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CROCS: ANCIENT PREDATORS IN A MODERN WORLD
AT THE AMERICAN MUSEUM OF NATURAL HISTORY

LIVE CROCS AND LIFE-SIZED MODELS ON VIEW
FROM MAY 28, 2016, UNTIL JANUARY 2, 2017

For 200 million years, crocs and their charismatic ancestors have been a tenacious presence on our planet, sometimes in forms that would seem unrecognizable next to the aquatic reptiles we know today. Featuring live species of crocs as well as fossils, life-sized models, and interactive components, the new exhibition *Crocs: Ancient Predators in a Modern World* at the American Museum of Natural History will explore fascinating insights about these animals' evolutionary history, biology, behavior, and precarious relationships with humans. The exhibition will also cover the surprising ways researchers are studying crocs in ways that may benefit humans including fighting antibiotic-resistant infections, tooth renewal, and blood substitutes.

"Crocodiles are among the world's most fascinating – often feared – creatures, yet these animals are also players in the great story of life on Earth," said Ellen V. Futter, President of the American Museum of Natural History. "This new exhibition continues a Museum tradition of bringing people, especially children and families, face-to-face with ambassadors from the natural world – along with their intriguing ancestors – in order to foster deeper understanding of the diversity of life, the often surprising interrelationships among species, and the fragility of natural systems, and to inspire greater responsibility in us all to study and steward life on Earth."

Evolutionary History

All modern crocodylians – the group including crocodiles, alligators, caimans, and gharials – are built for the water's edge, but their ancient relatives included galloping land predators, jumping insect-eaters, pug-nosed herbivores, and dolphin-like animals that hunted in the open sea.

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“Crocodylomorphs are a wonderful group to study evolutionary questions,” said *Crocs* curator Mark Norell, Macaulay Curator in the Division of Paleontology and the division’s chair. “They have an extensive fossil record, and they go way back in history. In fact, there are more species of fossil crocodylomorphs than there are living ones, and some are pretty bizarre.”

Although they may look like lizards, crocs belong to a group of animals called archosaurs, which also include all extinct dinosaurs, pterosaurs, and modern birds (see page 5 for a description of the Museum’s special exhibition *Dinosaurs Among Us*). Crocs are full of hard parts that fossilize well, and remains of their bones and teeth have been found on every continent, even Antarctica. A **video featuring Curator Mark Norell** called “Build a Crocodylomorph” lets visitors glimpse the staggering diversity the group once included. Visitors can also **touch a replica of the ancient marine crocodylomorph *Steneosaurus bollensis***, which lived until about 130 million years ago in what is now Europe. Also on view is a replica of a skull of the ancient croc *Thecachampsia americana*, which grew to about 19 feet long and lived between around 13 and 6 million years ago on the east coast of the United States.

Living Crocodilians

Although crocs have a rich and ancient history, modern crocodilians share a common ancestor that lived about 80-90 million years ago. They’re not “living fossils” – they’re modern animals that are elegantly adapted to their environments.

In *Crocs*, live species and detailed dioramas with life-sized models showcase the diversity of modern croc species, and a variety of interactive components will highlight **croc behavior** and allow visitors to **test their strength against a croc’s “crunch capacity,” learn to speak “croc”** by hearing the variety of sounds crocs make, use touchable skull replicas to find out how to **tell an alligator from a crocodile**, and more.

Live species featured in *Crocs: Ancient Predators in a Modern World* include:

- **Siamese crocodile** (*Crocodylus siamensis*): One of the most endangered crocodylian species, this crocodile has been eliminated from most of its historic range by hunting. Small populations remain in Cambodia, Laos, Thailand, and East Kalimantan.
- **American alligator hatchlings** (*Alligator mississippiensis*): Unlike birds and mammals, an alligator’s sex is not determined at conception. The temperature at which eggs are incubated is the key to producing male or female babies. Eggs incubated at 90°F develop

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into males; higher or lower temperatures produce an increasingly large proportion of female alligators. American alligators inhabit the southeastern United States.

