BIANNUAL NEWSLETTER OF THE PALAEONTOLOGICAL SOCIETY OF SOUTHERN AFRICA

(HALFJAARLIKSE NUUSBRIEF VAN DIE PALEONTOLOGIESE VERENIGING VAN SUIDER AFRIKA)

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Front cover:
Serenichthys kowiensis (Gess & Coates, 2015). Africa's earliest known **coelacanth**, from the 360 Ma late Devonian Waterloo Farm lagerstätten near Grahamstown, gives evidence for the world's earliest known coelacanth nursery. A baby *Serenichthys* cautiously emerges from its refuge in a bed of *Octochara* (a charophyte described from the site). Artwork by Anton Brink, Grahamstown.

EDITORIAL

Many thanks to many contributors for this edition of PalNews. At first I was worried that this would be a thin volume as contributions were slow in arriving but a couple of email prods did the job.

Over the past few years I have occasionally had requests for articles published in back issues of PalNews. I can't recall how it all started but, during the second half of 2015, **Mike Raath** contacted me to say that he was busy scanning all back issues of PalNews since its launch in April 1977 into pdf files to ultimately be made available on our website. Something he said he always wanted to get done in his retirement. At his request I provided some issues from our PSSA Archive that he needed and once completed, and with the able help of **Alex Parkinson**, we now have a complete record of our Newletter freely available on our website. Take a look at http://www.palaeontologicalsociety.co.za/pssa-newsletter.html

Something that also came across my desk from **Mike Raath** was an interesting website that houses the Paleobiology Database at Macquarie University, Australia. It is called "Fossilworks" (www.fossilworks.org). In a nutshell *"Fossilworks provides query, download, and analysis tools that utilize the Paleobiology Database's large relational database assembled by hundreds of paleontologists from around the world. The two websites and their predecessors have been used by professional researchers, students, and the public since 1998. The Fossilworks copy is refreshed daily. The data are owned by the contributors and the website and software were created by John Alroy."* This web based resource appears to be something very useful and South African palaeontologists should consider signing up. It was evident that no SA researchers or institutions were listed as yet……. Just a thought.

I have indicated to our incoming President, **Rose Prevec**, that I intend stepping down as editor of PalNews – this after my second stint of six issues (three years). So I have done the editor job now for far too - a total of seven years! New blood is needed.

Members – please consider nominating a candidate or two for this position when the new PSSA committee is elected in Stellenbosch in July'16. For me, this has certainly been a great way to keep in touch with the activities of our members and to constantly meet new friend. What a ride. Many thanks.

Cheers!

Billy de Klerk (ed)

PRESIDENT'S CORNER - Marion Bamford

ESI at Wits Marion.Bamford@wits.ac.za

During the last half of 2015 some members of the palaeoscience community in South Africa have been in the international spotlight, but here is just a brief summary as I do not want to spoil the details in the rest of the newsletter. Starting with the older time periods, the Karoo palaeontologists Michael Day, Bruce Rubidge, Roger Smith, Pia Viglietti and collaborators have published key papers on the mid Permian mass extinctions, a new biostratigraphic zone and more. The Elliot Formation has received a lot of attention from Jonah Choiniere, Blair McPhee and collaborators, who have found a second species of *Eucnemasaurus* and assessed the phylogeny of the basal sauropods. Lee Berger and his large group of collaborators announced a new species, *Homo naledi*, amid much publicity and some controversy. They have more material to analyse so will be hearing more from this group.

Apart from providing funding for research and students, the DST-NRF Centre of Excellence in Palaeosciences has brought together South African palaeontologists, especially the younger generation, and encouraged more interaction, networking and collaboration. This bodes well for the future of the PSSA and so the up-coming PSSA'16 conference in July in Stellenbosch should be well-attended.

The untimely passing of **Dave Roberts** was marked by a gathering in Cape Town at the end of November. He will be remembered for a very long time by his many works.

Enjoy the newsletter that Billy de Klerk has so ably assembled and edited. We all look forward to the PSSA conference in July and catching up on the next half of the year in person.

Check out new Palaeo press releases on: www.ancient-earth.co.za
Twitter: @CoE_Palaeo Facebook: CoE in Palaeoscience (soon)

Marion Bamford

(See additional news from Marion under ESI, Wits section. ***Ed****)*

Dr Dave Roberts.

Members of the PSSA were sadden by the recent death of **Dr Dave Roberts** on Monday 28th September 2015. He was well known to the scientific community for his research on coal, sedimentology and past environments associated with climate change and hominins. He had worked at the Council for Geoscience in Belleville for many years and retired recently. Dave was involved in projects with Curtis Marean and his team at Mossel Bay, with Dave Braun at Elandsfontein and at Langebaanweg with a number of people.

We will miss Dave at our future PSSA meetings ! Our hearts go out to all those who knew and loved him, especially to Thalassa Matthews, and their young daughter.

A memorial gathering was held to celebrate the life of Dave Roberts on Sunday 29th November 2015.

oOo

PSSA'16
Palaeontological Society of Southern Africa, 19th Biennial Meeting, Stellenbosch University
4 – 9 July 2016

Abstract closing date extended to - **15 April 2016**

Conference Convener – Dr Ryan Tucker - tucker@sun.ac.za
All information at: **http://wcgm.weebly.com/pssa-2016.html**
Submissions should be sent to pssa2016abstracts@gmail.com

Invitation – (from conference convener **Dr. Ryan Tucker**)

The Department of Earth Sciences at Stellenbosch University is honoured to be the host of the 2016 biennial meeting of the Palaeontological Society of Southern Africa, which will be held July 4th to the 9th.

SAVE THE DATE: Conference: July 4th to the 9th, 2016
Abstract Submission - Closing: April 15th 2016
Workshops: July 4, 2016
Conference: July 5th to 8th
Field trip: July 9th
Registration deadline remains April 29th

A basic outline of the abstract guidelines is currently loaded with the official form forthcoming.
Please send any questions about the meeting to pssa2016abstracts@gmail.com

CALL FOR SYMPOSIA: At this time I would like to call for possible symposia topics & symposia convieners.
On the 4th, there will be several all-day workshops, including one on using VG studio Max and 3D data to test paleontological hypotheses. On July 9th, there is an optional field trip out to the West Coast Fossil Park.

I sincerely hope that you can participate in the meeting. I think it will be of great assistance to you as you consider your career options in Palaeontology in South Africa.

Dr. Ryan Tucker
Lecturer in Sedimentology & Palaeontology
Department of Earth Sciences
Stellenbosch University

Special Note: - SVP Travel Grant
For Master's, Doctoral, and Post Doctoral Students only

Excitingly, The Society of Vertebrate Paleontology is sponsoring two student travel grants for those of you who wish to attend PSSA 2016 in Stellenbosch (Note: you must be a member of the Society of Vertebrate Paleontology to apply). Students will be chosen based on academic merit and financial needs. A motivation letter (350 words, max) and recommendation letter from your primary supervisor must accompany your abstract.

