struck Earth and completely changed the course of life, and Corral Bluffs, right in the state of Colorado, provides the best place in the world to investigate the origins of the world you see around you today.

Above: About 300,000 years after the asteroid impact the diversity of forests started to recover, including the diversification of walnut trees. At this same interval of time, mammalian body mass increases 30 times compared to mammals that survived the K–Pg mass extinction. In this scene, a new species of crocodilian swims toward two *Ectoconus* fighting along the edge of a pond. The science team used evidence from the site to guide artist Andrey Atuchin as he re-created what the landscape looked like during Earth's comeback.

Facing page, from top:

Some of the science team at the Corral Bluffs site, on terrain that was covered by leafy subtropical to tropical forests 65 million years ago.

Tyler Lyson (left) and Ian Miller in the field, soon after realizing they were on to something big. Lyson is holding a concretion, the type of rock that unexpectedly led to a landmark scientific discovery.

This fossil of the world's oldest bean pod was key to unlocking the mystery of how mammals were not only thriving but rapidly increasing in body size. The appearance of legumes at 700,000 years post-asteroid was providing a substantial food source that mammals, including humans, rely on today.

A LASTING IMPACT: COLORADO GIVES DAY 2019

You can make a big difference in kids' lives on Tuesday, December 10, when you make a donation to your Denver Museum of Nature & Science on Colorado Gives Day. You will not want to miss being a part of the statewide movement by joining thousands who give on this special day!

Your gift on Colorado Gives Day will fund the Museum's scholarship pool for schools and organized youth groups, reducing the cost of enhancing a field trip experience for 90,000 children annually. In addition, your gift on this day gets a boost from the $1 million Incentive Fund, created by Community First Foundation and First Bank.

Since 2014, nearly $200,000 has been raised for the Museum on Colorado Gives Day. The average gift is $50, which allows 20 students to enjoy a classroom program, temporary exhibition, or IMAX or Planetarium show during their field trip. A gift of $500 means 18 kids can spend an unforgettable night sleeping in our world-famous wildlife halls.

Gifts of every size make an impact! Schedule your gift today at coloradogives.org/dmns and help create a vibrant future for Colorado. Thank you for your support.

COLORADO GIVES DAY
COMMUNITY FIRST FOUNDATION
12.10.19
1STBANK
Corporate Partner

RECEIVE FREE TICKETS FOR THE SCIENCE BEHIND PIXAR

Do you like free tickets? Then you will want to upgrade to the Giving Club! In addition to supporting scientific research and education, upgrading your membership to the Curator level gives you free tickets and special access throughout the year to events and exhibits—even when they're sold out!

- Complimentary Flex Tickets (14) for you or your friends and family to use for popular exhibitions such as *The Science Behind Pixar,* now open, and *The Art of the Brick,* opening in June, select evening lectures, and IMAX and Planetarium shows. Flex Tickets let you design your benefits based on your personal interests.
- Invitations to special events throughout the year, including the popular Behind-the-Scenes Night and IMAX Night, just for Giving Club members.
- First access to summer camp registration, even before other members!

As a Giving Club member, your gift supports ongoing scientific research, preserves rare artifacts, and fuels lifelong discovery in the millions of people served by Museum exhibitions and programs. Upgrade today by logging in to your online Museum account and start enjoying additional benefits right away.

Find out more at dmns.org/givingclub or call 303.370.6306. Monthly installment plans start at just $42 per month.

MAKE A MATCH

As you consider your end-of-year giving, keep in mind your employer may be one of 10,000 companies that match employee donations to nonprofits such as the Museum. Memberships qualify for matching too! Find out more at dmns.org/give/matching-gifts or check with your human resources department for more information.

REWARD YOUR EMPLOYEES AND SUPPORT TOMORROW'S INNOVATORS

Imagine how happy your employees and their families will be as they spend time together experiencing wonder and discovery at the Museum. When your business becomes a corporate member, your employees will enjoy Museum admission, events, discounts, and more. At the same time, your organization will impact the community by supporting informal science education for the workforce of the future. Corporate membership is a unique benefit you can add to your total rewards package. Memberships start at $2,500 annually and a portion is tax-deductible. Get the details at dmns.org/corporatemembership or email corporatemembers@dmns.org.

THE FUTURE IS NOW

You have the opportunity to ensure that the Museum's mission endures for generations to come by planning now. There are many options for you to create a planned gift that will meet your needs, while supporting the Museum as it continues to grow and evolve. Find downloadable brochures and a free Estate Planning Kit, or evaluate your current plan at dmns.planmylegacy.org.

A UNIQUE GIFT FOR YOUNG PROFESSIONALS

If you are looking for the perfect gift for the young adult in your life, consider a Young Professional (YP) membership at the Museum. Memberships include all the basic benefits plus free admission for the named YP member and up to seven guests each visit, free tickets to after hours 21+ events, and invitations to other exclusive events. Find out more at dmns.org/YP. We look forward to seeing your young professional at the Museum!

