

Dinosaur goes to France

By STEVEN LANG

Securely embedded in Eastern Cape rocks for more than 200 million years, the bones of a *Heterodontosaurus tucki* were subjected to five days of high-tech scans at a synchrotron in Grenoble, France this week. Palaeontologist and Emeritus Curator at Albany Museum, Billy De Klerk, discovered the almost complete skeleton of the turkey-sized dinosaur in a riverbed near the town of Rossouw in 2009.

Author and former journalist, Ben MacLennan had asked De Klerk to examine bone fragments he had found in a stream bed in the late 1990s. It was not possible to identify the fragments but De Klerk returned to the site in January 2009 for further exploration. He made a remarkable discovery: "I found a single small *Heterodontosaurus* dinosaur skull and a small skeleton further downstream which I tentatively identified also as *Heterodontosaurus*."

The name *Heterodontosaurus* means "different teeth" which is the only way to describe its peculiar configuration of teeth – a line of molars that appear to have been used for grinding plant material, a set of large canines that one might expect in a carnivore and a row of incisors up front.

Concerned that the bone and whatever else lay below it could soon be worn away by the water, De Klerk knew he had to find out more about it before it was too late.

Extracting the skeleton was gruelling work because the rock was particularly hard and the river made it impractical to use plaster of Paris as palaeontologists would normally do when removing precious fossils.

De Klerk and John Hepple of the Rhodes Geology Department used a heavy duty rock-saw to remove chunks of the riverbed which they then brought to the Albany Museum and prepared for study. They quickly realised that al-

though the fossils were in good condition they were fragile and could easily be damaged by the traditional tools of the palaeontologist.

His next option was to send the skeleton, still partly embedded in the rock, for a Computed Tomography (CT) scan at Wits University in Johannesburg. CT scans allow scientists to study the anatomy of a specimen from every angle imaginable without chipping the delicate bone. The method also makes it possible to examine structures on the inside of a skull.

The Wits Micro CT scanner is far more powerful than a conventional hospital CT scanner but it was not able to produce clear images due to the presence of hematite inclusions in the rock. The metallic substance showed up as bright white blotches obscuring the finer details the palaeontologists were hoping for.

Fossilised bones and the surrounding rock have very similar densities making it difficult to separate them from each other, but the synchrotron in Grenoble has the capacity to enhance the contrast between the two. High-energy X-rays generated in the synchrotron allow scientists to reconstruct the *Heterodontosaurus* in minute detail.

The skeleton was in the synchrotron 24 hours a day for five days generating three terabytes of data which can now be analysed by Prof Jonah N Choiniere of the Evolutionary Studies Institute at Wits and the post-graduate students who accompanied him to Grenoble.

This process will allow the scientists to virtually dig out the fossils without damaging any part of it. They will create three-dimensional images that palaeontologists will be able to study wherever they may be.

So far the team in Grenoble has been able to determine that the specimen collected in the Eastern Cape was a juvenile as its skull bones had not yet fully joined together. They



In this picture of the skull of the *Heterodontosaurus tucki* you can clearly see the line of fairly straight molars that would have been used to grind plant matter. The large canines were probably vestiges of an ancestral carnivorous dinosaur. CT scans produced at the synchrotron in Grenoble indicate that when the *Heterodontosaurus* lost its teeth, or when they were worn out, new teeth slipped into place. Photo: Supplied

were also able to confirm that the early dinosaur had rows of teeth that would replace each other when the front teeth wore out.

More exciting images are still to be produced and will certainly provide palaeontologists with much to think about.

Grahamstown palaeontologist Prof Billy de Klerk at the site where he spent three days excavating rocks that contained one of the best preserved *Heterodontosaurus* skeletons in the country. The site is near the village of Rossouw, 35km north of Dordrecht in the Eastern Cape.

Photo: Supplied



Communicating science and more clean ups

Panel Discussion and Workshop: Science Communication

On Friday 12 August, the Rhodes School of Journalism and Media Studies, in collaboration with SAIAB, *Grocott's Mail* and the Rhodes Science Faculty, will host a panel discussion and workshop on science communication at the Africa Media Matrix for practising scientists and journalists from Grahamstown to explore how science and journalism can work together to solve some of the challenges facing the local municipality. From Friday 8 August to Friday 12 August, *Grocott's Mail* will run a suite of articles exploring water and sanitation; rubbish and recycling; alien invasive plants and biological control mechanisms, among other so-

cio-economic concerns. More info: Penny P Haworth@saiaab.ac.za

Water and sanitation

Over recent weeks, there has been slow but steady progress to resolving problems in water infrastructure. As explained during the Grahamstown Residents' Association (GRA) water forum on 5 May, the municipality faces many problems. These include ageing infrastructure that has not been maintained for decades and not planning for vastly increased demand. Some of the problems have been fixed with the replacement of water pipes in African Street and Somerset Street; upgrading pump and filtration equipment is a longer-term project. GRA planned a follow-up forum on 27 June,

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but it had to be postponed because of the water crisis unfolding at the time. Sewerage infrastructure is also in dire need of an upgrade, and we can expect failures until these major upgrades are complete.

At the height of water supply failures, residents were queuing for over two hours at the spring outside town.

Rainfall has been particularly low this winter, putting further pressure on the system. Please use water sparingly and install a rainwater tank

if you haven't already: even a relatively light rain can fill a tank surprisingly fast.

Clean-ups

Water and sewerage are an important part of the urban environment – the human habitat. So is reducing litter and improved waste management. Clean-up campaigns continue. Part of the strategy of GRA has been encouraging the closure of municipal dump sites in areas where they are abused.

Garden waste can be taken to Complete Compost in the industrial area. Recycling garden waste as compost is more sustainable than dumping it in landfill, so this is in any case a better solution. Please observe the principle of separation: garden waste should not in-

clude general trash.

Degraded waterways

The Matyana River is severely polluted. The source of the river is close to the Vergenoeg and Zolani communities, in the vicinity of the old slaughter facility.

The river flows next to the Oval Sports Field, Scott's Farm and through lower Beaufort Street. This river, which feeds into the Kowie River, is long overdue for action to clean it up.

Public Lecture: larval ecophysiology

On Thursday 11 August at 10am the SA Institute for Aquatic Biodiversity (SAIAB) hosts Professor Karen Chan from the Hong Kong University of Science and Technology

(HKUST) in a public lecture on larval ecophysiology. Studying how a creature's physical functions are adapted to environmental conditions helps us understand vulnerable marine ecosystems and the life cycles of marine organisms. This in turn can be usefully applied to ecosystems management and sustainable development. More info: Penny PHaworth@saiaab.ac.za

The Planet

The US National Oceanic and Atmospheric Administration (NOAA) reports that the planet-wide temperature average for June was not only a new monthly average, but global monthly temperatures have set new record highs for 14 months in a row, a new record.

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