Museum of Natural Sciences

112 or 114 Science Place
University of Saskatchewan
Saskatoon, Saskatchewan
S7N 5E2

For group bookings call: 966-4399

http://artsandscience.usask.ca/museumofnaturalsciences/

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WELCOME TO THE MUSEUM OF NATURAL SCIENCES

The Museum of Natural Sciences is located in the center of a science complex surrounded and supported by Departments of Biology and Geological Sciences also The Science Library, and is linked to departments of Chemistry and Physics; the Collaborative Science Research facility, and the Agriculture building at the University of Saskatchewan.

Located directly off "The Bowl", this Museum is designed to showcase earth's formation, history and diversity of life through geological time, by using live and static displays. To enhance this journey through earth's history, information panels will explain concepts in greater detail throughout the area.

Visitor Behavior Guide

During your visit at the Museum we expect you and any dependants to please:

WALKING FEET, INSIDE VOICES
(we get excited about all the great things here too, but we respect the other visitors, people studying and working all around the area)

OBSERVE-- DON'T DISTURB
(respect live displays including plants, animals, open water and fish

ENSURE SUPERVISION
(of children at all times)

What you should expect:

- FREE admission!
- To spend up to two hours for a self- guided full depth tour. Of course, you may spend as much or as little time as you wish!
- Closed Stat holidays and Dec 25 to Jan 2

What we expect:

- We request pre-booking of groups larger than 10 (306-966-4399) to avoid being disappointed or turned away due to capacity limits or other pre-booked events

The Museum design leads you through evolution through the biological area. *Starting at the panel to the left of the central stairwell* it describes the flow of museum design as this accompanying literature describes. In addition to this overview walking guide, information panels have descriptions and pictures to further illustrate earth's history. Many of our live specimen representatives remain unchanged in physical appearance since before the dinosaurs roamed the earth!

AGE OF FISHES

The Devonian period (410 to 360 mya*) is known as the Age of Fishes. It was a time of great diversification of all groups of jawed fishes.

In the various tanks and ponds, it is possible to see representatives of some of Earth's diverse aquatic life.

Beginning with the invertebrate tank there are representatives of many phyla found at the North American West Coast. This sea life is amazingly similar to what was present many millions of years ago.

In the cartilaginous fish tank one can see a representative of the family of fishes with very little bone. The sturgeons in this tank are representing a species which can be found in certain lakes and rivers of Saskatchewan.

In the tropical marine tank, there are representatives of bony fishes from the warm ocean waters from around the world. Often these representatives have specific behaviours and physiological modifications that assist in survival and reproduction, further enhancing the concept of natural selection.

The Amazon River tank has representatives from warm, fast moving rivers of the Amazon River basin. Often these species have aggressive and distinctive parental behaviours that ensure survival of the offspring to a more mature stage. This is another evolutionary adaptation.

The air-breathing fishes are unique in their physical adaptations that enable them to spend time out of water for extended periods, blurring the line between aquatic and land creatures. They are most definitely fishes, but ones which are capable of surviving environmental changes such as droughts which change the bodies of water normally found in a region on a seasonal basis.

Oxygen-acquiring adaptation showcases another evolutionary concept: changes that ultimately allow survival of a species through a period of extreme conditions.

Some air breathing fishes have adapted swim bladders or other organs that function similarly to a lung. Others simply have developed adaptations that allow them to carry oxygenated water against their gills, while still others have adaptations that allow oxygen absorption through skin or specialized organs.

Further in the gallery are two ponds, one representing a large domesticated species derived from the common carp called koi. Carp have a great ability to survive low oxygen conditions for extended periods of time.

The central pond represents a species of ancient armored fish called a spotted gar. This fish can live in very low oxygen conditions due to an adapted air bladder which acts as a form of a lung. Fossil records show this species has survived unchanged in North American waters for 50 million years, and the ancestors are observed in the fossil record since the Cretaceous – over 110 mya*.

AGE OF AMPHIBIANS

The age of amphibians spans about 100 million years. It follows the first appearance of vertebrates on land which occurred about 370 million years ago. Towards the end of this age an increasing number of reptiles shared the land.

In the live display there are large North American bullfrogs. These frogs are not able to travel far from moist areas and require water to reproduce and grow their offspring (tadpoles). They are more mobile than fishes, but are still not able to move far away from water and explore the unclaimed land that existed in the Devonian period. Some amphibians share similar movement to that of a swimming fish, further enhancing the theory of evolution onto land from sea.

Located around the corner from the bullfrogs is a fibreglass replica of a very large amphibian that lived before the dinosaurs, some 270 mya. This replica of a Devonian amphibian, called *Eryops*, would appear much like a salamander does today.

*mya = million years ago

AGE OF REPTILES

According to most paleontologists, reptiles evolved from the large group of ancient amphibians known as Labrynthodonts, which received their names from the distinctive structure of their teeth.

The age of reptiles includes the Triassic, Jurassic, and Cretaceous periods (250 to 65 mya). Reptiles dominated the land and took to the sea and air. Dinosaurs are the most famous of the ancient reptiles. Our replicas represent four of the most well known examples.

Triceratops was a large herbivorous dinosaur, which attained a length of 9meters and weighed 8 tons. The elaborate frill on the neck served as a defence, a display for mate attraction and possible thermoregulation.

Tyrannosaurus rex is probably the dinosaur about which most people know. This was one of the largest carnivores to ever live, achieving a height of 6 meters and length of 15 meters. The long tail was used for balance. Studies of animals alive today would allow that *T. Rex* was both scavenger and hunter.