10 YEARS OF GOOD TASTE

BY NICOLE GARNEAU, PhD

Ten years ago, *Expedition Health* opened to the public and with it the first health-based community research lab housed at a museum. Since then, the Genetics of Taste Lab has been going nonstop, enlisting more than 10,000 members of the public to actively participate in real scientific research.

Humans are 99.9 percent genetically identical. The remaining 0.1 percent makes us different—in ways you can see, and in ways you can't. The Genetics of Taste research has been devoted to understanding how small differences in our DNA have a huge impact on the way we taste food. What we've found might surprise you.

2009–2013, BITTER TASTE PILOT

This study launched us! We put forth evidence to challenge a decades-old dogma in taste, suggesting the concept of "supertaster" should be more narrowly defined. We also published a new methodology, the Denver Papillae Protocol, now a best-practice in the field of taste. We garnered media attention, making a name for our little community lab that could.

2013–2015, FATTY ACID TASTE

Thirty years of research suggested fat might be the sixth taste, but no large-scale studies backed this up. (Not saturated fat, like in bacon or ice cream, but the healthier unsaturated version.) We collaborated with Dr. Richard Mattes at Purdue University and found people can detect fat taste, especially women and girls. The ability is also hereditary, but the gene(s) have yet to be identified.

2015–2016, A SWEET TASTING STUDY

For this fun test, participants received differing concentrations of sucrose to judge both the level of sweetness and preference for each solution. Alongside Dr. Robin Tucker of Michigan State University, we showed for the first time that sweet-liking is directly related to an increase in sweetened beverage intake and a decrease in water intake.

2016–2017, SCIENCE OF SOUR

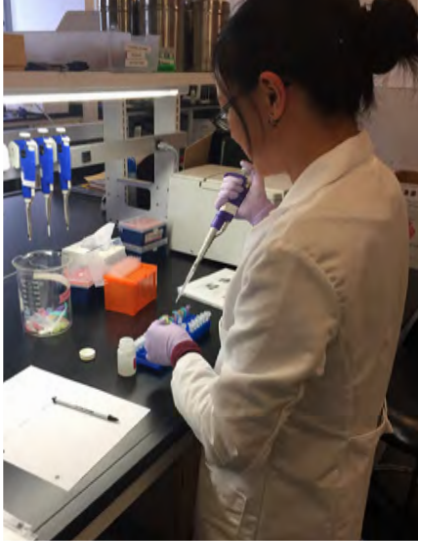
We all agree sour is a taste, but we are still analyzing whether all sour-tasting molecules (like citric acid compared to lactic acid) are created equal and which genes are involved with detection and preference. Stay tuned.

2017–2018, SAVORY AND SOUR

Adding a bit of acid, like a lime or vinegar, to protein is a common practice across almost all cultural cuisines. However, how does adding sour to a dish affect the savory taste of umami? This analysis will soon be completed.

2018–2019, GENES AND GRAINS

Finally, in partnership with CSU and the USDA, we just finished collecting data to examine why whole grains taste sweet to some people and bitter to others, which genes are involved, and how varieties of whole wheat each have a unique taste profile.



Two generous Science Education Partnership Award grants from the National Institutes of Health supported the first and the three most recent studies and learning research and evaluation. Dr. Joseph Polman of the University of Colorado Boulder and Patty McNamara are examining what "community scientists" gain from participating in authentic research and how to make the scientific process more inclusive. Ultimately, as a scientist, I do not own science. Everyone owns science, and I am excited about scientific entities, including the Museum, removing barriers and offering opportunities for ordinary people to contribute to advancing scientific knowledge.

Finally, our most sincere thanks to you, the people who tasted solutions or strips, swabbed your mouths for DNA, and shared your stories. We are also grateful to many donors who have supported this work. A genetics lab, for and by the people, would not be possible without you!

DISCOVER MORE

Dr. Nicole Garneau is curator and chair of the Department of Health Sciences and principal investigator for the NIH SEPA grant.

For more about the Genetics of Taste Lab and access to the scientific publications, visit dmns.org/genetics.

The creation of the lab and first taste study and the 2016–2019 taste studies were made possible by a Science Education Partnership Award from the National Institute of General Medical Sciences, National Institutes of Health (awards #R25RR025066 and #R25OD021909, respectively).

