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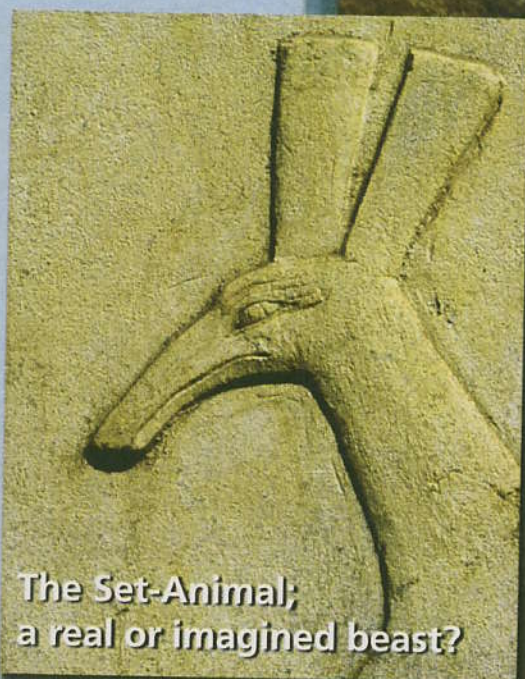
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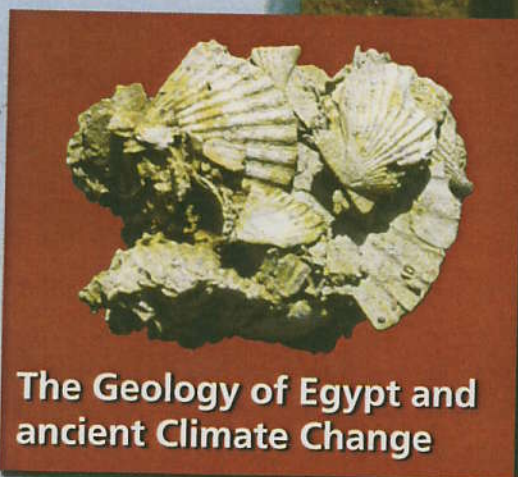
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The History, People and Culture of the Nile Valley

Lord Carnarvon, Egypt and Tutankhamun



The Set-Animal;
a real or imagined beast?



The Geology of Egypt and
ancient Climate Change





AE Supporting Egyptological Causes: 2009

The Egypt Exploration Society

In the fourth of a series of articles on the work of the Egypt Exploration Society, Dr. Judith Bunbury looks at the hard evidence for ancient climate change in Egypt and Sudan – Egypt and the Global Cooling Crisis.

Although we worry about global warming, the ancient Egyptians seem to have spent their time worrying about global cooling! With the help of the Egypt Exploration Society, who have funded expeditions across Egypt and into Sudan, we can start to take a regional view of some of the landscape and climate changes that have effected Egypt and the Egyptians since pre-historic times.

From a geographical point of view, the Nile ought to behave like any other large river, but the 'Messinian Salinity Crisis' when the Mediterranean dried out (between five and six million years ago) meant that its precursor (the Eonile) cut down two and a half kilometres to form a canyon larger than the Grand Canyon in the United States. When the sea flooded back into the Mediterranean basin, the canyon became an arm of the sea and gradually almost filled with sediments. While some of this sediment came from the White Nile, much of it also came from the wadis or sediment-filled valleys that, in earlier times, had been the tributaries of the Eonile.

As temperatures warmed dramatically at the end of the last Ice Age and sea levels rose the Sahara became green and the Nile Valley very wet. Evidence of hunting game in these areas in, for example, the Maadi culture (around 4,000 - 3,500 BC) suggests that the wadis contained tropical trees and grasses and were rich in game. However, after this warm Saharan Wet Period until the Industrial

Revolution the pattern of climate change has broadly been one of cooling, with the attendant desiccation of the Sahara and the destruction of the hunting ranges of the wadis.

