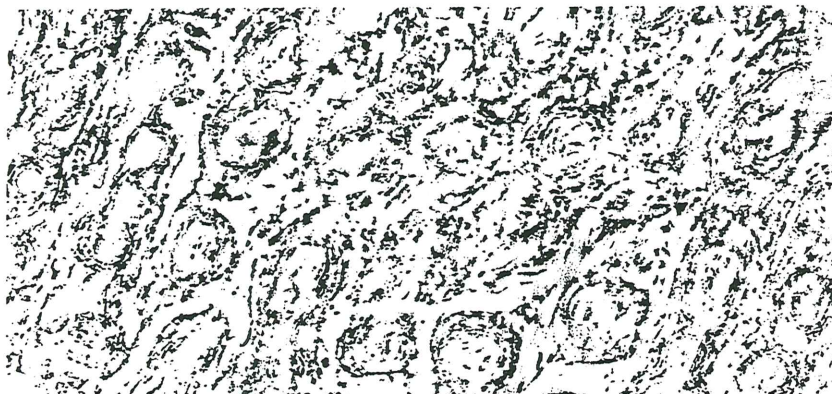


CHARNIA



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LEICESTER LITERARY & PHILOSOPHICAL SOCIETY

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LOOKING BACK ON THE (GEOLOGICAL) YEAR

One of the biggest developments in 1996 was the possibility that life had evolved on Mars. Following this disclosure in July, President Clinton accelerated NASAs Mars Global Surveyor programme. If eukaryotes and higher life forms have evolved on Mars, future exploration of the planet should produce spellbinding results. All being well, data should start to come in next July - unlike the recent Russian Mars'96 space vehicle which attempted to survey the Pacific floor off Chile. While I am writing this, NASA has just announced the discovery of an extensive pack of water-ice in a deep lunar south polar dark-side crater...

Nearer to home, a geological event which produced spectacular pictures was the eruption of magma in October from the volcano Loki underneath Vatnajokull in Iceland. Meltwater fed the sub-glacial Grimsvotn Lake. On a puny human scale vain efforts were made to beef-up roads and bridges crossing the Skeidararsandur coastal plain, which were duly washed away when the meltwater finally made its way to edge of the ice-cap at Shafitaafell. TV pictures taken from the air showed concentric cracks in the 600 metre thick Vatnajokull as the vent produced a spectacular ice-caldera.

Fortunately, there was little threat to human safety during the Iceland eruption, unlike Soufriere on the small Caribbean island of Montserrat during July. This eruption affected many people and appeals for financial assistance were published very recently in the 'Leicester Mercury'. Even Guadeloupe was showered with Soufriere's ash fallout. In this case, there appears to have been a build-up of very viscous magma, reminiscent of the Martinique eruption at the beginning of the century, right down to frightening nuee ardente events, plus violent pyroclastic episodes. So far, casualties have been few.

Another volcanic event this year, also producing spectacular TV footage, was the eruption of Ruapehu in New Zealand's North Island in July. This posed little threat to human life and was even marketed as a tourist attraction, compensating for the ruination of skiing pistes!

At the beginning of this month, Mount Nyamulagira in Eastern Zaire erupted, destroying a six-mile swathe of rainforest, threatening an area where Hutu refugees had recently camped.

On a final and sad volcanic note, a twenty-one year old Leicestershire student was killed in August on the flanks of the 7305 ft. Kanloan volcano in the Phillipines. Killed in the same eruption were two Filipinos. Two Belgians in the party were injured. This unhappy event reminds us of the fate which befell Geoff Brown and his group...

I have never seen an active volcano. The nearest I came to this was a pizza-stopover one night in Naples. I knew Vesuvius was somewhere behind the city in the dark of the night and I resumed my journey southwards before sunrise. One day...

Perhaps we can now sample seismicity in safety and with relatively little expense by going to London. The Natural History Museum opened its new £12 million Earth Science Gallery in July, the main feature of which is the Earthquake experience, a re-creation of the Kobe earthquake which occurred two years ago - and as a result of which fifty thousand people are still homeless! Give me rows of glass-topped specimen cases any time...

Considering man-made (or at least, man-induced) seismic events, Portuguese and Irish scientists found themselves trying to appease alarmists when they announced plans to detonate twenty tonnes of TNT off the coast of Northern Portugal. The seismic researchers from the University of Lisbon were warned that they could trigger a large earthquake and the Portuguese government put the experiment on hold last month. Understandable, since a major part of Lisbon was destroyed along with many of its inhabitants in the 1755 earthquake. Also in November, mining activity at Moncktonhall Colliery, near Edinburgh, was blamed by BGS investigators for a spate of tremors (some measuring Richter 2.0) in the suburbs of Edinburgh. The colliery not unnaturally in these dishonest times issued a denial.

