



## ANCIENT SEAS OF MANITOBA

### CRETACEOUS CREATURES

#### PALEOBOTANY

Although southern Manitoba was covered with water during the Cretaceous, some plant fossils have been found. They consist of logs thought to have drifted into the area from the western shore of the ocean. One such log has tentatively been identified as a bald cypress, a tree now found only in sub-tropical regions of the earth. The presence of rings indicates seasonal changes in the climate at that time.

Amber is resin that oozed from injuries in prehistoric trees. When fresh, it was soft and sticky, much as fresh pine gum is today. Insects, spiders, and mites that flew or crawled onto it were trapped. In some cases, they became completely embedded in it by subsequent flows of resin. Similarly pollen grains, spores, and other matter blown into by the wind became preserved also. Sooner or later this hardened gum fell to the ground and became covered with sediment. Amber from Cedar Lake, Manitoba is by far the richest and biologically the most important Canadian amber known.

#### PLESIOSAURS

The name plesiosaur is derived from two Greek words, "plesios" meaning "near to" and "saurus" meaning "lizard." This name refers to the fact that its skeleton is "nearer to lizards" than some of the other marine reptiles. The classic description of the plesiosaur was that it resembled "a snake threaded through the shell of a turtle." The plesiosaurs are quite unlike any animals today and they have no living descendants.

**PHYSIOLOGY:** Plesiosaurs were descended from land-dwelling ancestors. The limbs were modified into paddles with which the body of the animal was rowed through the water. The limbs acted as oars that could be pulled, backed, and even feathered. The neck allowed for darting movements to be made in pursuit of prey.

Like the mosasaurs, plesiosaurs were carnivorous, scaly-skinned, air-breathing, and likely viviparous, though some species appear to have been capable of dragging themselves out of the water to lay eggs on dry land. Plesiosaurs varied considerably in size and some were over 40 feet long.

**PLIOSAUR:** One group of plesiosaurs, the pliosaurs, had very short necks and large heads, which become relatively larger in the biggest kinds. The Australian pliosaur *Kronosaurus* was about 40 feet in length, of which the skull accounted for 9 feet, the largest head of any known reptile. The pliosaurs probably lived as sperm whales do today, diving to hunt larger cephalopods.

**ELASMOSAUR:** A second group of plesiosaurs, the elasmosaurs, had long necks and small heads. They culminated in the North American elasmosaurus, which reached a length of 40 feet, 23 feet of which was neck. Elasmosaurs probably lived at the surface, catching fish by twisting and turning and darting with their long necks.

**LOCH NESS MONSTER:** Since the first dramatic photograph of a supposed Loch Ness monster, taken in 1934, the evidence that there are still unidentified creatures in the loch has mounted dramatically. 'Sightings' have risen into the hundreds. Sonar tracings, motion pictures, and underwater photographs have added additional evidence. It is not conclusive because the photographs, especially those taken in the thick, peaty water, are indistinct.

The evidence suggests that the creatures, of which there must be enough to form a breeding community, can swim up to 10mph and grow up to 25 feet long. They live mainly in the depths, but can also venture onto land. They have small heads, bulbous bodies, and tails.

It is theoretically possible for a community of animals to live in Loch Ness. They would have space enough; the loch is 900 feet deep in places. The loch's immense quantities of salmon would make an ideal food supply. But what type of creature could 'Nessie' be?

One theory is that the monster is a plesiosaur. Plesiosaurs were roughly the right shape, could swim fast, and fed on fish. The underwater picture of a 'flipper' taken in 1972 by Robert Rines closely resembles that of a plesiosaur.

There are objections to the suggestion. Plesiosaurs were air breathing, and if there were a whole community of the

creatures in Loch Ness, the surface would be broken several times an hour as the animals rose to breathe. Secondly, the temperature of the water is a fairly constant 42° – too cold for any known reptile.

## MOSASAURS

The name Mosasaur derived from the Meuse River in Belgium where the first discovery was made “Mosa” is the Latin form of “Meuse” and “saur” is from the Greek “saurus” meaning “lizard”.

**DISCOVERY:** The first mosasaur was found in 1780 by quarrymen working in a shaft 90 feet below the surface of St. Peters Mount at Maestricht, Belgium, in rocks of Cretaceous age. Dr. Hoffman, a surgeon of Maestricht was called to examine the remains of what proved to be the skull and vertebral column. However, the specimen was found beneath ground owned by a clergyman named Goddin who claimed it. He forced Hoffman to yield the specimen as well as pay the costs of the resulting lawsuit.

In 1815 the troops of the French Republic, repulsed by the Austrians, laid siege to the city of Maestricht and bombarded Fort St. Peter. The commanding general of the French army ordered his artillerymen to avoid Goddin’s country house where the now famous fossil was kept. Goddin guessed the reason behind this and had the specimen removed and kept in the city.

After Maestricht fell, a reward of 600 bottles of wine was offered for its recovery. The following day the specimen was borne into French hands by a dozen grenadiers. It was sent to Paris, where it remains in the collections of the Museum National d’Histoire Naturelle.

