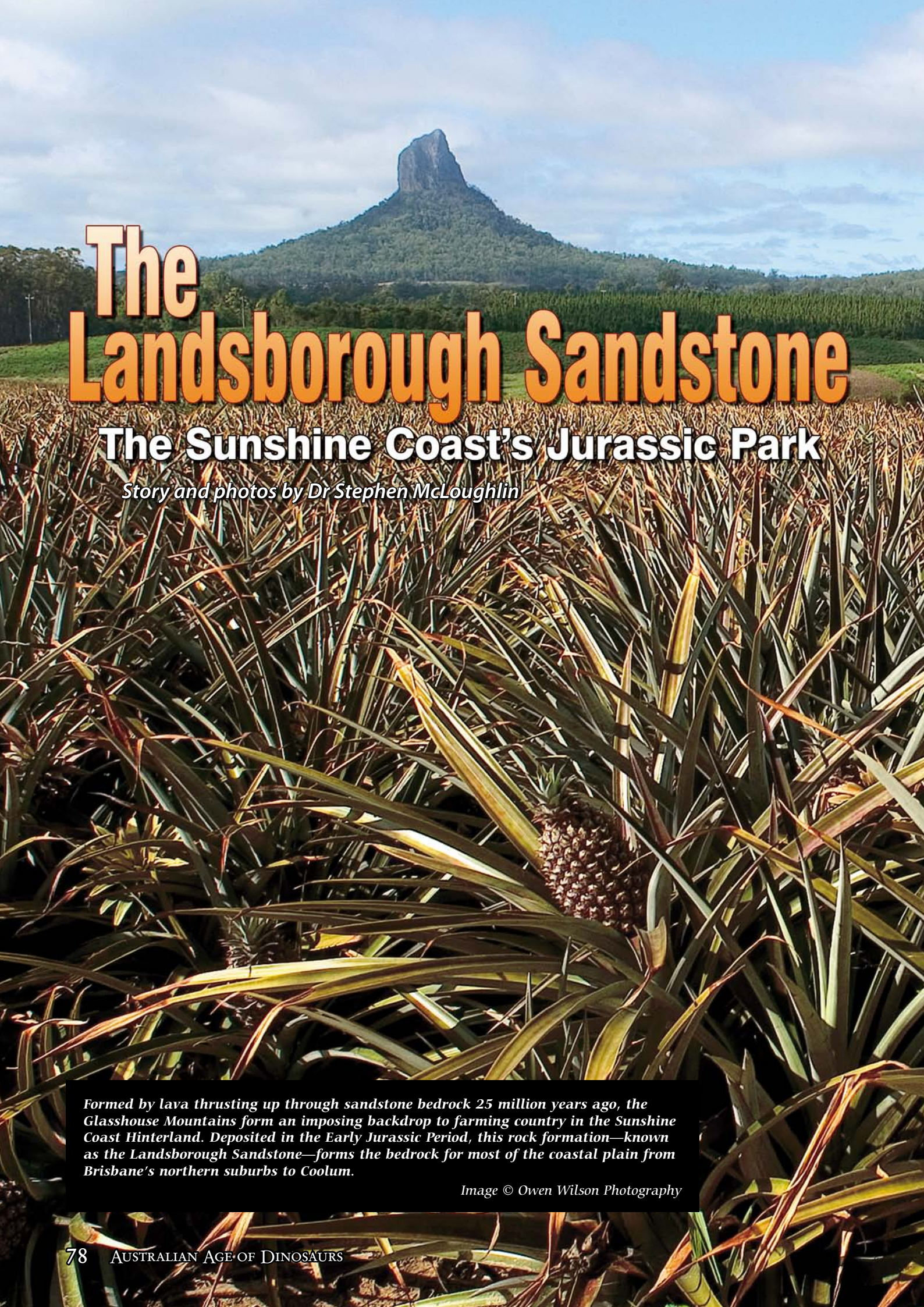
The Landsborough Sandstone

The Sunshine Coast's Jurassic Park

Story and photos by Dr Stephen McLoughlin



Formed by lava thrusting up through sandstone bedrock 25 million years ago, the Glasshouse Mountains form an imposing backdrop to farming country in the Sunshine Coast Hinterland. Deposited in the Early Jurassic Period, this rock formation—known as the Landsborough Sandstone—forms the bedrock for most of the coastal plain from Brisbane's northern suburbs to Coolum.