- **West African dwarf crocodile** (*Osteolaemus sp.*): Unlike most crocodylians, these shy predators do most of their hunting on land, prowling the forest at night. Growing up to 6 feet long, they live in tropical hardwood forests in central West Africa.
- **Central African slender-snouted crocodile** (*Mecistops sp.*): These crocs live in rivers and coastal waters surrounded by dense vegetation, often basking on logs overhanging water and leaping into the pool at the first sign of danger. Males reach up to 13 feet.

The exhibition also includes life-sized dioramas with models of the following species:

- **Australian freshwater crocodile** (*Crocodylus johnsoni*): Known as “freshies,” these 9-foot-long crocodiles are smaller and less imposing than Australia’s giant saltwater crocodiles. They usually keep to inland rivers and small lakes to avoid competition with the “salties” that dominate coastal waters.
- **Cuvier’s dwarf caiman** (*Paleosuchus palpebrosus*): The smallest living species of crocodylian – males grow to be 4 or 5 feet long – dwarf caimans make up for their small stature by sporting heavy armor in the skin of the back and belly, which protects them from predators and rough terrain. This forest dweller lives in the Amazon and Orinoco river basins of South America in shallow forest streams.
- **Indian gharial** (*Gavialis gangeticus*): The name “gharial” comes from the Hindi word for pot and refers to a bowl-shaped cartilaginous growth on the tip of the snout. Only sexually mature males develop this *ghara*, which may act as a resonator to help amplify sounds used in social communication. They live in rivers in India and Nepal, and males grow to 18 feet or more.
- **Estuarine saltwater crocodile** (*Crocodylus porosus*): Saltwater crocodiles are the largest living crocodylians and are found in coastal areas of Southeast Asia and Australasia. Males regularly grow to more than 15 feet, and exceptionally large specimens can top 18 feet and weigh 2,000 pounds. This model is a true-to-life sculpture of Gomek, the largest “salty” ever exhibited in the Western Hemisphere.

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Living with Crocodilians

The biggest threat to crocodilians is an ever-expanding human population. Farming and development leave crocs with fewer places to live and nest; unregulated hunting for leather has pushed some species to near-extinction; pollution from mine runoff and wastewater treatment alters crocodilian reproduction and development; and consumption of bush meat threatens crocs in areas where people struggle with food security. Attacks on humans are rare, but when they occur, locals question the wisdom of saving dangerous predators. Teaching croc safety, removing problem animals, and creating barriers to separate crocs from people help minimize risks.

Learning how to live alongside, and conserve, crocs may have concrete benefits for humans as well. Blood proteins that give crocs an innate immunity against some bacteria, viruses, and fungi may offer a new way of fighting antibiotic-resistant infections; researchers are working to synthesize these proteins for medical use. Stem cells in the jaws of alligators are being studied for clues about how they grow dozens of sets of teeth – up to 3,000 – in a lifetime. The results could be used to stimulate tooth renewal in humans. Croc hemoglobin is far more efficient at delivering oxygen than ours and is being studied with an eye toward synthesizing blood substitutes that could be used in emergency transfusions and stored more easily than blood donated by people.

Research at the American Museum of Natural History

Museum scientists carry out a wide variety of research projects on crocodilians, ranging from studies of the group's ancient origins to modern conservation genetics.

Curator Mark Norell is an expert in archosaurs, the group of animals that include birds, crocodilians, extinct dinosaurs, and pterosaurs. In the last couple of decades, the field of paleontology has become less geological and more biological, and the Museum has been at the head of that curve. Although excavation work around the world continues to be a key driver of new discoveries, access to advanced scientific tools like computed tomography (CT) scanners, electron microscopes, and high-throughput computing allows researchers to go beyond just identifying species and approximating when they went extinct. Now, paleontologists are asking more complex questions like “What did the brains of extinct sharks look like?,” “What color were their feathers?,” and “How did flight evolve?.” Dr. Norell has led this effort through his laboratory's work – which focuses on the evolutionary relationships of dinosaurs and modern

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birds – and through the work of the many scientists he has trained since he joined the Museum in 1989.