Motivation Letter could include:
Current progress within degree; How you overcame hardships or challenges during your current studies; How this support will facilitate your future endeavors within the palaeosciences.
*Proof of SVP membership must also be submitted.*For any questions please email me directly at tucker@sun.ac.za

oOo

NEWS FROM: Martin Pickford & Brigitte Senut – Paris

Département Histoire de la Terre in the Muséum national d'Histoire

New fossil discoveries in Namibia

Martin Pickford, Brigitte Senut and Helke Mocke

When it comes to palaeontological surprises Namibia seldom disappoints us. The Namibia Palaeontology Expedition has been carrying out surveys in the country since 1991, and almost every year another new fossil occurrence has been identified. Initially, prospecting was focussed on the dolomite belt of the Otavi Mountains, where *Otavipithecus* was found at Berg Aukas in 1992, along with twenty something previously unknown karst infillings of Miocene and Plio-Pleistocene age. This was followed by the discovery of a few karstic localities in Kaokoland in 1993, but overall the latter area seemed to be of limited promise and no follow-up survey was done …. until 2013, when Eckhart Freyer pointed out the existence of « peculiar » rocks near Oruvandje.

A visit to Oruvandje led to the identification of abundant tufa lobes in Kaokoland, some of which are similar in age and origin to the famous Taung deposits which yielded *Australopithecus africanus*. We have now mapped a dozen tufa lobes in the area north of Sesfontein, all of which are richly fossiliferous (plants and animals). The only one which has been analysed in preliminary detail is Okongwe (Leopard's Lair in the Herero dialect) which yielded abundant micromammals which include the extinct rodent genus *Stenodontomys* (previously reported from Makapansgat and Langebaanweg) suggesting a Middle Pliocene age. Other tufa lobes contain remains of dassies, klipspringers and other bovids, but in general large mammals are scarce in these carbonates. Omatapati is of particular interest because it contains abundant stone tools (flake technology) and associated animal remains in densely cemented breccia. Another fascinating lobe is Otijkondavirongo, which translates to the « Place beyond Civilization », which just about sums up its remoteness. Aussies would call it « The Outback » and the French would say « Au Milieu de Nulpart ». Its interest lies in the fact that the lobe is still growing, thereby providing a good example of how these deposits accumulated.

Another region endowed with similar deposits is the Naukluft, which is known to contain plants and crab fossils in tufa. So far no fossil mammals have been reported from the Naukluft, but we have a strong feeling that this is because no-one has looked closely.

Further south in the Sperrgebiet, our expedition has discovered immense quantities of vertebrates and invertebrates in freshwater limestones (palustral and lacustrine). Astonishing aspects of these carbonates are their age – Middle to Late Eocene – and their richness. The Eocliff-Eoridge deposits, which are of Bartonian age, contain millions of well-preserved micromammals, as well as a few fossils of larger taxa (giant dassies, anthracotheres). Black Crow is even older (Lutetian) but is not as rich in fossils. Nevertheless, it has

yielded a suite of large mammals including arsinoitheres, dassies and creodonts, as well as small species of primates, rodents, sengis and chrycochlorids (golden moles). The Sperrgebiet limestones are throwing new light on faunal connections between Southern Africa and South America. For example, rodent ear ossicles from Eocliff resemble those of chinchillas, a family of burrowing rodents from South America. A phalanx from Black Crow likely represents a « sloth-like » mammal. They have also led to a thorough reappraisal of the stratigraphy of the Sperrgebiet: many of the levels previously correlated to the Cretaceous are now known to be Middle and Late Eocene on the basis of the fossils found in them.

On another front, the owners of the Simanya River Lodge reported the discovery of fossil snails on the slopes of the Kavango River in Northern Namibia, across the river from Angola. A follow-up survey to the area revealed the existence of a richly fossiliferous layer of chert and chalcedony beneath the Kalahari sands and about 20 metres above current river level. The fossils comprise abundant freshwater snails and a few ostracods associated with small fragments of silicified wood. The suite of fossils and their mode of occurrence resemble those of sites in Angola, DR Congo and Zimbabwe which, in the old days, used to be grouped into the « Grès Polymorphes », widespread deposits covering much of Central Africa south of the Equator, but whose ages are poorly constrained (post-African Surface – pre-Holocene). The fossil-rich fluvial deposits in Etosha Park found by Martin Hipondoka in 2005, seem to be part of the same suite of deposits as those at Simanya – both are related to the Cubango palaeo-drainage flowing southwards from the Angolan Highlands. If the correlation is reliable, then the deposits at Simanya could well be Late Pliocene.

An interesting point about all these silicified deposits in the Grès Polymorphes, is that they occur inside the vegetation category known locally as Miombo Woodland (wooded savannah) which suggests palaeoclimatic constraints on their formation. In more arid zones such as the Namib (including Kaokoland), superficial induration is by carbonate and not silica, whereas in more humid zones, superficial weathering results in lateritic soils and ferruginous horizons.

Fig 1. Members of the Kaokoland Expedition contemplating the still active tufa lobe at Okavanatje.

Fig 2. Brigitte cooling off in the shade of the immense tufa lobe at Otjikondavirongo. Outside it was 45°C or more. This tufa lobe shows most of the elements of the processes that lead to tufa deposition, including the caves fronted by a bryophyte curtain, the waterfall and its associated mosses, the pool at the base of the cliff.

Fig 3. Fossil bat jaw in breccia at Otjitamei tufa lobe (scale 1cm).

oOo

Helke Mocke - National Earth Science Museum, Geological Survey of Namibia - Windhoek.

During the last 6 months the National Earth Science Museum and staff were very active both in the museum and the field. Here are some highlights.

Every year all museums and heritage institutions in Namibia celebrate Heritage Week. This year the Heritage Week was celebrated from the 21-25 September under the theme and sub-theme: "*Preserving today for tomorrow, Embracing our heritage through dialogue*". As part of these celebrations out museum organised a debating competition for grade 7 pupils on the topic: *"Climate change, is it real or not & possible innovative*

solutions to reduce our impact on climate change (our youth's perspective)". During the debate the museum had the privilege of hosting eight local schools.

Fig 1: Debates in progress.

On each day of the week two school teams came head to head for about forty minutes to debate on climate change, its effects on the world, how mankind has contributed to it and finally how we as Namibians can make a difference in combating climate change, especially at home and in schools. The pupils came up with the most interesting solutions, made new friends and most importantly had lots of fun. A prize giving ceremony was held for the participants a few weeks after the event, during which all participating schools received book prizes, while the winning school received a weekend to the Gobabeb Research Station located in the Namib Desert.

