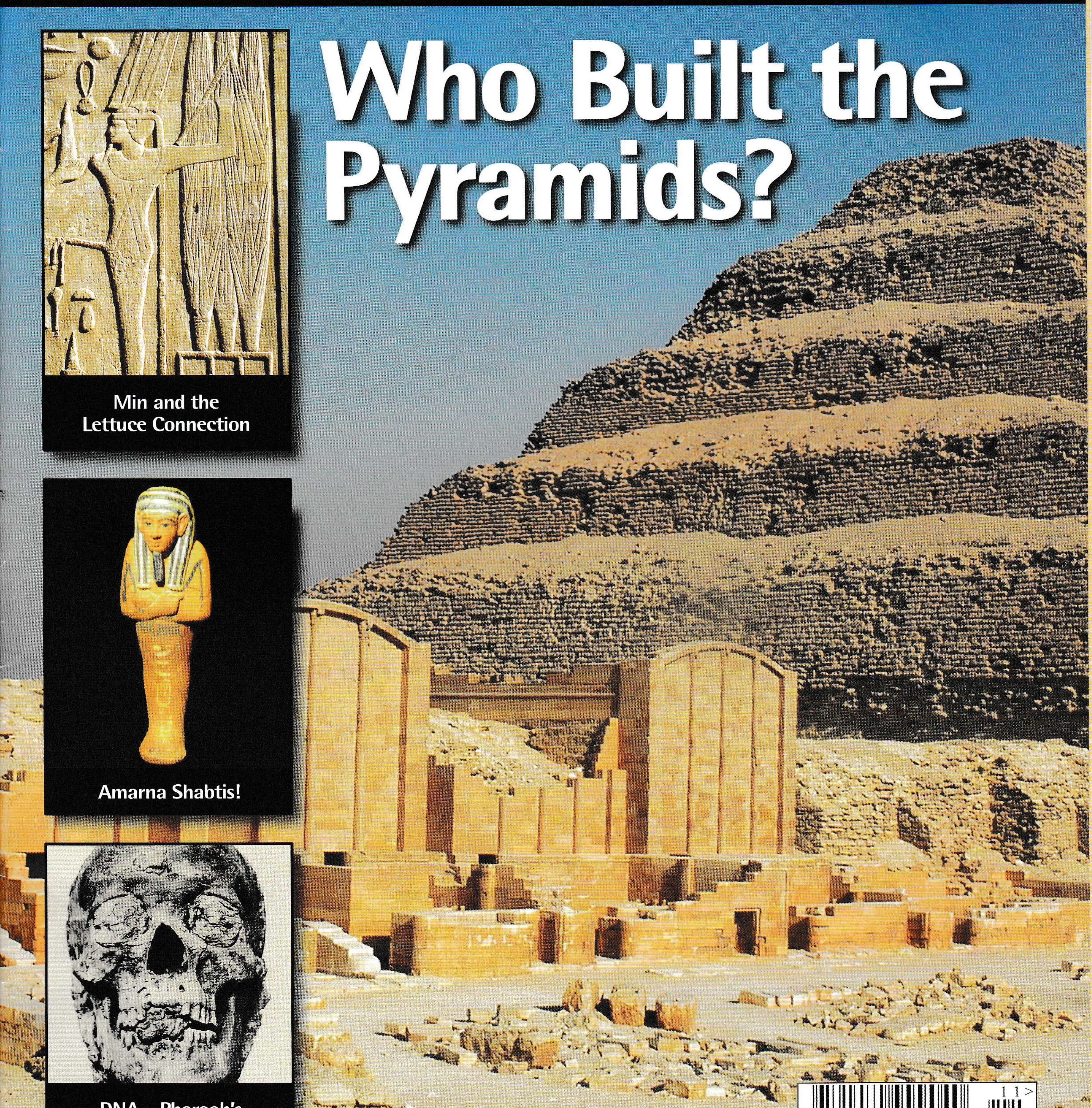
ANCIENT EGYPT

£4.90
Volume 13 No.2
Issue 74
October/November 2012

www.ancientegyptmagazine.com

The History, People and Culture of the Nile Valley



Who Built the Pyramids?

Min and the Lettuce Connection

Amarna Shabtis!

