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Cretaceous Marine Reptiles

Fact Sheet

Introduction

Reptiles were among the first vertebrates to be fully adapted to life on land. Unlike their amphibian ancestors, the reptiles were able to move freely on land because their eggs, which had a protective and often hard shell, did not need to be laid in water or moist areas. Many millions of years after they first appeared on land, some reptile groups returned to the sea by evolving an ability to swim. Marine reptiles have been found across the globe, including Australia. The best record for fossil marine reptiles in Australia comes from central Queensland, from rocks dated to around 110-100 million years old (Early Cretaceous Period). These rocks formed at the bottom of a great inland sea which stretched throughout central and southern Queensland, into northern New South Wales, and South Australia. Vast numbers of bones and shells accumulated on the sea floor, eventually becoming fossilised, forming layers of what is now the Great Artesian Basin.

Turtles and Ichthyosaurs

Fossil remains of marine reptiles so far found include those of turtles similar to those found today, dolphin-like reptiles called ichthyosaurs, short-necked pliosaurs and long-necked plesiosaurs. All of these reptiles breathed air and, except for some turtles, were flesh eaters. The fossil turtle, *Notochelone costata*, was the most common marine reptile in the inland sea, but the plesiosaurs and ichthyosaurs are probably the best known. Ichthyosaurs (‘*fish lizards’*) evolved a streamlined, fish-like shape similar to sharks and dolphins, but had their ancestry on land. They show that a close resemblance or convergence can develop between very different animals that adapt to a similar way of life. Ichthyosaurs were fast and agile swimmers. *Platypterygius* (*'broad fin')* was a large ichthyosaur which grew to 6 or 7 m long. It swam by moving its tail from side to side, as fish do, and similarly, steered with its paddles. Ichthyosaurs were completely adapted to life in the sea. Their young were born live so the mother did not have to come out of the sea to lay her eggs as other marine reptiles such as turtles do. The ichthyosaur hatchlings were born tail-first and were ready to swim as soon as they were born, similar to whales and dolphins today. *Platypterygius* hatchlings were nearly 2 m long. A hatchling and its mother were discovered in Queensland in 1988. The hatchling's head was on one side of a piece of rock and ten of the mother's ribs were on the other side. The mother's snout and tail were not found, but nearly 3 m (half) of her body was preserved.

Plesiosaurs

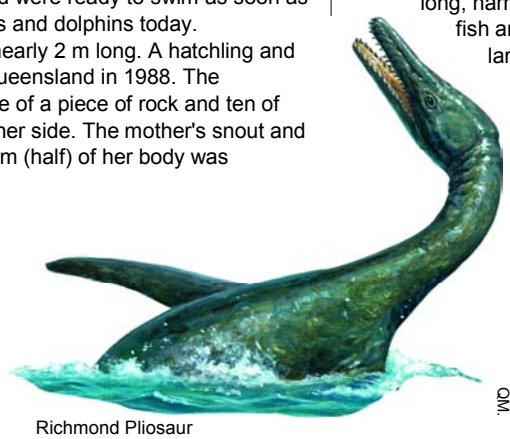
Plesiosaurs and pliosaurs, unlike ichthyosaurs, swam with their paddles and steered with their heads and tails. Pliosaurs usually had short-necks with big heads and large teeth while plesiosaurs had long-necks, small heads and fine teeth. *Eromangasaurus australis* was a long-necked plesiosaur and a partial skeleton (backbone) in the Queensland Museum suggests the animal could have been 9 to 10 m long. Scientists think plesiosaurs, like *Eromangasaurus*, may have left the water to lay its eggs on the beach, like a turtle. The most complete Australian plesiosaur remains were discovered in 1999 in northern Queensland. The specimen, 80 per cent intact, has been affectionately nick-named 'Dave' after its discoverer. Dave was 5 m long, including a 3 m neck. ‘Dave’ had crushed bivalve (clam) shells preserved in its gut region. This was surprising, as plesiosaurs were not previously known to have preyed on bivalves.

Pliosaurs

Kronosaurus queenslandicus, a short-necked pliosaur, was probably one of the most ferocious carnivores of the inland sea. The best-known skeleton of *Kronosaurus* was taken to America by its discoverers and is on display at Harvard University. Its length, as mounted, is 12.5 m long but only 1.5 m in diameter. *Kronosaurus* had massive jaws with 15 cm teeth. *Kronosaurus*' cigar-shaped body was driven through the sea by four of the strongest paddles ever developed by a marine animal. These probably moved the streamlined rigid body faster than any other sea animal - when it kept to a straight line. *Kronosaurus* could have killed and eaten any large animal it caught, but supple ichthyosaurs could have probably dodged it. The animal takes its name from *Kronos*, a mythical Greek giant who ate his own children!

Smaller pliosaurs shared the seas with giants like *Kronosaurus*. The seal-sized *Umoonasaurus demoscyllus* from South Australia was found in 1987 by opal miners. It was an almost complete skeleton, preserved in beautiful white opal. Another well-preserved specimen is the ‘Richmond Pliosaur’, found near Richmond, north-west Queensland. This un-named species is one of the most complete pliosaur fossils in the world, only missing some of the paddle bones. The Richmond Pliosaur has long, narrow jaws that indicate it probably fed mostly on fish and belemnites. However it could also tackle larger prey, as fossil turtle shells have been found with teeth marks that closely match the jaws of the Richmond Pliosaur.

Kronosaurus and *Eromangasaurus* exhibited two extremes in body shape. The differences in their shapes were achieved during more than 100 million years of adaptation to different sizes of prey and hunting techniques. Some smaller long-necked plesiosaurs, which had less specialised necks than either of these animals, lived in brackish to non-marine conditions in the central parts of the inland sea and streams. Opal miners have found their remains in northwestern New South Wales.



Richmond Pliosaur

QM.

Queensland Government

Although *Platypterygius*, *Kronosaurus* and *Eromangasaurus* were large carnivorous marine reptiles sharing the inland sea, competition for food was not as fierce as might have been expected. Study of fossil remains reveals the animals specialised in different food sizes. The long-necked plesiosaurs like *Eromangasaurus* followed behind schools of small fish, belemnites and ammonites (relatives of today's cuttlefish and squid). Long-necked plesiosaurs are commonly depicted with very supple, flexible necks, but some scientists now think they were held straight. This would allow the plesiosaur to strike at prey while concealing the bulk of it's body in murky water. Ichthyosaurs were well equipped to catch fish, but fossilised stomach contents show that their favourite foods were belemnites and ammonites. *Kronosaurus* ate larger fish and reptiles. Teeth marks, probably those of *Kronosaurus*, were found on the skull of *Eromangasaurus*.

Fish

Large predatory fish and sharks were common in the inland seas. These include sharks (possibly species of *Cretolamna*) related to modern Great White Sharks. One *Kronosaurus* specimen had shark vertebrae preserved at the back of the skull, possibly indicating that it choked while eating a shark. Large bony fish such as *Cooyoo australis* and *Pachyrhizodus marathonensis* would also have been significant predators. A large filter-feeding fish (*Richmondichthyes sweeti*) had armour-like scales, possibly as a defence against predators.

Further Reading

Marine reptiles

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