In mid-November, news broke of a mining tragedy where hundreds of gold miners were trapped underground in Southern Peru, following a Richter 7.3 earthquake.

On the subject of dishonesty, tourists have been swiping the 200 million year old 'fossilized forest' of Lesbos piecemeal over the past few decades. At home, English Nature announced in June that the Limestone Pavements between Orton and Asby in Yorkshire will be protected against 'rockery' thieves. In Australia, 30km north of Broome, thieves used power tools to remove a slab of preserved Stegosaurus footprints. As if that isn't bad enough, the rocks form part of an Aboriginal sacred site. This reminds me of a similar desecration of reptilian footprints in Midland Mudstone deposits, uncovered as overburden was being removed at a Shephed quarry a few years ago. The effects of other acts of selfish stupidity can be seen on the War Memorial slab in Bradgate Park. I can think that the motivating forces in these instances are greed and money - and a cretinous lack of intelligence.

At the end of November asteroid Toutatis whizzed past Earth at the rather uncomfortably close distance of 3 million miles. In 1992 it made an even closer approach and when it next intersects the Earth's orbit (in September 2004) it will be a whisker away at a mere one million miles. Makes you think about the Yucatan Peninsula, doesn't it? Every 100 000 years or so one of these minor planetary bodies does collide with Earth. Approximately a dozen of these Earth intersecting orbits are known and the odds of colliding with a big one are once in a million years, and with a smaller one, once every 2 000 years or so. The odds of near-Earth asteroids being perturbed from their orbits are at present not known. The Yucatan asteroid/meteor had an estimated diameter of seven miles - a fifty metre wide body hitting England at a velocity in excess of 100 000 mph would completely devastate the country.

Taking the possible destruction of our country as my next lead, readers may have been following events on the East Coast as local authorities exercise contrasting philosophies in arresting coastal erosion. Dynamic geology on a different time-scale maybe, but dynamic nonetheless - Grange Farm at Hornsea (Yorks) has finally gone and the Earle family is homeless. Their farm is now part of Mappleton Sands. (You may have been following this saga via news items, O.U. geology study material and current affairs programmes.) With Britain tilting on the Tees-Exe hinge line, something like 850 000 buildings and 2 million people are at risk from marine incursion, were it not for approximately 500 miles of sea defence works. Since the Domesday records were compiled, more than thirty townships have disappeared under the waves along the Holderness coast alone.

For the past two decades or so we have witnessed a deplorable decline of pure scientific research in favour of applied research. Sadly, English Heritage's funding of the Boxgrove dig has come to an end and the site was back-filled and covered in October. Further excavation at some future date may give a clear picture as to why the pre-Neanderthal Boxgrove Man could not successfully compete with other Hominids.

In May, the Piltdown forger was revealed as one Martin Hinton, a known practical joker who may have held a grudge against the then Keeper of Palaeontology at the Natural History Museum. Another tremor in Hominid evolution came in September when Australian scientists announced the discovery of putative rock art dated at 176 000 years in the North-west Outback. If validated, this will completely upset the idea that H. erectus reached Asia only one million years ago. Current interpretations show H. erectus evolving in East Africa two million years ago - around the same time as the Australian rock art was supposed to have been carved. It's sometimes difficult to adjust time-scales and accept changes to established knowledge. For example, are the accepted dates ascribed to ancient Mediterranean civilisations correct, or do renegades such as Velikovsky have a case? ... and what happened to Ogygia and Keuper Marl, to mention only two fairly recent changes in geological nomenclature. (Possibly a subject for a future article in 'Charnia'.)

On the topic of Hominid palaeontology, Louis Leakey's widow died last week, on December 9th. Although Mary Leakey collected several Doctorates, she began her career in archaeology following a variety of jobs after being expelled from two schools in her teenage years, without any academic qualifications.

Dinosaurs are not often out of the news. In May it was revealed that University of Chicago palaeontologists had discovered two new and complete specimens of predatory dinosaur. One, Carcharodontosaurus saharicus was an enormous Cretaceous beast with a massive skull. A human would be a mere bite-sized morsel, not worthy of even a snack! The second species has been named Deltadromeus agilis and this too is no dwarf, being over two metres high at the hip. Both types superficially resemble T.rex, though are not related. Both were discovered in the Sahara. It is sad that a few isolated bones of C. saharicus were collected prior to WWII but these were destroyed in the war.