GET THE MOST FROM YOUR MEMBERSHIP

- Visit anytime for free 364 days a year!
- Share your free guest general admission ticket(s) with friends or family.
- Make sure your eCard is up to date with version 3.2.2, or download your free eCard if you haven't yet. Find out more at dmns.org/ecard.
- Read the monthly eNews with members-only news, tips, and special offers. Not hearing from us by email? Send your address to members@dmns.org.
- Keep your membership current with Auto-Renew. Enroll online or by calling 303.370.6306 (daily, 9–5) and get a free gift. Your expiration date is printed on the mail label on the back of this magazine.
- Pack your membership card! Receive free or reduced admission at 360 science centers and museums outside a 90-mile radius of Denver and your residence through the ASTC Passport Program, astc.org/passport.
- Upgrade to the Family Plus level or higher and enjoy free admission to the Fort Collins Museum of Discovery.

ADD-ON OPTION IS GREAT FOR NANNIES!

Do you have a nanny or babysitter who watches your children? Although they cannot use your membership card, you can easily add them to your membership for just $50. Because memberships are nontransferable, it is important to not lend your card to someone who isn't named on the membership. The add-on option is perfect for nannies and grandparents who may occasionally bring your children to the Museum. And the add-on member enjoys many benefits. Not valid on Individual level memberships.

NEW WAY TO DONATE YOUR REFUND

When state income tax filing begins in January 2020, Coloradans will be able to donate all or part their refund to nonprofits, including the Museum. For information, visit coloradononprofits.org/refundwhatmatters.

WE'RE HERE FOR YOU

- 303.370.6306 (daily, 9–5)
- members@dmns.org
- www.dmns.org/members
- Members Lane at Ticketing

THANK YOU FOR YOUR SUPPORT!

Your membership helps us provide outstanding science education programs, exhibitions, and research.

CURIOSITY CRUISER

Introducing the Curiosity Cruiser, your friendly neighborhood museum on wheels! The Museum is hitting the road in a pop-up vehicle, stocked inside and out with fun activities for some on-the-go wonder for all ages.

Bring the Curiosity Cruiser to your community. We'll come to your next block party, festival, or office event. The Cruiser is staffed by Museum educators who know how to feed minds and imaginations. They'll set up the vehicle and facilitate the all-new multisensory activities while you enjoy the day. There's no end to the wows when you're enjoying some brain food.

For pricing and booking, visit dmns.org/curiositycruiser or call 303.370.6453.

#DMNScuriositycruiser • #DMNSmuseumonwheels

DENVER MUSEUM OF
NATURE&SCIENCE
2001 Colorado Boulevard
Denver, Colorado 80205-5798

A GIFT
THAT LASTS ALL YEAR!

Give everyone on your list–family, friends, neighbors, and colleagues–a FULL YEAR of fun and discovery with a gift certificate for a Museum membership!

It's easy. Log in at dmns.org and choose "Give a Membership." After purchasing, simply print the attached PDF certificate that is emailed to you or forward it directly to the recipient. Once the certificate is redeemed, the membership will be active for one year.

THIS IS JUST SOME OF WHAT THEY'LL ENJOY:

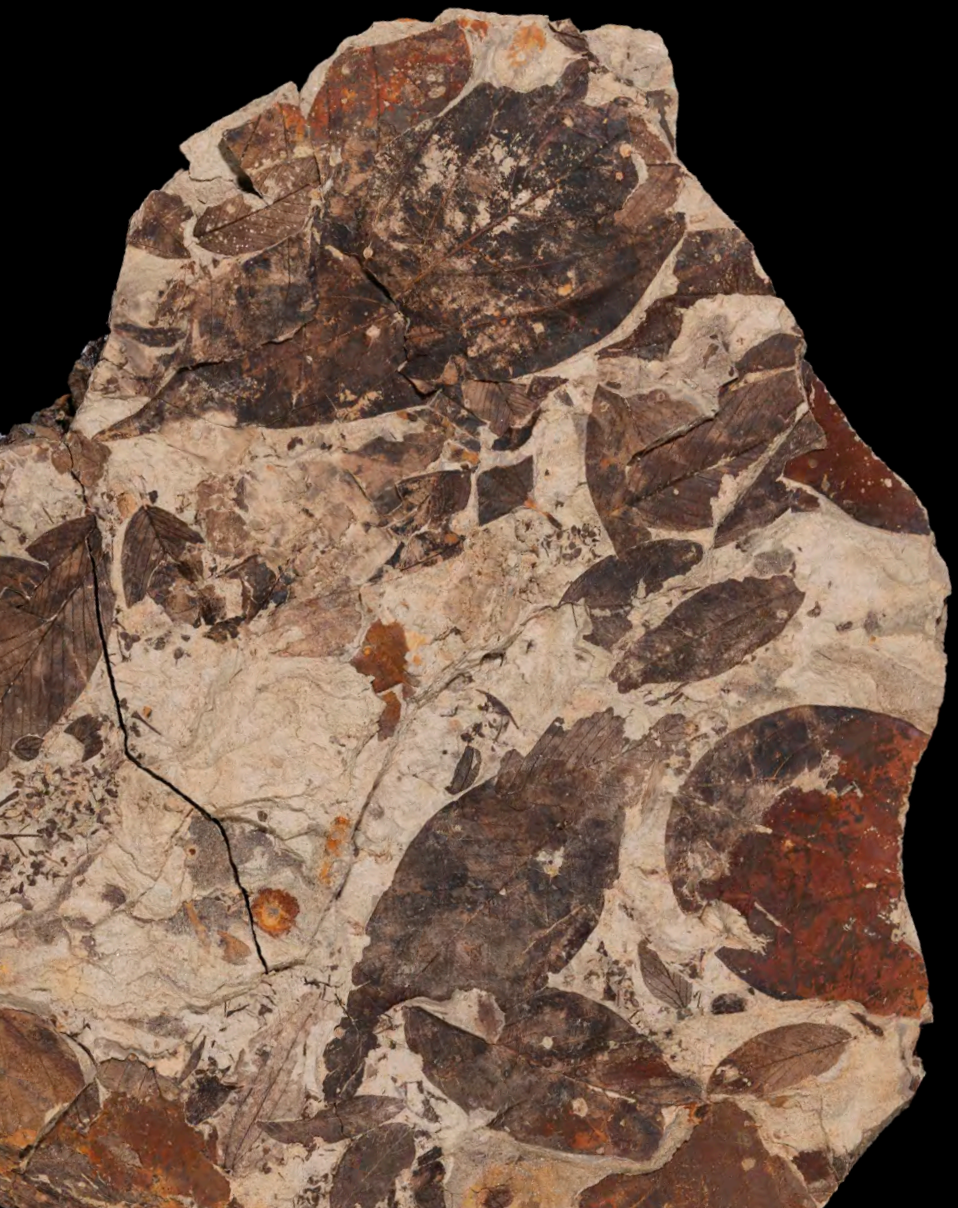
- Free admission to the Museum 364 days a year. Members may drop by for an hour or stay all day.
- Free guest general admission ticket(s) to give to friends and family.
- Discounts in the Museum Shops, T-Rex Cafe, Grab & Go, and Coffee Lab.
- Discounts on specially ticketed temporary exhibitions, including *The Science Behind Pixar*, now open, and *The Art of the Brick*, opening in June.
- Discounts on educational programs for all ages and early access to our very popular Summer Day Camps.
- Invitations to exclusive events, such as Members Preview Day for temporary exhibitions.
- Free or reduced admission to more than 360 science centers and museums worldwide.

Your purchase directly supports science education and research at the Museum. Thank you!

DISCOVER

ADULTS | CHILDREN | FAMILIES | TEENS

WINTER 2019



STARTING JANUARY 17

OPEN UNTIL 10 P.M. ON FRIDAYS

WINTER 2019

EXHIBITIONS

The Science Behind Pixar

Now open through April 5 • Phipps Gallery • Special timed ticket required
Get hands-on with science, technology, math, art, and engineering concepts used at Pixar Animation Studios to bring their beloved films and characters to life.

Extreme Sports: Beyond Human Limits

Now open through April 12 • Anschutz Gallery • Free for members
Experience the thrill of extreme sports in interactive exhibits and immersive environments that go inside the minds and bodies of some of the world's greatest athletes.

After the Asteriod: Earth's Comeback Story

Now open • Level 1 • Free for members
See fossils discovered near Colorado Springs by Museum paleontologists that have painted a vivid picture of how Earth recovered after the devastating asteroid impact 66 million years ago.

PHIPPS IMAX THEATER • Now showing

Apollo 11: First Steps Edition 2D
Superpower Dogs 3D
Turtle Odyssey 3D
Hollywood Favorites • Check dmns.org/imax

GATES PLANETARIUM • Now showing

Black Holes: The Other Side of Infinity
Destination Solar System
Imagine the Moon
One World, One Sky: Big Bird's Adventure
Space Tours Live

ADMISSION • Special ticket required for *The Science Behind Pixar.*

	MUSEUM	IMAX	PLANETARIUM
Adult member	FREE	$7	$5
Senior member (65+)	FREE	$6	$4
Youth member (3–18)	FREE	$6	$4

The Museum is open daily 9 a.m.–5 p.m. Closed December 25.
Beginning January 17, open every Friday until 10 p.m.!
Dates, times, prices, and schedules subject to change. Find more ways to discover at dmns.org.