**PHYSIOLOGY:** People are inclined to think of animals from the “Age of Reptiles” as primitive, and so many of them were, but if by primitive we mean to imply simple, or unspecialized, then the term cannot be applied to the mosasaur, for this voracious fish-eater was beautifully adapted to its underwater environment. For example, the design of the jaws of the mosasaur permitted great expansion, enabling the beast to swallow bulky prey. A joint in the middle of each mandible permitted the jaws to bow outward when opened. Two rows of hook-like teeth in the roof of the mouth held prey while the pointed recurved teeth of the jaws slashed it apart.

In size and head-shape the mosasaurs somewhat suggest modern alligators or crocodiles, though no creature living today bears more than a superficial resemblance to this extinct hunter of the seas. Its nearest surviving relatives are the monitor lizards of Africa and Asia.

The limbs of mosasaurs were modified into paddles and some species developed a tail fin to assist movement in the

water. The long backbone was made up of as many as 130 cup-and-ball vertebrae, indicating great flexibility. The tail which was long and muscular was moved in an undulating manner from side-to-side to provide the motive power for the big lizard. The relatively small flippers acted as stabilizers.

From its body construction, it appears that the mosasaur was a sub-surface feeder, pursuing its prey in much the same manner as seals do today. In all likelihood mosasaurs were viviparous, bearing their young live, since certain other reptiles are known to do this. It is possible, however, that they dragged themselves onto land to lay eggs like present day sea turtles. Mosasaurs were fish-eaters, although some skeletal remains indicate they may have been cannibalistic as well.

Some types of mosasaurs grew to lengths of 45 feet or more, the majority measured from 10 to 20 feet in length. Darting through the water in pursuit of smaller dwellers of the deep, the mosasaur must have proved a fearsome predator, extremely capable of holding his own against all comers.

## SQUIDS

Cephalopods are mollusks that have tentacles such as squids and octopuses. The fossil depicted on the website is the pen of a fossil squid. Pens are stiff rods of connective tissue, which are formed inside the animal to give them support. This specimen belongs to an extinct family of squids known only from the Jurassic of Germany and the Cretaceous of North America. The fossil squids discovered in southern Manitoba are among the largest known, indicating sizes ranging up to sixty feet in length.

Present day giant squids are preyed upon by sperm whales. The large fossil squids were probably preyed on by mosasaurs.

## TURTLES

The marine turtles of the Late Cretaceous include many large, spectacular forms. The largest, Archelon, reached twelve feet in length, with a large head and hooked beak. The limbs were modified to serve as powerful paddles, of which the front flippers were the major source of locomotion. The head probably could not be withdrawn but protection was afforded by a series of scutes (bony armor).

Present day turtles could be called “living fossils”, as they have changed little during the past millions of years.

## SHARKS

Sharks are among the most primitive of fish, first appearing in the fossil record almost 400 million years ago. The shark differs from other fish in that it has no bone in its skeletal structure. Its frame is composed of cartilaginous material. Usually the teeth are the only hard parts found preserved although the occasional vertebra has been found ossified.

These early sharks resembled modern sharks but were usually much smaller than many today.

Modern sharks first appeared in the Jurassic some 200 million years ago. Most Jurassic sharks were of moderate size but when the marine reptiles, the mosasaurs and plesiosaurs, died out at the end of the Cretaceous sharks became the dominant animals in the seas. They culminated in the giant of them all. Carcharodon, was a relative of the great white shark which still survives. Great whites today can reach lengths of 40 feet with 3 inch teeth. Carcharodon was over 50 feet in length and had teeth 8 inches long set in jaws that were over 6 feet wide.

## FISH

There were a great variety of fish present during the Cretaceous. Many of them are known only from tooth remains.

Among them was the bulldog tarpon, Xiphactinus. This species had a blunt head and jaws set with sharp teeth, reached a length of 15 feet, and weighed 500 to 600 pounds. It fed upon smaller fish and the young of marine reptiles. Another tarpon like fish was the smaller Gillicus.

## BIRDS

**ICHTHYORNIS:** With its feathered body, powerful wings and keeled breastbone, Ichthyornis, (“fish bird”) must have looked and acted like a plump tern. The mouth was armed with backwardly curved teeth which did not reach the front of the upper jaws; the lower jaws had extra joints which allowed them to open widely like the jaws of mosasaurs, with which they have sometimes been confused.

Though the various species of Ichthyornis stood only 6 to 9 inches high, they were apparently able to swallow thick-bodied fish.

**HESPERORNIS:** Very little is known about Cretaceous birds, for their remains are fragmentary and rare. Hesperornis (“western bird”) had very large feet, diminutive wings and a flat unkeeled sternum, thus indicating that it could not fly. Its legs were turned backward so far they could only be used for swimming.

Hesperornis had no need for wings or walking legs as long as it stayed in the water. There it lived like an oversized, flightless loon, skimming over the surface, diving, and swimming long distances while submerged. It could easily capture small fish while dodging carnivorous reptiles that might have fed upon it. Hesperornis probably nested on isolated islands or it is possible that it gave birth to live young and never ventured onto dry land.

## RESOURCES/CREDITS



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### Resources:

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