In August, Berkeley palaeontologists shed doubt on the theory that T.rex was a predator and that it was more probably a carrion-eater. Another school of thought supposes that this genus and other large dinosaurs were 'ambush predators' which preferred to hide and lie in wait rather than risk damaging their huge bulk in an awkward 'Keystone Cops' chase.

Back in May again, supposition raged over whether infant dinosaurs were born running or were totally helpless. Part of the arguments revolved around whether or not dinosaur females were good mothers. Oregon State University palaeontologists countered Jack Horner's idea that baby dinosaurs were 'weak-kneed' with evidence that the bones of many dinosaur neonates were in fact very strong. Much of the 'evidence' is based on 'ontogeny repeating phylogeny' in that birds such as ostriches produce strongly independent hatchlings.

Again in May (it was a good month for dinosaurs) came the news that dinosaurs probably did not so much roar as snuffle. This conclusion came from bioengineering research on the reconstructed hooter of Paralophosaurus.

In September scientists at Beijing University claimed that they had found material in dinosaur egg remains containing DNA. Analysis of the DNA indicates an homology index of 81 percent when compared with avian DNA. When compared with dinosaur bone DNA from Utah, the index reached 92 percent. The question is - and the same applies to supposed Martian meteorite samples - what exactly is being analysed? Is it original material, or is it extraneous contamination?

Mammoth DNA was in the news in August when a Japanese researcher announced that he wished to 'breed back' mammoths, using 'fossil' DNA and live elephant ova. Obviously, the veterinary department of Kagoshima University has little else to justify its existence.

Still in the Pacific Rim, Yonsei University in South Korea lost its collection of geological samples when rioting students ran short of projectiles to throw at the police. Thirty years work and ten thousand specimens from all over the world literally thrown out of the window...

Gold made the news in July when the Caledonia Mining Corporation announced its start-up. Projections indicate a yield of 25 thousand ounces of gold per year between 1997 and 2005. The concentration of gold in the Middle Dalradian rocks at Ben Chuiroon is quite high, at a third of an ounce per ton.

A month later, the BGS 'MIDAS' Project announced that it had identified very low levels of gold in Charnwood and this was followed by the usual sort of sensationalism in the local newspapers. I recall a chap by the name of King discovering specks of gold in the Bardon area way back in the sixties...

Someone far luckier discovered a large black rock in Madagascar in October. After removing an outer shell of mica, a core of 127 emeralds worth £33 million was revealed. These weighed-in at a massive 380 000 carats, or 167 lbs in English.

Those readers attending this season's excellent range of talks hosted by the Society will no doubt recall Tony Waltham's superb descriptions of Katmai and St. Helens, and of Kip Jeffrey's fascinating illustrated talk on gemstones whilst scanning these pages.

By the way, I try to make the front cover of 'Charnia' interesting. The last issue's design was based on a map of the Pieksamaki drumlin field in central Finland. Any guesses about this issue's front cover? As before, any offers of articles for 'Charnia' will be gratefully received.

Graham Stocks

Chicxulub - the end of an era.

Dr. Peter Maguire, Leicester University.

It is well over a decade since Alvarez and co-workers made the controversial suggestion that mass extinctions at the end of the Cretaceous were related to an impact by an asteroid or large comet. The search for a crater of suitable magnitude continued until Hildebrand identified from gravity and other geophysical data the Chicxulub impact structure on the Yucatan peninsula in the Gulf of Mexico. The circular structure, lying partly offshore is buried beneath about a kilometre of Tertiary shallow water carbonates. The existence and age of the structure are no longer in question, however, its size and internal geometry are still poorly constrained. In order to understand the possible effects of the impact on the Earth it is essential to define the precise subsurface morphology of the crater and in turn the amount of energy release resulting in possible catastrophic alteration of the biosphere. Recent seismic and other geophysical studies being undertaken by Leicester University together with colleagues from Cambridge, Imperial College and the University of Texas at Austin and UNAM in Mexico aims to study the crater as the source of the physical, chemical and isotopic anomalies seen worldwide at the Cretaceous - Tertiary boundary, and as the only well preserved large peak or multi-ring impact structure on Earth.