DNA – Pharaoh's

THE GEOLOGY OF GIZA

Geologist **Colin Reader** points out that the landscape of Giza has a direct impact on the antiquities that we see today and that detailed study of the lion body of the Sphinx reveals the complex geological history of the area.

The Giza plateau is an ancient wonder that, for thousands of years has drawn visitors from all over the world. But the existence of the plateau – of all its aspects from the prominent limestone escarpment, to the pyramids, temples and tombs themselves – owes much to a type of small creature that inhabited shallow seas that covered parts of north Africa about forty million years ago.

The small disc-shaped fossilised remains of these animals – nummulites *(see below left)* – have survived in abundance in the limestones at Giza. But on what basis can the site's impressive archaeological heritage be attributed to these creatures?

The rocks at Giza were formed from sediments laid down on a geologically ancient sea-bed that, at that time (some sixty million years ago), was crossed by a series of ridges – folds in the underlying bedrock. The shallow water conditions over these ridges were ideal for nummulites to flourish and, in some areas of the plateau, the limestones are almost entirely made of nummulite fossils *(see below right)*. These accumulations do not, however, reflect vast numbers of animals that developed in the shallowest areas, where the sea bed was churned by storm waves. It seems that heavy storms were a feature of this time and that they resulted in the removal of sand, silt and other fossils to leave behind only the relatively heavy nummulite remains.

It was the accumulation of these nummulites on an ancient sea-floor ridge, that led to the development of the landscape of the Giza plateau, with its area of high ground to the north, and it was perhaps this prominent landscape that originally drew the ancient Egyptians to the Giza site. Furthermore as discussed below, it was the variety of conditions that existed within the ancient seas at Giza, with nummulites, corals and other fossils, that led to the formation of a range of limestones that were quarried and then used for the building of the pyramids, temples and tombs.

The nummulite bank that developed in what was to become the Giza area, formed a 'reef' between offshore waters to the north and more sheltered conditions in the south, close to an ancient shore. The northern part of the Giza plateau, including the high ground on which the Great Pyramid sits, consists of the nummulite bank itself and other rocks formed under offshore conditions. The southern area of Giza, including the area of the Sphinx, consists of limestones laid down in more sheltered, lagoon conditions behind the reef.

The rocks of the Sphinx *(see opposite, bottom)* even show us how the conditions at Giza around forty million years ago began to change, with the shallow sea beginning to give way to the land. The lowest lying beds exposed by the excavation of the Sphinx ('Member 1' rocks in the cross-section) are rich in corals and have a hummocky upper surface. The sediments that formed these rocks were laid down in the shallow sheltered waters behind the nummulite-rich bank. Around this time, however, it appears that the ancient shore-line may have been shifting and, in the rocks that form the body and head of the Sphinx, we begin to see the influence of sediments from off the land.

ABOVE LEFT: A nummulite from the Western Desert of Egypt, 5 cm. in diameter. Photo: JPP.

ABOVE RIGHT: An accumulation of nummulites at Giza, with a pen to indicate scale. Photo Colin Reader.

These 'Member 2' and '3' beds *(see below)* are draped over the undulating upper surface of the coral-rich beds.

The 'Member 2' and '3' beds alternate between silty or clay-ey limestones and more durable sandy beds, which became the dominant strata near to the top of the sequence. The silty beds were laid down under calmer conditions within the lagoon, with the sandy beds showing an increasing influence of land-derived sediments. The 'Member 3' beds, which are the highest in the sequence and are particularly sandy, indicate a significant land-derived content and constitute the more durable beds from which the head and neck of the Sphinx were cut.

The different quality of the layers can clearly be seen at the site today, as the softer layers of stone have been eroded far more than the harder layers.

After these rocks were laid down, the eastern and northern flanks of the plateau were cut into steep cliffs by wave action from a sea that inundated the area about two million years ago. This natural landscape was then left largely undisturbed until the third millennium BC, when the ancient Egyptians were drawn to the site to build their huge tombs.

There is one other geological feature that is worthy of mention – the fragments of trees which can be seen scattered across the higher-lying areas of much of the desert fringe around Cairo and beyond. Although they look for all the world like wood, it's quite clear from the weight of the fragments that they are in fact stone; that is petrified wood *(see above right)*.