As the ancient Nile canyon filled with sediments, bore-hole evidence suggests that sediment from the wadi fans splayed out into the Nile Valley dominating it, but later the 'Wild Nile', supplying abundant sediment from central Africa including the rich volcanic silts of the Blue Nile started to build the floodplain sediments around the wadi fans and in some cases dissected them, depositing silts instead. The modern Nile is constrained to flow within the ancient canyon walls and when, like many normal rivers, it tries to meander, it is hampered. The fertile silts of the Nile Valley are hence a veneer of sediment that has been re-worked many times during the past 12,000 years as the Nile writhed, trapped between its own canyon walls.

A traditional view of climate change in Egypt is that promulgated by the ancient Egyptian writers themselves, for example in the *Tale of Sinuhe*. The impression from early Middle Kingdom texts is often one of apocalyptic change with, for example, 'the river turned to sand-banks' in the *Prophecy of Neferti*; the harsh conditions have often been linked to the First Intermediate Period and the low Niles recorded for this time. Indeed these early gloomy texts spawned a whole genre of lamentation. However,



from current investigations, a more complex and subtle pattern of changes is emerging.

Living with Landscape Change

Our records suggest that in antiquity, as now, some changes were the inevitable landscape changes that occur on the timescale of a lifetime, and were probably regarded as a fact of life by the people of the time. An example is the fairly rapid process of island formation and accretion to the mainland. A recent instance of this was recorded by the Survey of Memphis from maps and boreholes around Badreshein Island, one of many islands in the Nile that is



Above:
the last of the vegetation in the desert of northern Sudan.

outside of the bends in its course, and faster-flowing water erodes sediments while slower water deposits them. This creates a tendency for the outside of bends to be eroded and the inside of bends to become silted up (see *photo below*). By this process, the bends in the

Left:
a small river in California demonstrates meandering behaviour, with an erosional outer bend to the right and new material being deposited on the left of the channel.



Below:
a petroglyph in the Sudanese desert, showing a giraffe, indicating that the area may have seen much greener times in the past.

no longer an island. The island, formed around 1930, was the focus of ownership disputes between the east bank and the west bank but eventually the matter was decided when the island bonded itself to the west bank of the Nile where, by the 1970s, it was becoming part of the mainland.

The Nile's channel can migrate sideways as part of its meander pattern by up to nine metres a year when island formation and accretion is included, although the more modest rate of around two metres a year is common. Meandering occurs because the Nile's course is in soft sediment, albeit constrained by the canyon walls. River water tends to flow fastest around the

river migrate outwards and downstream. Meandering means that, if you live on the outside of a bend you are likely to be washed away but if you live on the inside of the bend of the river you will be left high and dry.

Opposite page:
human skulls in the desert. Following climate change, the land was no longer able to support the early inhabitants.





Movement of river channels is a perennial problem for the occupants of a river floodplain but the Nile-dwellers now and in the past seem to have realised that the win-win situation is to build your house or temple upon an island, which is not eroded during meandering. This pattern is evident in modern times in the situation of farm buildings but is also apparent in the records of the Survey of Memphis, which show that the migrating bend has spawned a chain of historical islands, the most recent of which is Badreshein Island mentioned above. Each of these islands in turn has been settled and many of the settlements remain today. In some rare places where the Nile floodplain is narrow, for example Armant, it seems that the channel merely flips from one side of the island to the other and back again over time, making these narrow points in the floodplain strategic locations.

On a broader scale, there are more subtle long-term changes spanning several generations; they are produced by the slow global cooling that followed warming at the end of the Ice Age. This has dried northern Africa, bringing about the return of the Sahara Desert. As the desert developed, there seems to have been a complex interplay between the formerly vegetated wadis, which became unstable and collapsed, pulsing sediment into the Nile Valley and the Nile itself, which has a seasonal flood provided by the Ethiopian monsoon. At times, the wadis seem to have become very prominent with their fans pushing out into the floodplain while, at other times, the Nile, swelled by the monsoon flood-waters of the Blue Nile, flooded into the wadi mouths and drowned the wadi fans. During the Predynastic Period it has been noted that these wadi fans were favoured as occupation sites and that, as they were conveniently situ-



Above:
workmen augering the muds
of the Nile floodplain.
Photo: Omar Farouk.