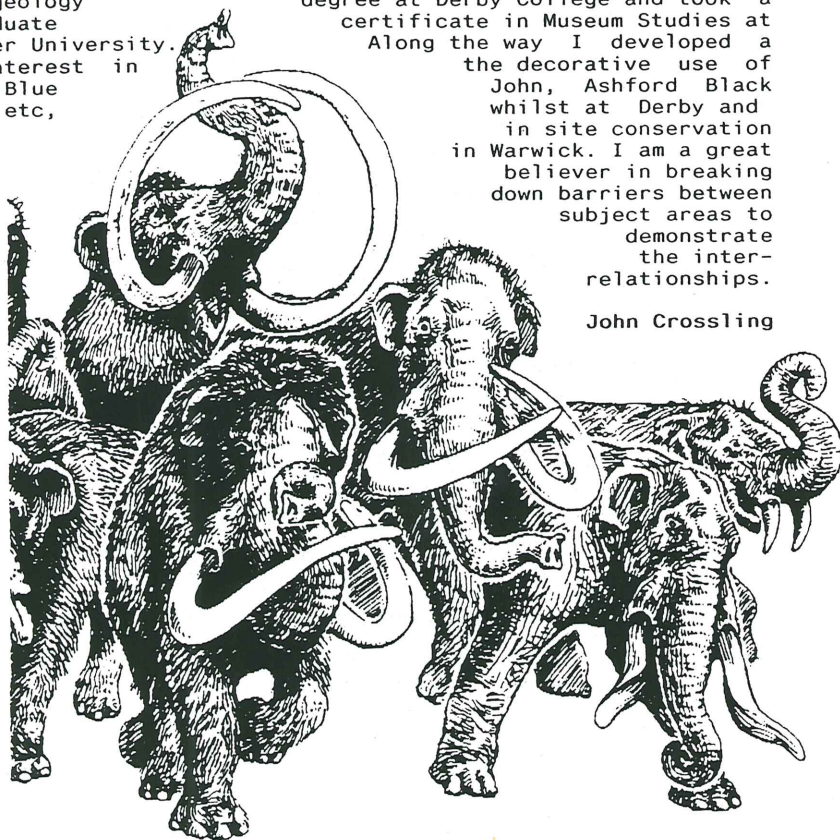
Peter Maguire : BSc (Edinburgh), PhD (Dunelm)
Lecturer and Senior Lecturer at Leicester University.
Explosion and Earthquake Seismology
Continental Extensional Tectonics - East Africa, Finland, Greece, Iceland - Faeroes.
Chicxulub Impact Structure, Yucatan, Mexico.

January 29th., 1997: Geological Site Conservation in Warwickshire.

My talk will look at the work of the Warwickshire Geological Conservation Group, the sites that the group has notified as RIGS, successes, failures and possible future developments. I have held the post of Head of Curatorial Services and Keeper of Geology at Warwickshire Museum for the past eleven years. Originating from Stockport, I had decided that I wanted to work in museums first, becoming interested in geology later. I did a geology degree at Derby College and took a postgraduate certificate in Museum Studies at Leicester University. Along the way I developed a keen interest in stone - Blue Marble, etc,

the decorative use of John, Ashford Black whilst at Derby and in site conservation in Warwick. I am a great believer in breaking down barriers between subject areas to demonstrate the inter-relationships.

John Crossling



March 8th., 1997: Saturday School - Vaughan College - The Geology of the Ice Age (The Quaternary: old problems, new perspectives.)

Over the past two and a half million years, the Earth has endured dramatic swings in climate, quite unlike anything seen since well before the Age of the Dinosaurs. These climatic changes affected both the surface geology and biology of this planet, and largely fashioned the landscape in which we now live. The rapidity and complexity of these changes mean that the nature and timing of events remain controversial. This one-day symposium will examine aspects of the ice age. Two main themes will be explored. First, current ideas concerning local Ice Age geology and palaeontology; and secondly, the way in which an understanding of Ice Age deposits enables us to manage our environment and husband vital resources such as water for future generations.

Organised by Dr. Jan Zalasiewicz.

BRINGING DINOSAURS TO LIFE

John Martin, Leicestershire Museums

Ever since the first dinosaur remains were found - perhaps by early humans 30,000 years ago but certainly in 14th century China and 16th century Europe - people have tried to understand fossils by drawing, painting or modelling the animals they thought the bones had once been part of.