The *Mosasaur* hanging above the *T.rex* was a swimming reptile which was theorized to have been a top predator of the prehistoric ocean. At the peak of its existence a vast inland sea covered much of North America.

Also found in the museum is *Stegosaurus*. This 6 meter long dinosaur had large plates on its back that were not attached to the skeleton of the reptile at all. It is theorized that the plates may have had two functions: to provide protection and for use in thermoregulation.

The two types of flying reptiles soaring above the second floor near the *T. Rex* are the *Pteranodon* and the *Rhamphorynchus*. The major differences between these two examples were size, tails, and teeth.

Snakes have evolved very little throughout geological time. There is not much evidence in the fossil record due to the nature of the fragile bones of a snake, but what is available indicates they have been around in their current form at least 130 million years.

Our birds represent one type of reptile evolution. The bird-hipped dinosaurs are theorized to have evolved ever-lighter bones, and developed feathers to enable sustained flight. This is characteristic to most birds. Flightless birds still retain physiological characteristics of those that fly, but have the adaptations to swim or walk at great speed in exchange for flying ability.

AGE OF MAMMALS

The age of mammals arose following extinction of the dinosaurs at the end of the age of reptiles, 65 mya. We live in the age of mammals.

Mammals today are the principal land-dwelling vertebrates, although some, such as dolphins and whales, live in the sea.

A major display in the Museum features the evolution of the horse. There are five replicas of the modern horse's ancestors, representing how the horse has changed over time. These characteristics include the reduction of the number of toes from 4 to 1 over time, the increase in the overall size of the animal, and the adapted crowning and ridging of the teeth. These changes allowed the movement from the forests to the plains which bore tougher grasses for food.

The earliest known member of this group is *Hyracotherium*, a forest-dwelling animal. It lived over 55 mya.

Mammals share several characteristics, such as milk-producing mammary glands to feed the offspring, warm-blooded homeothermic regulation, and hair or fur (or vestiges of the structures that make them). Mammals are able to exploit niches in the environment that could not support cold-blooded reptiles or amphibians.

Our live mammal representatives are degus (pronounced day-goo). They are small rodent-like mammals native to Chile. They do not fit cleanly into any taxonomic order and are considered by many to be lagomorphs, (like hares) rather than rodents (like rats).

AGE OF PLANTS

Although the focus so far has been on the evolution of animals, take a few moments to consider the evolution of plants (and interdependent insects, fungi, lichen, bacteria, and virus though not all are represented in the Museum).

The evolution of animals was very dependent upon these plants. The first plants appeared on land well before the earliest amphibians, more than 400 mya. All living land plants, including mosses and liverworts, evolved from green algae.

Early land plants were very small, probably confined to low, wet habitats. During the Age of Fishes, plants underwent great

diversification as the atmosphere changed. At the end of the Devonian period, the first great forest ecosystems existed, and into these ancient forests crawled the first amphibians.

During the Age of Amphibians, forests of giant club mosses and horsetails covered much of the land. Ferns and fern-like plants were abundant. These early plants are what generated coal deposits. This period, the Carboniferous, is known as the COAL AGE. Near *Eryops* are representatives of early land plants, very much still dependent on water for reproduction and growth.

Near the four story windows are the many archaic seed plants. These represent vegetation alive during the Age of Reptiles. It was also known as the Age of Conifers and Cycads.

Both the conifers and cycads are seed plants, unlike the spore-producing ferns, club mosses and horsetails. The seeds allow exploitation of habitats that are not flooded. The Museum's tallest tree is the conifer *Araucaria heterophylla.* Conifers remain a significant part of world vegetation even today, and are the basis for Canada's forest industry.

Angiosperms, the flowering plants, are the most recently evolved group of plants. They appeared during the Age of Reptiles, and now dominate most land environments. The tremendous diversity of angiosperms is scarcely represented from the waterfall to the Equus display. Angiosperms provide a significant amount of food energy for nearly all land vertebrates, including humans.

GEOLOGY FIRST FLOOR

EARTH SCIENCES: the many displays and information panels along the ground floor hallway of the Geology Building illustrate minerals, rocks, and meteorites. The diverse representations are but a small portion of what treasures the earth holds beneath our feet.

The underlying mantles of the earth begin the displays, followed by the chemistry of minerals and rocks. Examples of mined precious minerals and other raw earth geological materials are also explained.

Several cases show a large collection of naturally formed minerals from around the globe. These showcase the resulting visual and crystal structural differences that varying temperatures, pressures, and impurities produced with the same basic minerals.

Many panels also explain the causes and effects of earth events such as plate tectonics, earthquakes, volcanoes and tsunamis. A seismographic monitor in an adjacent hall shows current seismic activity from around the globe.

Throughout the Museum (and many University buildings) there are walls of mottled limestone called Tyndallstone. This is a sedimentary rock mined in Manitoba, Canada. It is full of invertebrate fossils such as crinoids, cephalopods, annelids, brachiopods, stromatoporids, and corals. The mottling of the stone was formed by the filling of tunnels (thalassinoides) created by burrowing creatures. Many fossils can be found easily, just look!

GEOLOGY SECOND FLOOR

FOSSIL RECORD: The second floor demonstrates earth's geological and biological beginnings, throughout evolution from the ancient seas and mud up to the ice age mammals and early hominids. Static displays inform and examples show the fascinating processes that shaped the world we stand upon, the air we breathe, the life that fascinates us, and ultimately - our very existence.