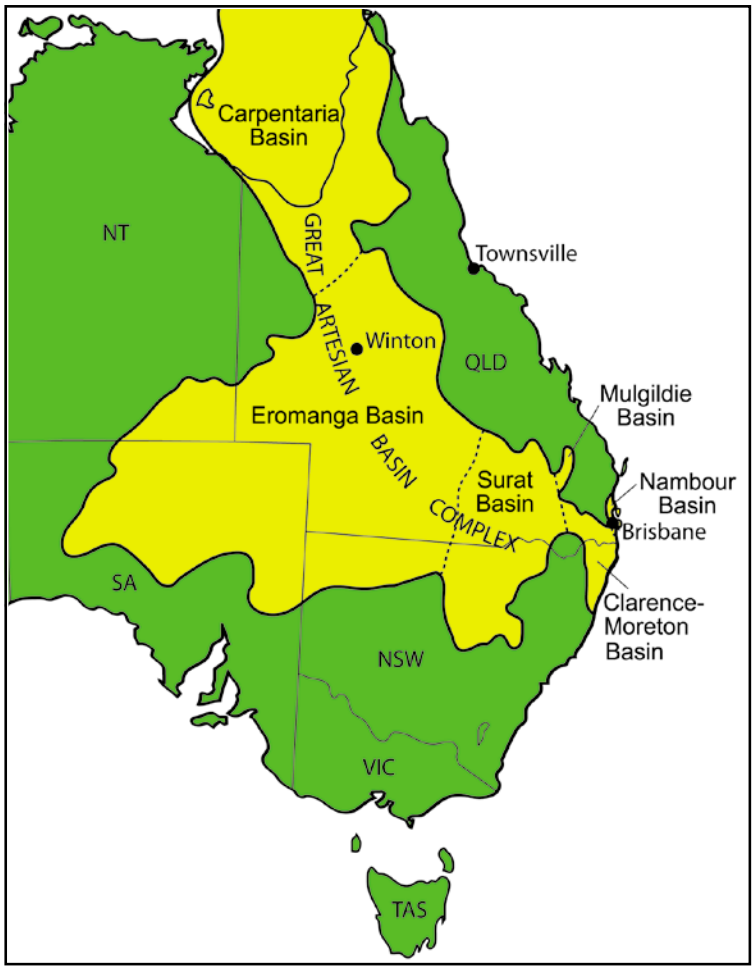
Image © Owen Wilson Photography

My introduction to fossil collecting came as a young boy growing up on a farm near Caboolture. Each time an old crop of pineapples was ploughed into the ground, small pieces of fossil wood would appear in the freshly disturbed soil.

These silicified stem fragments were easy to spot due to their distinctive woody grain and yellow to pinkish colour which stood out well among the pieces of quartz and ironstone on the surface. Over the years, quite a selection of fossil wood fragments were gathered from the farm paddocks whereupon they were tossed into an old billy-can. Today, many years later, these same specimens are neatly arranged and curated in a museum drawer, patiently waiting for a researcher to investigate their identity and unravel what information their growth rings might hold about Australia's ancient climate.

Those fossil wood fragments in the pineapple patch, it turned out, were weathering out of the underlying Landsborough Sandstone. This Early Jurassic formation forms the bedrock for most of the coastal plain stretching from the northern suburbs of Brisbane to Coolum in an area geologists call the Nambour Basin. The Landsborough Sandstone is the bedrock through which the Glasshouse Mountains volcanoes forced their magma 25 million years ago. It is the Landsborough Sandstone that crops out to form the majestic promontories of the Sunshine Coast such as Caloundra, Point Cartwright, Alexandra Headland, Mudjimba, and Point Arkwright. These headlands not only refract the waves and uplift the sea breezes for the benefit of surfers and paragliders, but provide local windows into the geology underpinning the Sunshine Coast and shed light on the biota that lived in the region nearly 200 million years ago.