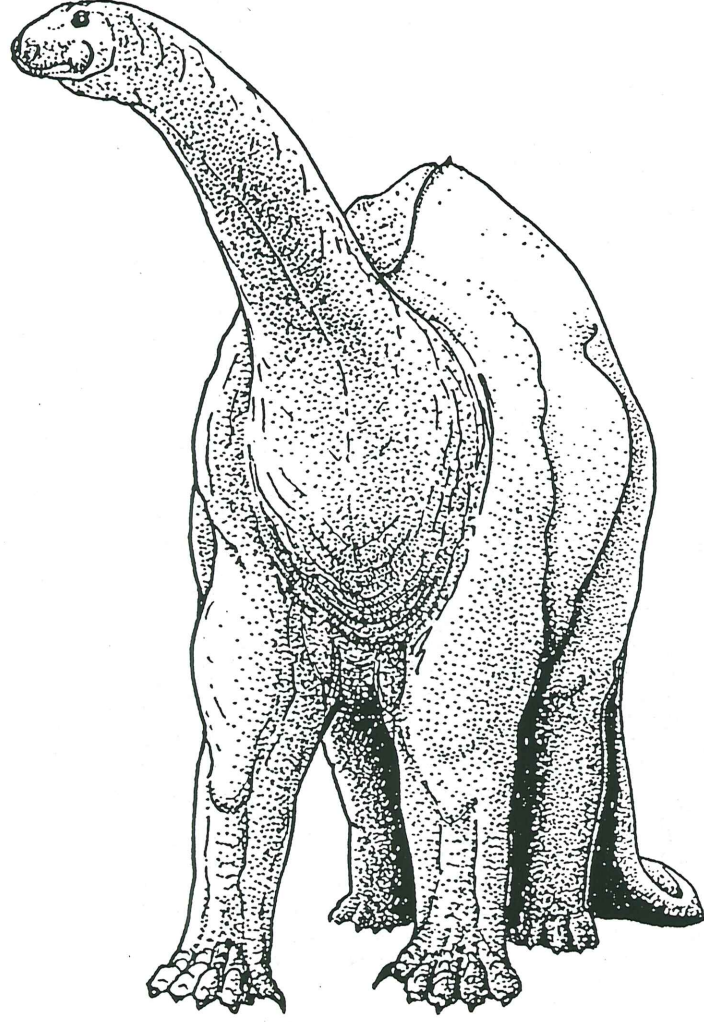
Palaeontologists still do this today. We call the results "reconstructions" and we still draw or paint them to help us understand how dinosaurs worked as living animals. We also use them to persuade the public that the science of palaeontology is worth doing, in books, TV, exhibitions and talks like this one.

As an illustrator and exhibit maker, as well as a palaeontologist, I am especially interested by two things in dinosaur art: first that it should be so persuasively powerful, with its ability to influence scientific and popular thinking for years, and second that most dinosaur art, believe it or not, is based on guesswork rather than real science.

The first dinosaur art, by early 19th century pioneers like Richard Owen (the inventor of the dinosaurs) shows what I mean. Their reconstructions look obviously "wrong" to us now; the reason is that they had only odd bones, not complete skeletons, so they were obliged to "make up" the shapes of the dinosaurs by guessing what the missing bits were like. Those same informed guesswork methods, which we call analogy and interpolation, are still used today. In this talk I explain how analogy and interpolation work, using well-known dinosaur reconstructions and real fossils and bones. I suggest that these "scientific" methods have as much to do with fashion, politics and the artist's prejudices as they have with science. I show how artist-palaeontologists reconstruct guts, muscle and skin to flesh out the bare bones of dinosaur skeletons. What colour were they? We still have no idea.

The problem is always this: if I don't know what it was like, how can I draw it?

Finally, I show that some dinosaur artists don't bother at all - they just copy earlier work. But I balance that with a selection of fine, well-researched reconstructions which are technically so good they almost qualify as "art" as well as "science".



- 1997 *Jan 15th* Dr Gordon Chancellor (Peterborough Museum)
 'Recent Vertebrate Fossil Finds from the Peterborough
 Area'
- Jan 29th* John Crossling (Warks Geol Conserv Soc)
 'Geological Site Conservation in Warwickshire'
- Feb 12th* Members Evening (Slides)
- Feb 26th* Dr Peter Maguire (Leic Univ) 'Chicxulub - the end of an era'
- Mar 8th* (*Saturday School, Vaughan College*)
 'The Quaternary: old problems, new perspectives'
- Mar 12th* A G M and Chairman's address 'Bringing Dinosaurs to Life'

Unless otherwise stated, all meetings are at 7.30pm (7pm for coffee), and in the
Geology Dept., University of Leicester