On the cover: From the paleontology collections, EPI.45594, various species of fossil leaves and tiny palm flowers, 65.8 million years old, Corral Bluffs, Colorado

DECEMBER

SUN	MON	TUE	WED	THU	FRI	SAT
Sensory-Friendly in *Discovery Zone*, p. 9 1	2	3	4	Bird Walk, p. 7 5	*Hollywood Films Every Fri & Sat Discover more @ dmns.org* Museum's 119th birthday 6	7
SCFD Community Free Day  8	9	Middle School Trivia Night, p. 11 10	Indigenous Film, p. 5 11	12	13	14
15	16	17	18	19	20	Winter solstice 21
22	Winter Break Camp 23	24	Museum closed 25	Winter Break Camp 26	27	28
29	Winter Break Camp 30	31				

JANUARY

SUN	MON	TUE	WED	THU	FRI	SAT
			Happy new year! Museum open 1	Winter Break Camp 2	Winter Break Camp 3	4
5	SCFD Community Free Day 6	Tommy Caldwell, p. 5 7	Indigenous Film, p. 5 8	9	10	11
12	13	14	15	Capitol Reef, p. 5 16	NEW! Museum open until 10 p.m.! 17	18
Sensory-Friendly in Dioramas, p. 10 19	20	21	Teen Lounge, p. 11 22	Digital Earth: Wine, p. 6 Bird Walk, p. 8 23	Museum open until 10 p.m.! 24	25
SCFD Community Free Day 26	27	Teen Lounge, p. 11 28	60 Minutes in Space, p. 6 29	The Last Question, p. 6 30	Museum open until 10 p.m.! 31	

FEBRUARY

SUN	MON	TUE	WED	THU	FRI	SAT
						1
2	3	4	5	Junk Raft, p. 6 6	Museum open until 10 p.m.! 7	Junior Surgeons/ Cutting Edge, p. 10 8
9	SCFD Community Free Day 10	Meet Charles Darwin, p. 7 11	Indigenous Film, p. 5 Travels with Darwin, p. 7 12	Valentine's Day Roast, p. 7 13	Museum open until 10 p.m.! 14	15
Stay up with the Stars, p. 10 16	17	18	*The Science Behind Pixar* Members Evening 19	20	Museum open until 10 p.m.! 21	22
SCFD Community Free Day 23	24	25	60 Minutes in Space, p. 6 26	Science Riot, p. 7 Bird Walk, p. 8 27	Museum open until 10 p.m.! 28	29

After HOURS

AT THE DENVER MUSEUM OF NATURE & SCIENCE

Indigenous Film Series

The Museum is pleased to partner with the International Institute for Indigenous Resource Management and the Denver American Indian Commission to present the monthly series Indigenous Film. Join us for a variety of films, from documentaries to feature films and youth film showcases. Then participate in a discussion with the Denver American Indian Commission and other special guests.

Wednesdays, December 11, January 8, February 12 • 6:30 p.m. • Phipps Theater • Free

The Dawn Wall with Tommy Caldwell

In January 2015, American rock climbers Tommy Caldwell and Kevin Jorgeson captivated the world with their effort to climb the Dawn Wall, a seemingly impossible 3,000-foot-high rock face in Yosemite National Park. The pair lived on the sheer vertical cliff for weeks, igniting a frenzy of global media attention. But for Caldwell, the Dawn Wall was much more than just a climb. He will share his story following a special screening of the documentary film *The Dawn Wall*.

Tuesday, January 7 • 7 p.m. • Phipps Theater • $20 member, $25 nonmember

The Spirit of Capitol Reef

For 12,000 years, people have left a rich record of their experiences in Utah's Capitol Reef National Park. In the new book *The Capitol Reef Reader*, award-winning author and photographer Stephen Trimble has put together 160 years worth of words by 50 writers, capturing the spirit of the park and its surrounding landscape through personal narratives, philosophical riffs, and historic and scientific records. The narrative is anchored by more than 100 photographs, including pictures from Trimble's 45 years of hiking the park. Trimble will share some of these photos and stories as well as anecdotes from his detective work to unearth stellar pieces of writing to create a one-of-a-kind volume of this special place.

Thursday, January 16 • 7 p.m. • $12 member, $15 nonmember • Book sale & signing

Digital Earth: Wine

Get a taste of the geography that fosters one of the most beloved beverages in human history: wine! In this edition of Digital Earth, your guides Dr. Ka Chun Yu and Dr. Bob Raynolds will use satellite images projected on the planetarium dome to take you to the Andes mountains where you'll find out what makes Malbec so delicious. And, of course, no wine tour would be complete without a wine tasting inspired by the places you'll visit. Ages 21+.

Thursday, January 23 • Gates Planetarium • 6 or 8 p.m. • $20 member, $25 nonmember

60 Minutes in Space

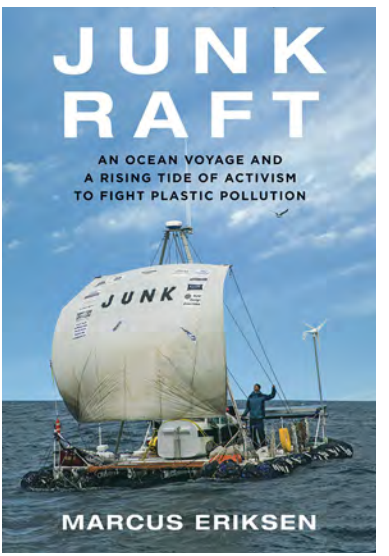
Go "behind the stories" with space scientists Dr. Steve Lee and Dr. Ka Chun Yu using the best images and animation available to help understand new developments. No reservations required. Seating is limited to first-come, first-served. No program in December.