The museum was also proud to host a diamond display as part of the Omugongo Diamond Conference, which was held from the 24-27 November. The exhibit showcased real cut and rough diamonds, the award winning "Shining Lights Competition" jewelry pieces, diamond cutting demonstrations and jewelry-making demonstrations. The event was well received by the public and the exhibit was open until the 27th November, which is a public holiday in Namibia, and made it possible for working Namibians to visit the exhibit.

On the 20 - 29 July a field trip to the Gai-As Formation in the Huab Basin, Kunene Region was undertaken with scientists from South Africa (Dr Roger Smith and Mr Sibusiso Mtungata) and Argentina (Prof Claudia Marsicano and Dr Leandro Gaetano).

Fig 2. Roger Smith putting together a large temnospondyl at Gai As

This year's expedition yielded 13 specimens, mostly of temnospondyl amphibians. One of the specimens is very similar to a specimen known from Russia, called *Dvinosaurus*. This research is sponsored by the National Geographic.

Fig 3. Dr Leandro Gaetano and Mr Sibusiso Mtungata carrying a large specimen back to the car.

A reconnaissance trip was undertaken from 30 October - 7 November with the Namibia Palaeontological Expedition (Dr Martin Pickford, Prof Brigitte Senut and Dr Loïc Segalén) to the Simanya River Lodge in the Okavango West Region and travertine deposits located in the Kunene Region. This was done to establish the fossil potential of the deposits located in these areas. The Simanya River site yielded many snails including *Pila*, *Bulinus*, *Melanoides, Lymnaea* and planorbits, while the travertines yielded *Hyrax* teeth, and bones and teeth micromammal, such as bats and rodents. The trip established that these areas have a high potential for yielding many fossil sites and material.

Fig 4. Trench at Simanya River Lodge which yielded many freshwater snails.

Fig 5. Waterfall travertine at Otjitamei which yielded fossils of micromammals and large mammals.

Finally, Ms Helke Mocke was proud and privileged to receive her **MSc degree** during a graduation ceremony held on the 9th of December'15 at the University of the Witwatersrand.

oOo

Dominique Gommery & Frank Sénégas
Centre de Recherche sur la Paléobiodiversité et les Paléoenvironnements - CR2P-UMR 7207 MNHN-CNRS-UPMC.
e-mail: dominique.gommery@upmc.fr ; frank.senegas@upmc.fr

2015 was a busy years for Dominique and Frank with several events and fieldworks in South Africa (Bolt's Farm Cave System) and Uganda (with the celebration of the 30th anniversary of the Uganda Palaeontology Expedition led by Brigitte Senut and Martin Pickford).
Since the 30th of September 2015, Dominique and Frank are part of the CR2P (Centre de Recherche sur la Paléobiodiversité et les Paléoenvironnements) in which other French palaeontologists are or were PSSA members, such as Brigitte Senut, Martin Pickford, Ronan Allain, Sébastien Steyer but also Bernard Battail, Véra Eisenman, Denise Sigoneau-Russel, and Philippe Taquet. The CR2P is the largest Palaeontology department in France and the members are housed on two sites: the "Jardin des plantes" of the National Museum of Natural History and the University Pierre and Marie Curie at Paris. It is a new palaeontological adventure for Dominique and Frank.
2015 was the 20th birthday of the signature of the Memorandum of Understanding between the Collège de France (represented by Yves Coppens), the Transvaal Museum (now Ditsong National Museum of Natural History) and the French Embassy in South Africa. For many years, this MOU have allowed the growth of the co-operation between France and South Africa in relation to Palaeontology and Prehistory. We want to thank Brigitte Senut and Francis Thackeray who were in charge of this cooperation (exchanges between France and South Africa of researchers, students and technicians but also fieldworks activities in South Africa). Dominique, with Yves

Laurin (president of the CFAS (French committee for South Africa)), organized a half-day ceremony at the "Palais du Luxembourg" (place of French Senate) in Paris, the 7th of February 2015, to celebrate this anniversary with the help of the French Embassy in South Africa, the CNRS (French National Center for Scientific Research) and WSP (William Sale Partnership). It was a good opportunity to thank Yves Coppens, Brigitte Senut and Francis Thackeray for the success of this cooperation for so many years.


BF1: Ceremony at the "Palais du Luxembourg". BF2: F. Thackeray during his speech on SA research on Human Evolution, Paris 07 Feb'15.


BF3: D. Gommery during his speech on Bolt's Farm Cave System.
BF4: The cocktail for the participants to the ceremony in the "salons de Boffrand" of the "Petit Luxembourg" dated between the XVIIth and XIXth century.

Dominique and Frank, with Stephany Potze and Lazarus Kgasi, from the Plio-Pleistocene Palaeontology Section of the Ditsong National Museum of Natural History, the core of the HRU team, carried out their fieldwork activities at Bolt's Farm Cave System. Since 2008, two fieldwork seasons are organized per year, April-beginning of May and October-beginning of November. In collaboration with the Department of Anthropology and Archaeology of UNISA (Jan Boeyens and Francois Coetzee), 12 students took part to the fieldworks at BFCS during the first season, and 1 during the second. Nonhlanhla Vilakazi, post-doctorate at UW, participated too and continues her study of reptiles from BFCS. An article concerning the first fossil rinkhals will be submitted very soon.

BF5: Excavation at Aves Cave I (BFCS), Oct'15.
BF6: Students of UNISA during the excavation at BPA (BFCS), Apr'15

BF7: Students of UNISA brushing the blocks of breccia at BPA (BFCS), April 2015.
BF8: First team at BPA (BFCS). Left-right: F. Sénégas (CR2P), D. Spohr (UNISA), N. Vilakazi (UW), E. Winter (UNISA), C. Jackson (UNISA & SARHA), L. Ségalen (UPMC), D. Gommery (CR2P).

BF9: Second team at BPA (BFCS), April 2015. From left to right: S. Pearlman (UNISA), G. Davies (DNMNH), J. McElwee (UNISA), P. Barrow (UNISA), L. Kgasi (DNMNH), D. Gommery (CR2P), N. Marques (UNISA).

John Hancox (UW), James Brink (National Museum-Bloemfontein), Thibaud Saos (from the famous site and museum of Tautavel in South of France) and Amélie Chimenès (CNRS) came at Aves Cave I (BFCS) in October to work on the geology and the macrofauna. Loïc Ségalen (UPMC-Paris) participated to the first season and continues his study on diagenesis processes, as well Greg Davies (DNMNH). Andy Herries (La Trobe University, Australia) and his student, B. Armstrong, undertook a ground penetrating radar study on BFCS.

BF11: J. Hancox and T. Saos observing the *in situ* breccia at ACI (BFCS), October 2015.
BF12: J. Brink and A. Chimenès sieving the decalcified breccia extracted during the excavation at ACI (BFCS), October 2015.

Brigitte Senut and Martin Pickford visited us at BFCS in the context of the 20th anniversary of the MOU and found out the progress of excavation in different loci done by the HRU team. Brigitte and Martin with Jacques Michaux (University of Montpellier) started the first prospection at BFCS leading to the discovery of the older site of the Cradle of Humankind in 1996, Waypoint 160 dated biochronologically between 4.5 to 4 Ma.