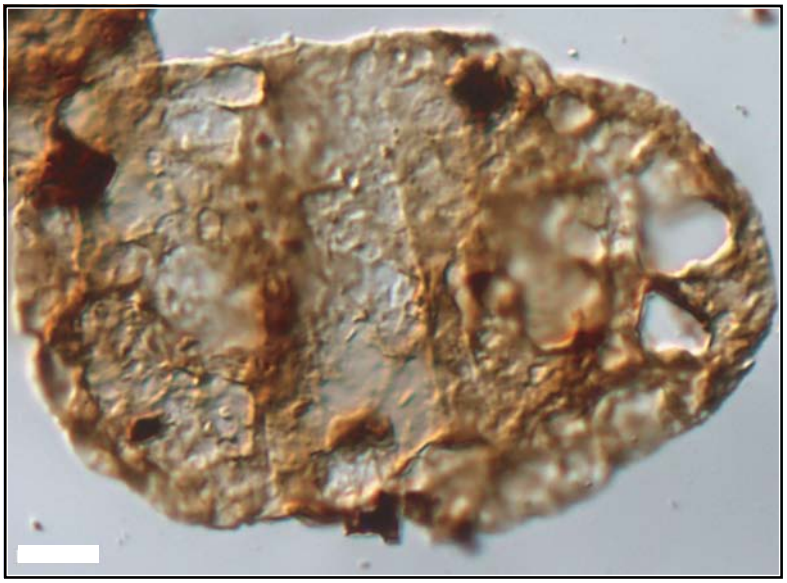
The sediments that now form the Landsborough Sandstone were deposited mainly in the channels and associated floodplains of large, north-easterly flowing, braided river systems around 200–175 million years ago. The rocks are mostly thick-bedded sandstones (hence the

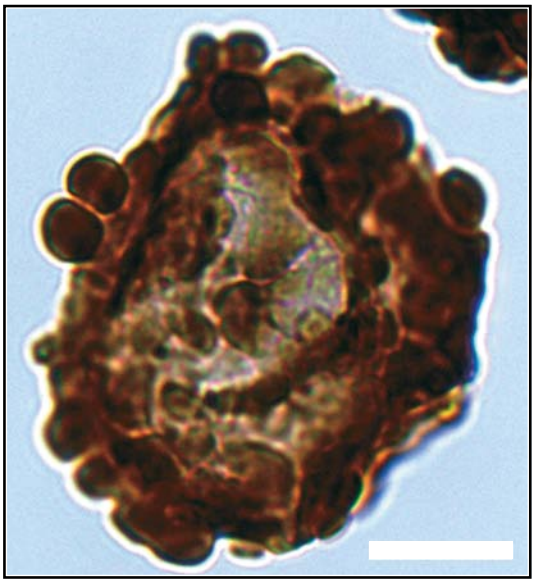


Outcropping along the coast north of Brisbane, the Landsborough Sandstone is the dominant sedimentary unit within the Nambour Basin *(see map left)*, ***forming the prominent headlands between beaches on the Sunshine Coast. The layered strata of the promontory at Point Cartwright, Mooloolaba*** *(above)* ***provides a window into the 200-million-year-old geological foundations of the Sunshine Coast, along with a venue for fishermen, paragliders, sightseers and local industry.***

name of the formation), but siltstones, conglomerates (consolidated gravels) and a few coal beds are also preserved.

How do we know the age of these rocks? There are no volcanic ash beds within the Landsborough Sandstone that we can date directly by radiometric means. Instead, the age is determined by matching fossils from this unit with other formations in the region that can be dated directly by uranium-lead or potassium-argon radiometric techniques. Fossil spores and pollen are particularly good for correlating rock units because a fist-sized piece of rock may contain tens of thousands of these microfossils. They not only help pin down the age





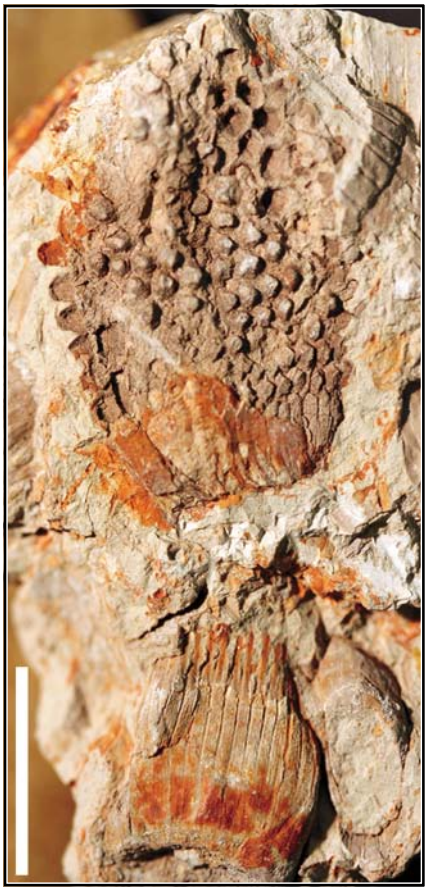
of the formation, but provide insights into the composition of the ancient vegetation and climate, especially in beds where leaf fossils are not preserved.