Wednesdays, January 29 & February 26 • 7 p.m. • Ricketson Auditorium • Free

Isaac Asimov's The Last Question

In 1979, the Museum produced *The Last Question*, a planetarium show based on a short story by acclaimed science fiction writer Isaac Asimov and narrated by the legendary Leonard Nimoy. The story takes place in 2061 and begins with a simple question posed to a computer. Now you can experience the cerebral tale as never before during this totally out-there event that combines visual elements digitized from the original glass slides, Nimoy's voiceover, and today's advanced planetarium technology. Swing by the cash bar before the show, and view items from the Museum archives, including objects related to Asimov and Nimoy. Dr. Ka Chun Yu, curator of space science, will lead a Q&A after the program. No late admittance.

Thursday, January 30 • 6 or 8 p.m. • Gates Planetarium • $12 member, $15 nonmember • Cash bar

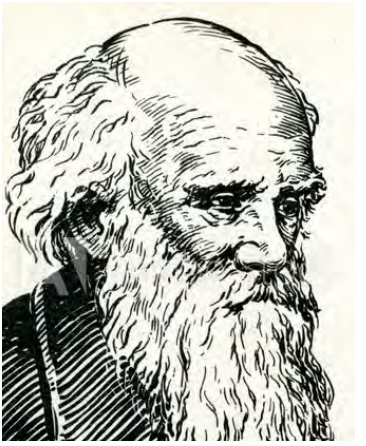


Junk Raft

In 2008, two sailors drifted across the north Pacific to Hawaii on a raft named Junk, made from 15,000 plastic bottles tied in old fishing nets stuffed under a Cessna 310 Aircraft. The 88-day, 2,600-mile voyage was designed to build a movement to save our seas from plastic pollution. This adventure has been captured in the book *Junk Raft: An Ocean Voyage and a Rising Tide of Activism to Fight Plastic Pollution*. Author Marcus Eriksen will share how a grassroots movement developed into massive global coalitions demanding better waste management and corporate responsibility to make smarter products and packaging. Eriksen will also be on a panel about the future of plastics to complement the upcoming exhibit, *The Plasticene*, opening at the Art Students League of Denver in January. The exhibit explores the full extent of our relationship with plastic as contemporary artists work with materials you may or may not realize are plastic, from acrylic to silicone to Tyvek to yoga pants. For more information about the panel and exhibit, visit www.asld.org.

Thursday, February 6 • 7 p.m. • Ricketson Auditorium • $12 member, $15 nonmember • Book sale & signing

Meet Charles Darwin



Celebrate Darwin's birthday by spending an evening with the affable Charles Darwin. Enactor Brian "Fox" Ellis is back by popular demand to bring Darwin to life. Hear humorous tales of Darwin's training as a naturalist, his insights into South American geology, his discovery of strange creatures on the Galápagos archipelago, and most important, the scientific evidence that led to his revolutionary theory. Equal parts dramatic storytelling, stand-up comedy, and show-and-tell, Ellis immerses you in the intellectual world of one of history's greatest scientific minds.

Tuesday, February 11 • 6 or 8 p.m. • Ricketson Auditorium • $15 member, $18 nonmember

Travels with Darwin

Charles Darwin, brought to life by enactor Brian "Fox" Ellis, leads you on this unique tour through the Museum's dioramas. Meet Darwin in South America and walk on over to the Galápagos Islands. Hear stories of his discoveries and the 10,000 specimens he collected. Ask questions and share insights with this great man. Darwin will offer an exclusive look at the specimens in our dioramas and the evidence behind his "rEvolutionary" ideas. Reservations required.

Wednesday, February 12 • 7:30 a.m. • Wildlife Halls • $27 member, $35 nonmember

A Valentine's Day Roast

Whether you celebrate Valentine's or Galentine's, spice it up with dissections, demos, and a Valentine's Day roast. Ages 21+.

Thursday, February 13 • 7 p.m. • Early nerd pricing: $25 member, $30 nonmember • Cash bar

Science Riot

Cheer on local scientists turned comedians as they attempt standup for the first time and wax hilarious about the unique nuances of their work. This one-of-a-kind comedy night for science fans will get you laughing with (and at!) some of the biggest brains in town. Ages 18+.

Thursday, February 27 • 7:30 p.m. • Science Atrium • $12 member, $15 nonmember • Cash bar

BIRD WALKS

Join expert birder Norm Lewis on birding outings across the front range. Transportation is not included. Participants caravan from a meeting location. Reservations required.