BF13: ACI (BFCS), Oct'15. From top to bottom: T. Saos (Tautavel Museum & site), M. Pickford (CR2P), D. Gommery (CR2P).
BF14: ACI (BFCS), Oct'15. Left-right: T. Saos (Tautavel Museum & site), B. Senut (CR2P), M. Pickford (CR2P), D. Gommery (CR2P).

BF15: B. Senut & M. Pickford (CR2P) at Waypoint 160 (BFCS), Oct'15.

oOo

Johann Neveling - Council for Geoscience, Pretoria.

Greetings all! Going back through *PalNews* back issues I was shocked to realize that almost an entire epoch has passed since I last reported on our doings at the CGS. Now is as good a time as ever to rectify that, as I was quite thrilled to have been able to spend more time in the field (at last by my standards) over the last year than has been the case for a number of years now. I managed two quick visits to the Elliot exposures between Senekal and Ficksburg. Once in March to support the helpful folk of Heelbo and then again in September, meeting-up with **Jonah Choiniere's** Jurassic safari, which was a lot of fun. However most of my field time last year was spent at lower elevations and stratigraphies, visiting Permo-Triassic boundary sites with **John Geissman**, **Bob Gastaldo** and his students. Chief among our activities was devoting more attention to an ash bed discovered high in the *Daptocephalus* Zone at Old Lootsberg Pass. It yielded some good zircons that were dated by Sandra Kamo at Jack Satterly Geochronology Laboratory in Toronto; supported by a high resolution paleomagnetic database established by John, our inhouse drilling maniac. The age, which was published in *Geology* late last year, was much older than expected and therefore has some interesting implications for end-Permian extinction models, something picked-up by and reported in ***The Economist*** http://www.economist.com/news/science-and-technology/21669606-mass-extinctions-are-more-complicated-they-might-first-appear-layers and ***EARTH* magazine** http://www.earthmagazine.org/article/permian-triassic-extinctions-timed-differently-land-and-sea.

We also mixed in some good old fashioned geological work, describing rocks and walking out multiple bounding surfaces, with dabbling in the latest technology. Many a colleague will know the frustration faced by any geologist attempting to characterize deposits exposed on steep cliff sections in Karoo. You normally end up taking photos or making observations (from a distance) from a steep slope below the cliff exposure, which result in distortion, under-representation, miscorrelation and similar evils. In an attempt to solve this problem we tested a GoPro camera mounted on a radio-controlled quadcopter (flown by Bob's student **Tak Sasajima**) and were blown away by the results. I include a photograph of deep channel fills that make-up some spectacular cliffs in the Katberg Formation. Playing around with software one can also recreate a 3D image of the outcrop. Now only if it could collect samples too…

Fig 1. Cliff mosaic viewed as seen from the quadcopter. Scale –that's me on ledge at top right!

Fig 2. "Captain Tak" and his loyal 'copter.

Amongst all the excitement we also had some sad news with the recent departure of **Ellen de Kock**, the curator of our collections, at the end of December 2015. Ellen has been with us for more than six years, during which time she became a much valued colleague and she will be sorely missed both as colleague and person. I only hope that we will be able to find someone of a similar caliber in her place in the very near future.

All the best - **Johann Neveling**

oOo

Jennifer Botha-Brink - National Museum, Bloemfontein.

The Karoo Palaeontology Department at the National Museum has undergone substantial revamping. Much of 2015 was spent managing several renovations in the fossil collection or within the department itself. **Elize Butler** managed the refurbishment of the fossil store, which involved the installation of new shelving and cupboards to house the entire collection. Most of the staff spent several months removing and then repacking fossils into their new home. Elize is to be congratulated on effectively managing such a massive undertaking. The annex, which is the area adjacent to the department, was also transformed into an appropriate scientific laboratory and we are finally having a proper dust extraction system installed. Once this is done, the department will look like a new laboratory! A new specialist technician, **Bobby Eloff**, was also recently appointed. She is now in charge of the osteohistology laboratory and collection and will be managing much of the thin sectioning from now on. **Jennifer Botha-Brink** has been involved in several collaborations. She continues to work with Dr **Adam Huttenlocker** from the University of Utah, USA and Dr **Ken Angielczyk** from the Field Museum in Chicago, USA, which resulted in the completion of several successful projects.

Adam Huttenlocker, showing just how much he loves therocephalians!

Jennifer attended the 74th Society of Vertebrate Paleontology meeting in Berlin in November 2014 and presented a poster on the lifestyle of *Lystrosaurus* and attended the 3rd International Symposium on Paleohistology in Bonn in July 2015 where she gave an oral presentation entitled "Breeding young as a survival strategy in the aftermath of the end-Permian mass extinction". After the ISPH meeting in Bonn, she travelled to Paris, France to spend time with her collaborators and spending time studying thin sections at the Natural History Museum. In September 2015, Jennifer visited Dr

l-r Mike Strong, Jennifer Botha-Brink and Adam Huttenlocker standing just below the Permo-Triassic boundary near Bethulie.

Marina Bento Soares at the Instituto de Geociências (UFRGS), Departamento de Paleontologia e Estratigrafia, Porto Alegre, Brazil for the second time to train students and collaborate in new projects on the osteohistology of Brazilian therapsids. A very productive field excursion was held in March 2015 with Dr Adam Huttenlocker and Dr **Colleen Farmer**, also from the University of Utah, USA, and Dr **Sean Modesto** from Cape Breton University, Nova Scotia, Canada. They visited several Permo-Triassic boundary (PTB) sites, which resulted in the collection of important, and in some cases, novel information regarding the end-Permian mass extinction in the Karoo Basin. Another field excursion is planned for April 2016 and will include

Dr **Rose Prevec** (Albany Museum, Grahamstown), Dr **Roger Smith** (Evolutionary Studies Institute, University of the Witwatersrand, Johannesburg) and Dr Adam Huttenlocker. Data from this upcoming field excursion to PTB sites in the Free State will be added to the data collected in 2015 and will form the basis of a comprehensive assessment of PTB sites in South Africa. The mega-database, containing taxonomic and stratigraphic information for all the Karoo Permo-Jurassic vertebrates housed in South African collections as well as those in overseas collections, was completed in 2015. The database contains 16 000 vertebrates. A project with Dr **Lucas Legendre** and Dr **Jorge Cubo** from Sorbonne Universités, UPMC University of Paris, France, and Dr **Guillame Guénard** from the University of Montréal, Canada, on the origin of ancestral endothermy in archosaurs, was completed and submitted to *Systematic Biology*. This collaboration has resulted in Dr Lucas Legendre joining me for a Postdoctoral Fellowship in 2016. I am currently preparing a manuscript on the lifestyle of *Lystrosaurus*. A new find, comprising an articulated partial skeleton of *Lystrosaurus curvatus* within a burrow-like structure, was recovered recently. I am describing the taphonomy and morphology of the skeletal remains and completing a review on the lifestyle of this genus.