Fortunately, a few leaf fossils are preserved in the Landsborough Sandstone and these help fill in the details of the types of plants that grew in southeast Queensland during the Early Jurassic. Conifers were present, represented by tiny twigs with spine-like leaves. Ferns of various families are preserved, but examples related to the modern Royal Fern (Osmundaceae) family are especially well represented. Horsetails (Equisetales) are also common. One of these plants, recovered from an outcrop at Bald Hills, even retains the spore-producing, cone-like strobilus attached to the top of the jointed stem. Other plant groups are less familiar, such as the extinct Bennettitales – a group of scrambling shrubs with leaves superficially similar to cycads. Another extinct group was the Caytoniales, recognised for their mesh-veined leaflets that occur in sets of four attached to a single leaf stalk. They are an important group because studies of their seed-bearing organs suggest that they were close relatives of the flowering plants – although true flowering plants did not arise for another 50 million years. Yet another plant group was the enigmatic *Palissya*. This genus is commonly allied with the conifers but its loose cones with small, cup-like appendages on its fertile scales are unlike any modern conifer, hence it is assigned to its own family. Future studies may even show that it is allied to an entirely different group of plants.

Such leaf and cone fossils are sparse within the Landsborough Sandstone. They occur mainly within the thin siltstones, which weather away rapid-

With no volcanic detritus present to enable conventional radiometric dating methods, the comparison of pollens in the Landsborough Sandstone with pollens from other geological formations has played a huge role in determining the age of the deposit. Due to their abundance, fossil seed pollen *(above left)* ***and fern spores*** *(above right)* ***are particularly good for correlating rock units. A fist-sized piece of rock is capable of containing tens of thousands of these microfossils. Leaf fossils also help to fill in the gaps, with fossils of the Osmundaceae family being particularly well represented in the Landsborough Sandstone. The fossil specimen*** *(below inset)* ***from Narangba compares to a modern Royal Fern*** *(below).*

Images above courtesy of Vivi Vajda, Lund University Scale bar = 10 microns



***The stem and strobilus of a equisetalean (horsetail) recovered from an outcrop at Bald Hills** (left). **Although some plants such as conifers, horsetails and ferns are relatively common in the Landsborough Sandstone, others such as this** Palissya **cone, with finger-like appendages on its fertile bracts** (far left), **are rare.** Scale bars = 10mm*

Shore platforms along the Sunshine Coast often contain the iron stained remnants of fossil wood** (below left). **However, a range of unusual shapes such as concentric rings** (left) **and other strange patterns represent mineral growths, concretions or deep weathering and are not fossils.

ly at the surface. The best fossil deposits in the Landsborough Sandstone are generally found in freshly excavated quarries and road cuttings. Unfortunately, many of these prime fossil localities are transient. A fossil-rich claypit at Narangba has now been filled as a refuse tip, road cuttings are commonly grassed over, stream sections may be drowned by dams and some quarries may be 'rehabilitated' by well-meaning public officials and community groups. In these cases, valuable palaeontological heritage may be locked away or lost forever. Enlightened local councils would be wise to retain some of these exposures as sites for geoscience education and research.

Returning to the plant remains, it is permineralised wood that is the most commonly observed fossil type in the Landsborough Sandstone. It is regularly unearthed by local farmers ploughing ground or excavating dams. Examples of fossil wood are best seen by the public around the coastal headlands. Logs up to several metres long are exposed on some of the wave-cut rock platforms, where they are commonly stained brown or red by their high iron content. Where they are sufficiently well preserved, it is possible to prepare thin sections of these woods for microscopic examination of their cell structures. They are typically conifer woods with distinctive rings that indicate growth under a seasonal climate.

Not all the unusual structures on these rock platforms are fossils. Strange cannonball-shaped nodules, dish and turtle shell-shaped structures, and pock-marked patterns in the rocks that look like biological features, in reality represent a range of mineral growths, concretions and weathering characters that are not true fossils.

Finally, any discussion of a Jurassic Park on Brisbane's doorstep must ask the question: "Where are the dinosaurs in these Early Jurassic rocks?" Certainly, we find evidence of amphibian bones of this age in the neighbouring Clarence-Moreton Basin near Marburg. A reasonably complete amphibian fossil is also known further to the west, in the Surat Basin, and near Carnarvon Gorge there are also dinosaur tracks in rocks of this age. So far however, no vertebrate fossils of any type have been recovered from the Landsborough Sandstone. There is no particular reason why they should not be present – perhaps it is just a matter of time before one is found. So next time you take a trip to the Sunshine Coast beaches, keep an eye out for that 'first' Jurassic dinosaur bone in the local cliffs.

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