Right:
muds retrieved by augering
awaiting analysis.

Below:
the Nile floodplain today.



ated at the mouth of a vegetated and game-rich wadi system with access to the Nile, they were the 'des. res.' of their day (see illustrations on page 54).

Mud and Fly-tipping

The Nile's former courses and patterns of broader landscape-change can be teased out by boring the mud using an auger, a method widely used in Egypt. In our work we take a forensic approach to the mud, silt and sand recovered. By

making a detailed description of the colour, grain-size and other characteristics of the sediments, we can deduce the type of watery environment in which they were deposited. Then we sieve out all the items larger than two millimetres in diameter that are in that sediment to provide additional clues. Over the past seven years of sifting mud in this way we have recovered a surprising variety of bits and bobs, which include a human tooth, a faience bead, chippings of building and decorative stones, plant remains and thousands of fragments of pottery. Some bits, including roots and rolled sherds, contribute to the environmental evidence, while others provide clues as to the dates of the deposits.

In addition to our own logs, we have access to the vast reservoir of borehole logs that have been collected by members of the EES as part of a number of expeditions over the past twenty years.



Chad has provided the key to interpreting these disparate results.

Kröpelin's results, published in *Science* in 2008, show in detail the climatic changes for the southern Sahara over the past 6,000 years. His comprehensive dataset from a rare perennial lake, Lake Yoa, showed how rainfall, vegetation and windblown sand levels have changed over the period. Using this as a baseline record, we can assemble the data from our many boreholes, mindful of the time-clues that they contain, to show how desertification of the Sahara swept southwards producing sahel and then desert conditions in Egypt. So, while observations in the north suggest that sahel conditions already prevailed during the Fifth Dynasty, and that wind-blown sand arrived during the late Old Kingdom, in the Karnak area the process is not evident until the First Intermediate Period to early Middle Kingdom.

Moving further south to the area of 'Khafra's Quarries', excavated by Ian Shaw in the Gebel al-Asr area near Abu Simbel, there is no evidence for sahel conditions until the end of the Middle Kingdom with laminated sand and loose wind-blown sand post-dating the latest extraction at the site.

Above:
at work on the EES Survey of Memphis in 2004, investigating the in-filled river channel at Badresheim. On the left is Dr. David Jeffreys, the Project Director.

Left:
the Nile floodplain from the desert escarpment at Saqqara.

Below:
a view of the River Nile in the north Sudanese desert. It is easy to understand the lure of the river when the deserts dried out.
Photo: Graham Smith.



The results from each log provide a record of the changes in the waterscape at a particular point in space through time, a kind of sedimentary narrative. In many cases the accidental (or deliberate) addition of rubbish to the deposits can provide a constraint on the dates of the landscapes. The difficulty then is how to synchronise all these separate narratives into a four-dimensional map of Egyptian landscape change! Fortunately, work far to the south in



Badarian



Above:
a reconstruction of a wadi mouth
and the Nile Valley in the
Predynastic Period.

Ancient Egyptian rule periodically extended beyond the southern boundary of modern Egypt into what is now Sudan. Work with Kate Spence and Pamela Rose just beginning, between the Second and Third Cataracts at Sesebi, suggests that Egyptian occupation co-incided with the time at which sahel conditions were still extant in the south while the Nile Valley, in what is now Egypt, was already surrounded by desert. In future seasons we hope to continue our augering campaign to test whether the end of New Kingdom colonial rule was related to the collapse of

the hinterland vegetation in the area and the onset of full desert conditions, which precipitated a retreat to the homeland.

Movement of People

How did the people fit into this pattern of landscape change? This is the province of hydro-politics but we may speculate that the lack of cultural continuity between the Predynastic communities was linked to their relative isolation in the large wadi systems of what are now the deserts of Egypt. With global cooling after the Saharan warm period, these people were displaced from the, by then, fragile wadi habitats and pushed towards the Nile Valley, where we find them in the Early Dynastic Period perching on the dissected wadi fans. Perhaps the events of the end of the Early Dynastic – the conflict implied in the Narmer Palette and its resolution in the unification of Egypt – were driven by the need to become a settled and co-operating community. Certainly this transition was not smooth or instantaneous since the borehole evidence points to at least three further episodes of wadi activity as rainfall destabilised the denuded wadi sands, washing them into the floodplain. Each was followed by a come-back on the part of the silts of the Nile Valley.