Eastern Plains Raptors and More

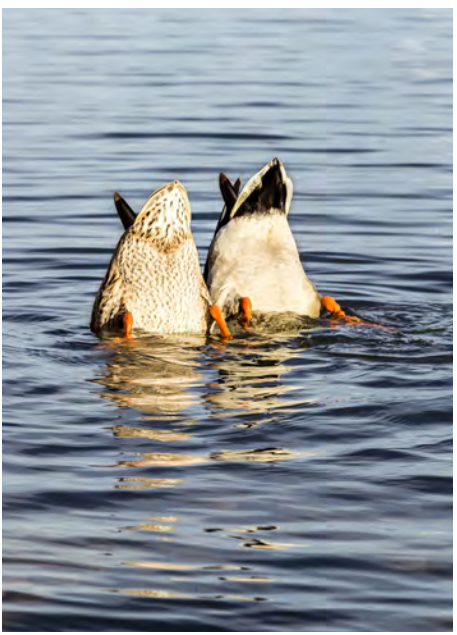
Time for our annual winter raptor trip to the plains, following the rural utility lines that raptors of many species use for perching and hunting. We may see red-tailed and rough-legged hawks, northern harrier, golden and bald eagles, falcons such as American kestrel, merlin, and prairie falcon, and perhaps an owl or two. Afterward, on to the riparian woodlands along the South Platte River, to look for woodpeckers, nuthatches, goldfinches, and sparrows. Somewhere along the way we usually find a surprise or two—maybe a Lapland longspur? Or a common redpoll? Anything might show up!

Thursday, December 5 • 8 a.m.–5 p.m. • $27 member, $35 nonmember

Urban South Platte River and West Side Hotspots

The secret to a good winter birding day in Colorado is to find a nice mix of waterfowl and other over-wintering birds. Our day will begin along the South Platte River because as lakes, ponds, and reservoirs freeze, the moving open waters of the Platte host thousands of waterfowl along its passage through Denver. There are prime locations for 15 or more species of ducks, geese, and grebes. The riparian vegetation along the river hosts good numbers of songbirds, and raptors cruise the skies above. Then we'll move west to several fine winter birding sites along the Front Range. Destinations will depend upon recent bird activity.

Thursday, January 23 • 8 a.m.–5 p.m. • $27 member, $35 nonmember



Cherry Creek State Park

Cherry Creek always has one of the highest winter bird counts of any locality in Colorado. Parts of the reservoir remain open, attracting wintering "diving ducks" such as mergansers, scaup, and bufflehead, "dabbling ducks" like gadwall, mallard, and northern shoveler, as well as a good variety of grebes, loons, and gulls. Brushy habitat found throughout the park hosts spotted towhee, American tree sparrow, and white-crowned sparrow, and in the woodlands are nuthatches, chickadees, and woodpeckers. Cherry Creek's extensive prairie areas has specialties such as northern shrike and merlin, along with early migrants like bluebirds and Say's phoebe.

Thursday, February 27 • 8 a.m.–5 p.m. • $27 member, $35 nonmember

CANOE TRIPS

Paddle along scenic rivers while gaining new knowledge about geology, wildlife, astronomy, and dinosaurs. Reservations and information: 720.283.0553, CentennialCanoe.com

Dinosaurs by Canoe on the Colorado

Experience fascinating rock formations from the age of the dinosaurs and paddle your way along the Colorado River with geologist Dr. Bob Raynolds as your time-travel guide. Camping along the river's banks and exploring Dominquez Canyon will leave you awed by the immensity of geologic time.

Friday–Sunday, June 12–14 • $459 adult, $429 youth (6–12 years)

Ecosystem Interactions: Finding the Balance

Explore the interactions that occur every day in nature while canoeing the gorgeous canyons of the Gunnison River. With Museum educator and naturalist Tim Blesse, you'll deepen your understanding of ecology and critical water resource issues. K–12 teachers may receive re-licensure credits. A pretrip workshop at the Museum on Saturday, June 6, 9 a.m.–4 p.m., is available to all participants and is required for re-licensure credit. For adults, with family and friends age 16+ welcome.

Saturday–Monday, July 11–13 • $459 adult

Stargazing on the Colorado

Embark on a memorable weekend with space scientist Dr. Ka Chun Yu as you revel in both earthbound scenery and the breathtaking skies above. Without the interference of city lights, learn about planets, constellations, and deep space.

Saturday–Monday, July 18–20 • $459 adult, $429 youth (6–12 years)

Geology on the Green River

Paddle along one of the longest stretches of tranquil wilderness water in the western United States, just north of Canyonlands National Park in eastern Utah. Geologist and paleobotanist Dr. Ian Miller will be your guide as you marvel at colorful sandstone walls hundreds of feet high and explore canyons and ancient rock art.