Elize Butler is almost ready to submit an article on the postcrania of *Galesaurus planiceps*, and is also busy working on a publication on the cranial description of a new gorgonopsian, which forms part of her PhD. **Alex Botha** joined the department in March 2015 to complete an MSc on the Osteohistology of the leopard tortoise, *Stigmochelus pardalis*. He aims to assess osteohistological variation through ontogeny, between individuals and elements. Tortoises have compactness profiles similar to aquatic turtles, which has been the source of some confusion. Alex's main focus is on comparing compactness profiles at various locations along a bone to determine if a particular region impacts the compactness profile results and thus, inferences regarding lifestyle. **Luke Norton** is continuing his PhD on tooth replacement in various cynodonts. He is currently close to submitting two articles, one on *Galesaurus* and another on *Cynosaurus*. **Mike Strong** is doing a part-time PhD on the search for osteohistological markers indicating the presence of the mammalian diaphragm. He is studying the vertebrae and ribs to determine if the ligaments attaching the diaphragm to these elements leave signs of their presence in the bone tissues. He has dissected and thin sectioned several animals and the results are promising. Once dealt with, he will apply his techniques to therapsids to determine if similar markers can be found in their bone tissues, indicating the presence of a muscular diaphragm and thus, possibly endothermy. **Fabio Hiratsuga Veiga** is currently doing his PhD on Brazilian therapsid osteohistology. Although not an official supervisor, I am involved in co-authoring the publications arising from his thesis. He is close to submitting an article on a comparison between the traversodontid cynodonts *Exaretodon* and *Protuberum*.

Recent Publications:

Ecker, M., **J. Botha-Brink**, J. A. Lee-Thorp and L. K. Horwitz. 2015. Ostrich eggshell as a source of palaeoenvironmental information in the arid interior of South Africa; pp. 95-111 in J. Runge (ed.), *Changing climates, ecosystems and environments within arid southern Africa and adjoining regions: Palaeoecology of Africa* 33. CRC Press, Florence, Kentucky, 228 pp.

Lyson, T. R., T. M. Scheyer, E. Schachner, **J. Botha-Brink**, G. S. Bever, K. de Queiroz, C. Farmer, **B. S. Rubidge**, J. A. Gauthier. 2014. Fossorial ancestry in the origin of turtles? Insights into the origin of the turtle lung ventilation mechanism and their shell. *Nature Communications.* 5:5211 DOI: 10.1038/ncomms6211.

Gower, D. J., R. J. Butler, A. G. Sennikov, **J. Hancox** and J. **Botha-Brink**. 2014. A new species of *Garjainia ochev*, 1958 (Diapsida: Archosauriformes: Erythrosuchidae) from the Early Triassic of South Africa. *PLoS ONE* 9: 11: e111154.

oOo

Albany Museum, Grahamstown - Rose Prevec, Robert Gess & Billy de Klerk

Rose Prevec - It has been a while since I contributed to Palnews - apologies, Billy! As a former editor I should be more merciful and forthcoming… In my defense, it has been a busy time with me taking over as head of the Earth Sciences Department at the Albany Museum, especially with such large shoes to fill. Fortunately, Billy de Klerk has remained a welcome presence in the department since his retirement, although he is clearly getting the most out of life with regular travels and family visits (but not nearly enough woodworking!).

A highlight of 2015 was a trip to India, to attend the 'International conference on Current Perceptions and Emerging Issues in Gondwana Evolution' at the famous Birbal Sahni Institute of Palaeobotany (BSIP) in Lucknow, followed by a fascinating and epic fieldtrip via Jabalpur, Agra and ending in New Dehli.

A colourful welcome at the Birbal Sahni Institute of Palaeobotany, India, Lucknow.

It was the first time I had travelled to India, and not without some trepidation. As anticipated, the daunting poverty and suffering of both people and animals is hard to see, but I was amazed how the acceptance, joy and gentle attitude of the people I witnessed, softened and enriched the experience. The warmth and generosity of the staff at the BSIP left the delegates of the congress feeling like royalty. Although few foreign delegates attended the conference, it proved to be a wonderful opportunity to meet with fellow *Glossopteris* workers, and I have forged what I hope will be long-term working relationships with some lovely people.

Intrepid fieldtrip participants

The incredible scenery and architecture, and the endless feast of amazing sights made this certainly one of my most intense and enjoyable visits to another country. And it is paradise for vegetarians! If you have a list of places to visit in your life, please add the Taj Mahal in the city of Agra. I was expecting a postcard, and received a life-changing experience instead. Never has architecture touched me as deeply as this giant and delicate building. For me, India was a place of intense

colours and flavours, great contrasts, deep emotions and enlightenment.

Rose at the Taj Mahal – you have to see it!

Colours.

The past six months have been a little tense, awaiting final confirmation of my appointment to Production Scientist in the civil service. Fortunately, this has at last come through, and both the Entomology Department and Earth Science Departments at the Albany Museum have fully entrenched heads of department! Under the guidance of our manager, Mr Manzi Vabaza, our Museum is slowly getting back on its feet after years of poor funding and inadequate human resources.

One of my first tasks last year was to renovate the preparation laboratory, and to install a dust extraction system. Thanks to the NRF and their Eastern Cape Museum infrastructure grant, as well as to the Centre of Excellence in Palaeosciences and with some independently raised funds, we were able to install two dust extractor arms and a powerful extractor fan. This is proving to be very successful in improving both the airflow through the lab and in reducing dust levels significantly. The adjustable nature of the arms allows for precise positioning of the system near the site of dust generation, reducing the suction required for effective extraction. The transparent hoods reduce shading, and the airflow through the arms is adjustable. Noise levels are a lot lower than in many other commercially available systems. This has been fantastic for the health and well-being of our preparation staff, and it has also reduced the amount of dust filtering through into our collections. The system was installed by the Port Elizabeth-based company Vivid Air. While we were at it, we decided to renovate the lab, giving it a spring clean,

and a new coat of paint inside and out. This task was tackled with great enthusiasm and energy by preparators Zibongile Peter, Armstrong Khoso and Khokela Camagu, and we are all pleased with the result.

Thank you to the DST, NRF and the persistent staff at the Centre of Excellence in Palaeosciences! You are doing great things for palaeontology. Access to funding from both the African Origins Platform and the CoE-Pal means that palaeontology in South Africa has never been in such a good position financially, and attaining a critical mass in terms of human resources may just become a reality.