As populations were increasingly focussed into the Nile Valley, the need to co-operate and maximise the productivity of the floodplain became more urgent. To some extent the conflicts we are now seeing between the nomadic peoples of the ephemeral lakes or 'dars' in Sudan and more settled populations reflect those that occurred further north in Egypt when the nomadic life-style of Predynastic Egypt came under pressure from habitat collapse in the Saharan hinterland. Perhaps the sahel phase marks the point at which both life-styles are equally precarious and conflict reaches a maximum?

Evidence from the north of Egypt suggests that the early Old Kingdom was the time when the Sahara started to become a wilderness and the Nile Floodplain less wild as the river focussed into a few large channels much like those of today. These changes swept southwards through Egypt over the following millennium. Without the counterbalance of the Saharan hinterland,

Below:
a reconstruction of a wadi mouth
and the Nile Valley in the Early Dynastic
Period, when the wadi wash-out has
begun and human settlements became
concentrated and focussed on the
banks of the River Nile.

Early Dynastic





Left:
Zootechus Insularis, a small snail that survived in the Sahara Desert during the Old Kingdom (identified by Richard Preece).

settlements moved onto the river levées and islands of the Nile channel where they were protected from flooding. Only the memory of the former ranges survives in the routes through the desert to the oases, to the mines, the Red Sea and in the Bedouin life of the Eastern Desert.

From the Old Kingdom to the nineteenth century, settlements have followed the writhings of the Nile across its floodplain with well-documented episodes of technological change and the harnessing of the waters for irrigation. Only since the construction of the Aswan High Dam have new patterns of settlement and life on the Nile begun to emerge.

It is interesting that, although there were ancient perceptions of change and crisis, the ancient Egyptians overall proved remarkably robust in the way that they adapted and re-adapted to their landscape in flux. Now that, over the past few centuries, global temperatures have started to climb again, we might predict that the sahel belt with tropical savanna close behind will start to migrate northwards, again greening the Sahara as it goes. As scientists then, the race is on to recover the evidence of the fossilised Global Cooling Event before our current episode of Global Warming washes it away! In the meantime, will we prove as resourceful and robust as our forebears were and adapt to the challenges that change offers us?

Judith Bunbury

Judith is a geologist at the Department of Earth Sciences in the University of Cambridge, who, with her graduate students, focusses on cultural landscapes and waterscapes, particularly in Egypt.

All illustrations, unless otherwise stated, by the Author.

About the EES

The Egypt Exploration Society is one of the most important foreign institutions carrying out archaeological work in Egypt. Most of the funding for our work comes from membership subscriptions, and membership is open to anyone with an interest in ancient or mediaeval Egypt.

If you would like to support fieldwork and research in Egypt, please join the Society and help to continue the work of archaeologists such as Howard Carter, who began his career working for the Society.

Membership benefits can be found on our website (www.ees.ac.uk). All Members can attend EES events around the country and in Cairo, and have access to our important and comprehensive Egyptological library in London. Most importantly, you will know that your subscription is helping to continue the long tradition of British fieldwork and research in Egypt.

Through a new initiative launched in 2008, members can also contribute directly to particular projects and become members of the 'Amelia Edwards Group'. For full details see our website.

The Egypt Exploration Society has an increasing presence on the internet with a rapidly-growing 'Facebook' group and on-line news feeds and blogs, to keep members up-to-date with the Society's news and events.

Contact Details

The Egypt Exploration Society,
3 Doughty Mews, London WC1N 2PG.
Telephone: +44 (0)20 7242 1880. Fax: +44 (0)20 7404 6118.
E-mail: contact@ees.ac.uk.

Below:
Modern bottles in reed beds along the banks of the Nile will help to provide time-markers for future archaeologists and geologists.