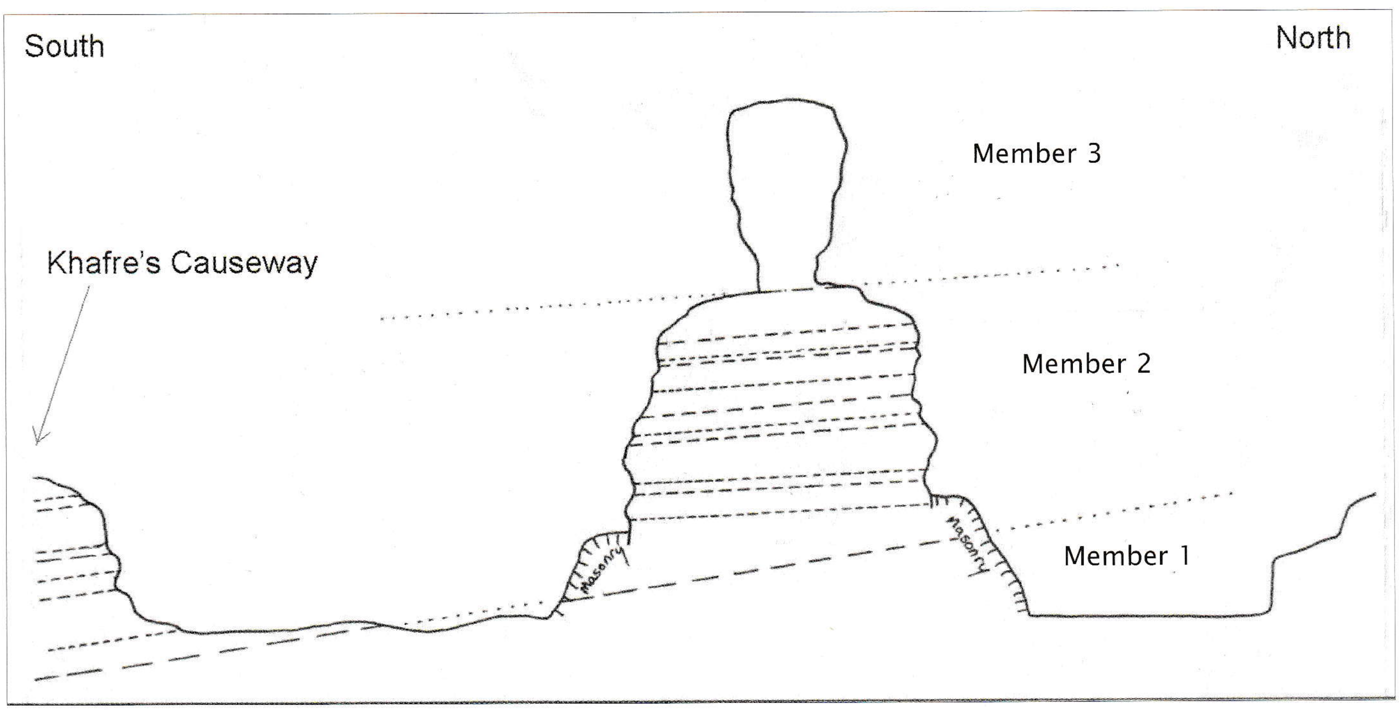
These fossilised trees provide some of the earliest evidence for a river system in north Africa some thirty-six million years ago [the Gilf River described by Colin in his article on the Geology of the Western Desert that appeared in AE 70, February/March of this year. Ed.]. A vast delta of gravels was washed down this river and deposited across the northern Libyan Desert and, if the evidence is to be believed, the river was huge, dwarfing today's Nile. The fossilised trees that litter the high plateau today must have been washed down this river from the south, from a tropical hinterland in the heart of what is now the African land-mass.

A piece of fossilised wood from Dahshur. Photo: JPP.

So, when you visit Giza, or indeed any other site in Egypt, don't just look at the monuments, look at the stone from which they are built or cut and at the stone they are built on; you will be witnessing history that predates the ancient Egyptian civilisation by thousands of millions of years!

Colin Reader

Colin is a geologist by profession. In recent years he has become very interested in the geology of Egypt and also in the archaeology of the Old Kingdom in particular. He is Chairman of the Manchester Ancient Egypt Society, and a regular contributor to AE.



A cross-section of the Sphinx at Giza, showing the three limestone 'members'. Drawing: Colin Reader.