Although we currently only have one permanently employed member of staff (yours truly), the Earth Science department at the Museum is nonetheless growing, thanks to this greater availability of contract and research funds. All of our offices will be occupied this year, for the first time since we expanded into the former Ichthyology Department. Two of our preparators, Khokela Camagu, Armstrong Khoso are enormously relieved to know that they have another three years of funding at the Museum through an African Origins Platform grant, and we are in the process of advertising a third post. **Rob Gess** and **Nicola McLoughlin** have received CoE-Pal postdoctoral fellowships based at the Museum, and we are extremely fortunate to have a Ph.D student, **Aviwe Matiwane**, working with me on *Glossopteris* taxonomy (sorry for her). She has been awarded a CoE-Pal bursary. We will also be hosting two honours students from the Rhodes Geology Department, who will also be doing *Glossopteris*-related projects, with a biostratigraphic angle.

In November **Rob Gess** and I attended the Cape-Karoo Imbizo at NMMU in Port Elizabeth, which was a very informative three day conference, followed by a fieldtrip to local geological sites in the Eastern Cape. It was great catching up with old friends, while also crossing paths with non-palaeontologists , at a truly interdisciplinary forum. Thanks to **Martin de Wit**, Bastien Linol and colleagues, for bringing us all under one roof.

I look forward to seeing many of you at the PSSA in Stellenbosch later this year.

All the best,

Rose

Rob Gess - In August Rob Gess presented 2 papers at the 13th International Symposium on Early and Lower Vertebrates in Melbourne, Australia where he enjoyed catching up with developments from around the world and chatting to colleagues. He assisted with a preconference fieldtrip to the famous Gogo Station, Frasnian (Late Devonian) lagerstätten in the Kimberlies, to collect fossil reef fish preserved in limestone nodules. For Rob this was a dream come true.

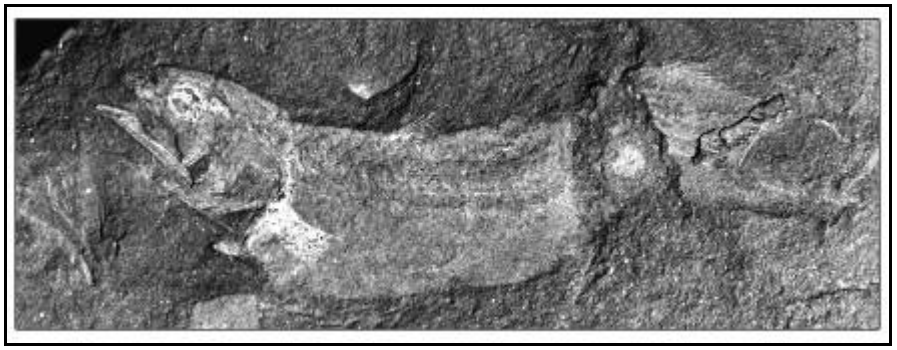
Rob with an Eastmanosteus (placoderm) nodule and colleagues at Gogo

Whilst in Melbourne he was also able to spend some time with **Norton Hiller**, discussing brachiopod samples from the Baviaanskloof Formation.

The post conference fieldtrip was very interesting and participants visited fish fossil sites in Victoria and New South Wales including the *Edenopteron* site, the Bunga Beds, Wee Jasper and the Canowindra mass death assemblage.

Rob chiselling into the Devonian near Eden in New South Wales

The fossil coelacanth ***Serenichthys kowiensis*** (Illustrated on front cover. Ed) was published by **Rob** and **Mike Coates** in the *Zoological Journal of the Linnean society* in September. Based on exquisitely preserved 3 to 5 cm long specimens from Waterloo Farm, these are the earliest known Coelacanths from Africa and one of only half a dozen reconstructable Devonian coelacanths. They also represent the world's oldest coelacanth nursery by about 60 my.



Serenichthys - holotype part.

In October he discovered that road upgrades east of Grahamstown were cutting through Witpoort Formation strata, including carbonaceous mudstones. Negotiations with the road engineers and SANRAL have allowed a monitoring system to be put in place. Fortuitously former geology student and Albany Museum palaeontology volunteer Chris Harris was visiting at the time. Having, as an undergrad, spent a lot of time helping Rob to split similar mudstone and shale from Waterloo Farm he is the perfect candidate to help keep an eye on things and conduct sampling. Interesting new invertebrate material is forthcoming as well as plant fossil fragments reminiscent of the Waterloo Farm flora. These new sites are an important addition to our sparse record of South African Famennian palaeontology.

Chris Harris at one of the new sites outside Grahamstown

The Cape Karoo Imbizo was held at NMMU in late November. It was well attended by geologists and palaeontologists. Rob gave a talk demonstrating how vertebrate biostratigraphy may be used to confirm the date of the Devonian/Carboniferous boundary in South Africa.

Maarten, Rob and Bruce at Welwood during the Imbizo

In Late December and Early January Rob carried out field exploration for new Adolphspoort Formation (Bokkeveld Group) fish sites in the Klein Karoo. Temperatures were well over 40 degrees but Rob was rewarded with a promising new site which he will return to excavate in more equitable weather. Otherwise, Rob has been pushing ahead with the ongoing description of organisms from Waterloo Farm. Publication of his reconstructions of *Africanaspis* (placoderm) species with Kate Trinajstic of Curtin University (Perth) is approaching the finishing line.

In mid-February he will be welcoming Tetsuto Miyashita (from the University of Alberta) to the Albany Museum for a collaboration on new ancient lamprey specimens.

Cheers, **Rob**

Billy de Klerk - Since my retirement in April'15, I quickly adapted to a new pace of life. I thought I'd have more time on my hands…how wrong I was! Busy, doesn't half describe retirement. Apart from taking advantage to travel a bit, I spent some time on improving my wood-turning skills. In addition we were muscled into two stints of baby-sitting our grandchildren who live in JHB. Must say I'm glad to live 1000km away in GTN so that it doesn't happen too often. Over the past months I have presented numerous popular Karoo and dinosaur talks to interested groups like U3A, Rotary (Port Alfred and Grahamstown), Rhodes Zoology students, etc. and have lead two student field trips to the Karoo. On the research front it was really gratifying to finally see that the number of large fragmentary Kirkwood sauropod dinosaur bones, that I, and numerous visiting palaeontologist, particularly Cathy Forster, Callum Ross, Scott Sampson and Eric Roberts, etc.), had collected over the past 20 years or so, were finally identified and published. PhD candidate, **Blair McPhee** at the ESI at Wits, under the supervision of **Johan Choiniere** and in collaboration with **Phil Mannion** (Dept. of Earth Science, Imperial College London, UK), took a long hard look at the anatomy of these

various fragments and were able to identify the kinds of beast that gave rise to them. Our findings are published - http://dx.doi.org/10.1016/j.cretres.2015.11.006

While reflecting on these, seemingly unremarkable discoveries at the time, I had a look at the many field photographs that I took at the time, and I thought it would be a good to present some history.

Jun'96 – Cathy Forster(r) discovered a well-preserved sauropod (Diplodocidae) caudal at the "Kirkwood Cliffs" (stratotype) locality. Here she excavating the caudal with Scott Sampson (l).

