

LIGHTNING RIDGE, N.S.W.

Situated in northern New South Wales, close to the Queensland border, lies the town of Lightning Ridge. World famous for its black opal, it is also well known in palaeontological circles for its opalised dinosaur bones. The sediments in which the opal and opalised bones are found were laid down during the Cretaceous Period, around 100 to 120 million years ago. They are part of the Finch Clay Facies within the Wallangulla Sandstone member of the Grimman Formation and are thought to be of freshwater deltaic to estuarine in origin.

Opal requires specific environmental conditions in which to form. During the Cretaceous Period parts of Queensland, New South Wales, Northern Territory, Western Australia and South Australia were covered by the Eromanga Sea. Its size and shape shifted constantly as it ebbed and flowed, and as it receded it deposited silica-rich deposits along its shoreline. Extensive erosion of the silica-rich deposits around 30 million years ago led to the release of large amounts of soluble silica, which permeated into cracks and cavities in the sediments, infilling natural moulds from plants, animal bones and teeth. Over time the silica hardened to form non-crystalline opal with unique light diffraction properties, which makes opals shine with so many colours today.

Opal is only found in a few places in the world and Lightning Ridge is the only place in Australia where black opal is found. Miners have been digging for the precious gem in and around Lightning Ridge for over one hundred years. During that time no doubt countless opalised bones were discovered, but many miners would not have recognised them as fossils and would have cut them up for their opal content. It wasn't until the 1970s and 80s when concerted efforts by palaeontologists like Alex Richie and Tom Rich encouraged opal miners to come forward with any strange shaped opal they may have found, that important finds were brought to light. Since then hundreds of fossil bones and teeth have been discovered, including Australia's first Mesozoic mammal – *Steropdon galmani*.

In 2005 miners Rob and Debbie Brogan found a partial dinosaur skeleton, which was analysed and described earlier this year. Nicknamed "Lightning Claw" it belongs to a group of large carnivorous dinosaurs called Megaraptora. It is only the second theropod dinosaur in Australia known from more than a single bone; the first being *Australovenator wintonensis* from Winton. Large theropod dinosaur claws have been found in the Early Cretaceous rocks of Victoria, but they are not diagnostic enough to be named.

As more fossils came to light it became obvious that some of these amazing finds should be displayed for the general public to appreciate. So the concept of the Lightning Ridge Opal Centre was formed. Currently information, books and opals are on display in the Australian Opal Centre showroom in Morilla Street, including a model of what the new Opal Centre will look like. The state of the art two storey, energy efficient underground building, designed by renowned architects Glenn Murcutt and Wendy Lewin, will house an amazing collection of priceless opals and fossils as well as being the centre for education and information of the region. At the moment it is a rather large hole in the ground, but funding for the Centre is progressing and it should not be long before it comes to fruition.

One of the many fund-raising schemes for the establishment of the Opal Centre is an annual Fossil Dig, conducted in a large shed adjacent to the site of the future Australian Opal Centre on the Coocoran opal fields. The digs are organised by Elizabeth Smith, palaeontologist, artist and member of the Australian Opal Centre committee. Elizabeth and her husband Robert have lived in Lightning Ridge for almost 40 years and Robert mined a claim many years ago before concentrating on perfecting the photography of the beautiful black opal. His photographs can be seen in their book "Black Opal fossils of Lightning Ridge", which includes images of opalised fossils as well as stories of life in this outback town. Elizabeth wrote her PhD thesis on the fossil turtles of Lightning Ridge and now spends most of her time at the Opal Centre as well as a valuer of the opal specimens that are brought in by the miners.

For more information on how to join the next Fossil Dig at Lightning Ridge in 2016, visit the website at: www.australianopalcentre.com

Further reading:

Black Opal Fossils of Lightning Ridge 1999. Written and illustrated by Elizabeth Smith, photographs by Robert Smith. Kangaroo Press.

A Large-clawed theropod (Dinosauria: Tetanurae) from the Lower Cretaceous of Australia and the Gondwanan origin of megaraptorid theropods. P.R. Bell, A. Cau, F. Fanti and E. Smith. Gondwanan Research 2015.



Inside Australian Opal Centre showroom, Lightning Ridge, NSW.
Photographer: Gerry Kool



Inside the temporary Opal Centre, adjacent to future Centre site, with display of some of the inventive methods of opal tumbling.
Photographer: Gerry Kool



Sign on the Coccooran opal field, depicting future Australian Opal Centre.
 Photographer: Gerry Kool



Large hole in the ground – site of the future Australian Opal Centre.
 Photographer: Gerry Kool.