In the Museum’s Sackler Institute for Comparative Genomics, Director George Amato has long focused on using genetic analysis to aid conservation of crocodiles. Through the Sackler Institute’s DNA barcoding program, Dr. Amato works with government organizations to identify illegally traded wildlife products, including products developed from crocs. His research also includes molecular ecology and population genetics of crocodiles for development of conservation management plans.

Research associate in the Department of Herpetology, Evon Hekkala uses DNA samples from museum specimens to study how species evolve. Recently, she and colleagues used DNA from mummified crocodiles to find that the Nile crocodile, the largest and most common crocodylian in Africa, is actually two species and not one.

Dinosaurs Among Us

Also currently on view at the Museum is *Dinosaurs Among Us*, a major exhibition that highlights the unbroken line between the charismatic dinosaurs that dominated the planet for about 170 million years and modern birds, which also happen to be crocodiles’ closest living relatives. The dinosaur-bird link is marked by shared features including feathers, wishbones, enlarged brains, and extremely efficient respiratory systems. The fossil record of this story and the biological research it inspires – much of which is being done by scientists trained or working at the Museum – grows richer by the day. *Dinosaurs Among Us* is also curated by Dr. Mark Norell.

Crocs: Ancient Predators in a Modern World was created by Peeling Productions at Clyde Peeling’s REPTILAND.

The Museum gratefully acknowledges the **Richard and Karen LeFrak Exhibition and Education Fund**.

Dinosaurs Among Us is proudly supported by **Chase Private Client**.

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AMERICAN MUSEUM OF NATURAL HISTORY (AMNH.ORG)

The American Museum of Natural History, founded in 1869, is one of the world’s preeminent scientific, educational, and cultural institutions. The Museum encompasses 45

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permanent exhibition halls, including the Rose Center for Earth and Space and the Hayden Planetarium, as well as galleries for temporary exhibitions. It is home to the Theodore Roosevelt Memorial, New York State's official memorial to its 33rd governor and the nation's 26th president, and a tribute to Roosevelt's enduring legacy of conservation. The Museum's five active research divisions and three cross-disciplinary centers support approximately 200 scientists, whose work draws on a world-class permanent collection of more than 33 million specimens and artifacts, as well as specialized collections for frozen tissue and genomic and astrophysical data, and one of the largest natural history libraries in the world. Through its Richard Gilder Graduate School, it is the only American museum authorized to grant the Ph.D. degree and the Master of Arts in Teaching degree. Annual attendance has grown to approximately 5 million, and the Museum's exhibitions and Space Shows can be seen in venues on five continents. The Museum's website and collection of apps for mobile devices extend its collections, exhibitions, and educational programs to millions more beyond its walls. Visit amnh.org for more information.

Hours

The Museum is open daily, 10 am–5:45 pm. The Museum is closed on Thanksgiving and Christmas.

Admission

Museum admission is free to all New York City school and camp groups.

Suggested general admission, which supports the Museum's scientific and educational endeavors and offers access to the Museum's 45 halls including the Rose Center for Earth and Space, is \$22 (adults) suggested, \$17 (students/seniors) suggested, \$12.50 (children) suggested. All prices are subject to change.

The Museum offers discounted combination ticket prices that include suggested general admission plus special exhibitions, giant-screen 2D or 3D film, and Space Shows.

- Museum Plus One includes one special exhibition, giant-screen 2D or 3D film, or Space Show: \$27 (adults), \$22 (students/seniors), \$16 (children)
- Museum Supersaver includes all special exhibitions, giant-screen 2D or 3D film, and Space Show: \$35 (adults), \$28 (students/seniors), \$22 (children)

Visitors who wish to pay less than the suggested Museum admission and also purchase a ticket to attend a special exhibition, giant-screen 2D or 3D film, or Space Show may do so on-site at the Museum. To the amount they wish to pay for general admission, they add \$25 (adults),

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\$20.50 (students/seniors), or \$13.50 (children) for a Space Show, special exhibition, or giant-screen or 3D film.

Public Information

For additional information, the public may call 212-769-5100 or visit the Museum's website at amnh.org.

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