Left. Aug'07 – Eric Roberts, Dave Goodwin (and **Billy**) at Umlilo game farm, close to where, *Nqwebasaurus*, and numerous large sauropod bones had been found in the past. At this time Eric had discovered a …"Eusauropoda indet."

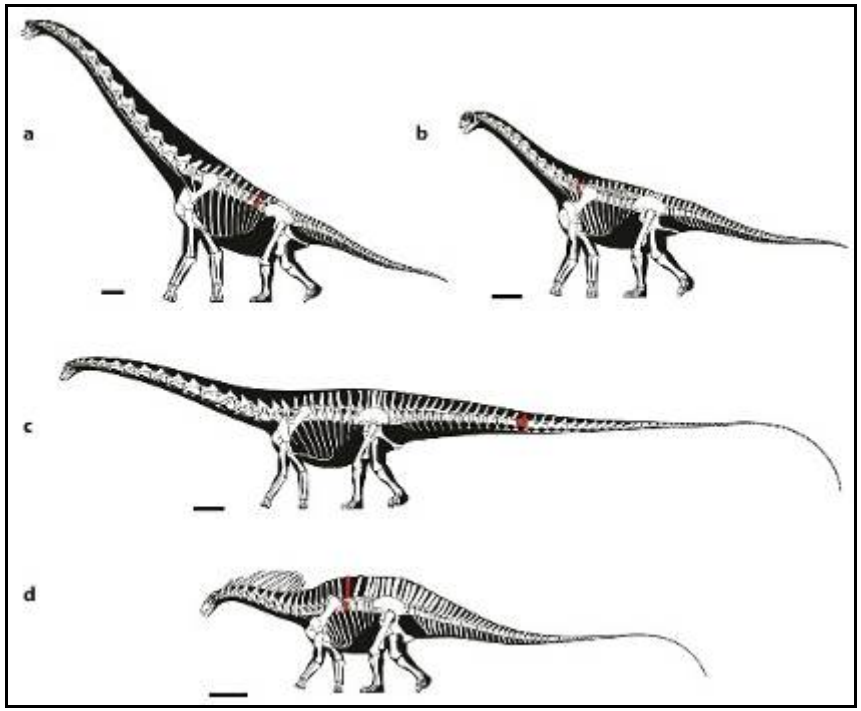
Right Aug'07 – Billy de Klerk and Eric Roberts excavating the soon to be …"Eusauropoda indet" – Id. courtsy of Blair McPhee et al 2015.


Jun'11 – Billy de Klerk wealding the Stihl rock-cutting saw during the excavation of the sauropod bone that he had found at Umlilo in **Aug'07**

Jun'11 – Cathy Forster, Jonah Choiniere and Karen Poole doing the hard yards carrying out part of a large sauropod bone at Umlilo farm.

Aug'14 - Blair McPhee and Billy de Klerk inspecting preparation progress of the Kirkwood sauroupd bones.

Aug'14 L-R Blair McPhee, Marius Vermaak, Billy de Klerk and Jonah Choiniere all pondering the nature of single large isolated Kirkwood sauroupod bone fragments at the Albany Museum.



If you enlarge this picture you'll see a single bone in each sauropod skeleton coloured in red. Blair, Phil Mannion and Jonah were able to identify each large fragment of bone, and allocate them to "…at least four taxonomically distinct groups of sauropod, comprising representatives of – (a) **Brachiosauridae;** (c) **Diplodocidae;** (d) **Dicraeosauridae;** and a (b) **eusauropod** that belongs to neither Diplodocoidea nor Titanosauriformes. This represents the first unequivocal evidence of these groups having survived into the earliest Cretaceous of Africa. ☺ http://dx.doi.org/10.1016/j.cretres.2015.11.006

Till next time….. ***Billy de Klerk***

In support of Evolution …..

The Earth Speaks, clearly, distinctly, and, in many of the realms of Nature, loudly, to William Jennings Bryan, but he fails to hear a single sound. The earth speaks from the remotest periods in its wonderful life history in the Archaeozoic Age, when it reveals only a few tissues of its primitive plants. Fifty million years ago it begins to speak as "the waters bring forth abundantly the moving creatures that hath life." In successive eons of time the various kinds of animals leave their remains in the rocks which compose the deeper layers of the earth, and when the rocks are laid bare by wind, frost, and storm we find wondrous lines of ascent invariably following the principles of creative evolution, whereby the simpler and more lowly forms always precede the higher and more specialized forms.

The earth speaks not of a succession of distinct creations but of a continuous ascent, in which, as the millions of years roll by, increasing perfection of structure and beauty of form are found; out of the water-breathing fish arises the air-breathing amphibian; out of the land-living amphibian arises the land-living, air-breathing reptile, these two kinds of creeping things resembling each other closely. The earth speaks loudly and clearly of the ascent of the bird from one kind of reptile and of the mammal from another kind of reptile.

This is not perhaps the way Bryan would have made the animals, but this is the way God made them!

— ***Henry Fairfield Osborn***

The Earth Speaks to Bryan (1925), 5-6. Osborn wrote this book in response to the Scopes Monkey Trial, where William Jennings Bryan spoke against the theory of evolution. They had previously been engaged in the controversy about the theory for several years. The title refers to a Biblical verse from the **Book of Job (12:8), "Speak to the earth and it shall teach thee."**

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NEWS FROM:

CENTRE OF EXCELLENCE PALAEOSCIENCES

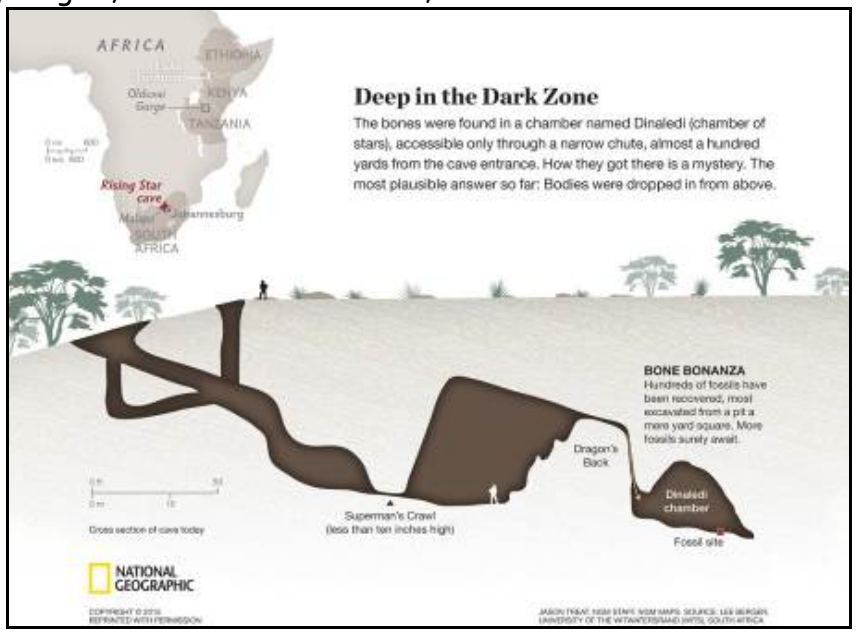
UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

Francis Thackeray, ESI at Wits.