Wednesday–Sunday, July 22–26 • $714 adult, $681 youth (6–12 years)

CHILDREN & FAMILIES

Sensory-Friendly Discovery Zone for Families • All ages with adult

Discovery Zone is bursting with activity, which can be overwhelming for some children. By limiting attendance and turning down some of the ambient noise, we are excited to offer an enjoyable low-sensory morning for families with children who would benefit from these adjustments. This event is free, but registration is required.

Sunday, December 1 • 7–9 a.m. • Free • Registration required

Sensory-Friendly Diorama Halls for Families • All ages with adult

Enjoy some low-sensory time in our famous diorama halls with reduced sound, increased lighting, and a supportive environment for families with sensory integration issues.

Sunday, January 19 • 6–8 p.m. • Free • Registration required

Stay Up with the Stars for Families

Stay up late with us as all the stargazers in the family explore the incredible Colorado night sky. After dinner at the Museum, watch planetarium shows, see some of your favorite constellations through high-power telescopes (weather permitting), warm up with a hot chocolate bar, and make your own star-studded crafts. All ages welcome; programs designed for K-8 families.

Sunday, February 16 • 6–9 p.m. • member: $20 adult, $15 youth; nonmember: $25 adult, $20 youth

Spring into Science Family Overnight • Grades K–8 with adult

Spend a memorable night experiencing the magic of the Museum with your whole family! After pizza dinner, check out the wonders of Colorado springtime with a dino egg hunt through the Museum, watch a planetarium show, and experiment, explore, and engage in hands-on fun for everyone. Then sleep among the animals in our renowned diorama wildlife halls. Wake up to a full breakfast and an IMAX screening.

Saturday–Sunday, March 14–15 • 6 p.m.– 9 a.m. • member: $75 adult; $65 youth; nonmember: $95 adult, $85 youth

CHILDREN'S WORKSHOPS

Junior Surgeons • Grades 2 & 3 / Cutting Edge • Grades 4–6

Observe and perform dissections to find out how the human body functions. Dissect hearts and lungs, eyes, brains, and frogs. Examine real bones, listen to your own heartbeat, and more!

Saturday, February 8 • 9 a.m.–3 p.m. • $60 member, $70 nonmember

SCHOOL BREAK CAMPS (GRADES K–5)

Looking for something amazing for your kids to do during school breaks? At the Museum, your child will experience fun and wonder, see IMAX films and planetarium shows, and explore the marvels of our temporary exhibitions. Available for grades K & 1, 2 & 3, and 4 & 5. Limited early morning drop-off and late pickup options available.

Winter Break Science Camp

NEW this year for winter break: camps by the day with a different theme each day!

December 23, 26, 27, 30, January 2, 3 • 9 a.m.–3:30 p.m. • $60 member, $75 nonmember • Early or late care, $10/day for each

Spring Break Science Camp • Grades K–5

March 23–27 or March 30–April 3 • 9 a.m.–3:30 p.m. • $160 member, $175 nonmember • Early or late care, $45/week for each

TEENS

Teen programs are generously supported by Lincoln Hills Cares.

Middle School Trivia Night • Grades 6–8

Enjoy this free trivia night after hours at the Museum! Brain-crushing science trivia and free snacks and drinks.

Tuesday, December 10 • 7–9 p.m. • Free

Teen Lounge

Teens take over the Museum at this totally free, uniquely teen night. It's going to be awesome! Includes free snacks, entertainment, and activities. Check out dmns.org for details.

High School • Wednesday, January 22 • 7–9 p.m. • Free
Middle School • Tuesday, January 28 • 7–9 p.m. • Free

Reservations and general information: 303.370.6000, daily, 9 a.m.–5 p.m., or dmns.org

Print-at-home tickets are available at dmns.org with no handling fee. You will receive a confirmation email with further information about your event. Sales are final on all tickets unless the Museum cancels.

Giving Club Flex Tickets may be used for complimentary admission to many temporary exhibitions, IMAX and Planetarium shows, Science Lounge, and select lectures. Info at dmns.org/givingclub.

Please always bring your membership card and photo ID when you visit the Museum.

Last Minute SHOPPING

EVERYDAY *Savings*

THERE'S SOMETHING FOR EVERYONE ON YOUR LIST

THE MUSEUM SHOP - LEVEL 1

MEMBERS SAVE 10%!

MEMBERS SAVE 10% EVERY DAY!

T-REX CAFE

SALAD BAR, GRILL, KIDS MEALS – LEVEL 1
11 a.m.– 2 p.m.

GRAB & GO SANDWICHES, SNACKS – LEVEL 1
9 a.m.– 4 p.m.

COFFEE LAB – LEVEL 2
9 a.m.– 3 p.m.

Proudly serving locally sourced Colorado products.

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