Reporting on - *Homo naledi,* a new hominid species from South Africa.

On September 10, 2015, Lee Berger and his team of explorers and scientists made a spectacular announcement from Maropeng near Sterkfontein, Swartkrans and Kromdraai in the Cradle of Humankind. They announced the discovery of 15 individuals of a new hominid species (*Homo naledi*), represented by more than 1500 fossils from the site called Rising Star. Two years earlier, a few explorers had entered the Rising Star solution cavity which at intervals had extremely narrow passages. The so-called Dinaledi Chamber (the "Chamber of Stars") was at the end of a tortuous route. Only the smallest of the speleologists could access this part of the cave, where a few bones were exposed on the surface.

Photographs were taken, one of which was relayed to me by Pedro Boshoff, an enthusiastic cave-explorer with more than 20 years' experience in the Cardle of Humankind. Having recognised it as a hominin, I sent Lee Berger an SMS message on October 1, 2013, simply saying "Hi Lee. Pedro reports a hominin. A SAHRA permit will be needed to explore further. Can you please help him? Thanks. Francis". Almost immediately, Lee confirmed the hominin discovery at Rising Star. Paul Dirks, a geologist, was called in to assist, and a team was established.



What happened next was analogous to a mission to the moon, with a "Control Centre" consisting of tents outside the Rising Star cave. The hominin material on the surface of the Dinaledi Chamber included teeth, parts of skulls, and postcrania. A preliminary excavation was undertaken. Surprisingly, there were no carnivore or antelope remains of the kind typically found in cave assemblages in the Cradle of Humankind.

Within two years of the discovery, two articles were published in the online journal, eLife. The impact was immediate through newspapers (front pages in London, New York, Washington and beyond); through major television and radio networks; as well as through Facebook and Twitter. National Geographic published a prominent article as a cover story. The world was agog, to put things very mildly.

At the time of the announcement I was in London for the opening of a conference of the European Society for the Study of Human Evolution (ESHE). Dr Fred Spoor, a world expert on early *Homo*, was one of the first speakers. It was just after 10:00 am Greenwich Mean Time when he reached the end of his lecture. He said "Well, an embargo on a press release has just been lifted". He flicked on a slide of Big Ben, with the arms of the clock pointing to 10:00 am. He then showed an impressive slide of the entire *Homo naledi* assemblage of bones, saying "And here we have the newest species of early *Homo*. It has been called *Homo naledi*, from South Africa". With those words Fred ended his lecture, and he sat down.

The tea break followed almost immediately after Fred's talk, and suddenly I was confronted by a crowd of palaeontologists, some of whom knew something about the fossils. I was the only South African palaeoanthropologist attending that ESHE conference. Among the questions were "How old is *Homo naledi*? How were the skeletons accumulated? Is it really true that carcasses were deliberately deposited at the back of the cave?" These and other questions are still being asked. It is all very exciting.

Homo naledi has a combination of features, including those of *Australopithecus* and *Homo*. The cranial capacity is about 500 cc. John Hawks referred to *Homo naledi* as having a brain "about the size of an orange" (although to my mind it would have been a big orange for comparison purposes. Perhaps "about the size of a large grapefruit" might have been more appropriate). Phillip Tobias had described *Homo habilis* fossils from Olduvai Gorge in Tanzania. These specimens had cranial capacities of about 600 cc. At one time it was even thought that 600 cc was an "endocranial Rubicon" for early *Homo*. So I expect Phillip (or "PVT" as we affectionately called him) would have been surprised that Lee and his team decided to place these new fossils into the genus *Homo*. But as I have written elsewhere, there appears to be no clear boundary between *Australopithecus* and *Homo*. This has become evident within the past two decades, during which new fossils have been discovered at an exponential rate.

The dating of *Homo naledi* is a big challenge. Work is in progress, but it can be mentioned that I have used morphometric analyses to indicate two things. Firstly, the description of *Homo naledi* as a new species appears to be valid. Secondly, although different, *H. naledi* appears to be most similar to hominin specimens that are in the order of 2 million years old. (See - Thackeray, South African Journal of Science, November/December issue, 2015).

Lee Berger has again demonstrated his expertise in co-ordinating a major project that has involved many researchers and explorers. We look forward to the results of further fieldwork and research.

References:

Berger, L.R. 2015. *Homo naledi*, a new species of the genus *Homo* from the Dinaledi Chamber, South Africa. eLife, http://dx.doi.org/10.7554/eLife.09560

Dirks, P. et al. 2015. Geological and taphonomic context for the new hominin species *Homo naledi* from the Dinaledi Chamber, South Africa". eLife, http://dx.doi.org/10.7554/eLife.09561.

BBC News:

http://www.bbc.com/news/science-environment-34192447

From the Cradle to the grave? #Naledifossils
http://wildonscience.com/2015/09/from-cradle-to-grave/

3D tour of Rising Star
http://ewn.co.za/Features/Naledi/Rising-Star-Caves

Interview on SABC TV with Becky Ackermann on *Homo naledi*
https://www.youtube.com/watch?feature=player_detailpage&v=si6h644NXFc#t=1490

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Other hominid fossil work:

Prof Ron Clarke – Big Little Foot feat was a labour of love.
http://www.bdlive.co.za/business/innovation/2015/10/20/big-little-foot-feat-was-a-labour-of-love

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News from Francis Thackeray, ESI at Wits

In February 2015 I travelled to Paris for a celebration of 20 years' collaboration between France and South Africa in the context of palaeoanthropology. It was a grand occasion at the Palais du Luxembourg, with **Yves Coppens**, **Dominique Gommery**, **Brigitte Senut**, **Martin Pickford**, **Jose Braga** and colleagues. To reciprocate, celebrations of the 20-year collaboration were held in Pretoria in October, with the French ambassador Elisabeth Barbier in attendance together with Jose Braga who has championed the AESOP programme which promotes research on African heritage. There were excursions to Sterkfontein and NECSA where CT scanning and neutron tomography of fossils are being undertaken, facilitated by Frikkie de Beer and Gawie Nothnagel. A 3D imaging workshop at the University of Pretoria, organised by Anna Oettle and her team, was very successful. There were also meetings at Wits.

It was a pleasure to host **Marine Cazenave** (from Toulouse) while she was based at the ESI with me, working on CT scans of femora of *Paranthropus robustus*.

Fieldwork at Kromdraai is very exciting, with **Jose Braga**, **Laurent Bruxelles** and our team. We are finding new hominid fossils. **Watch this space !**

In Toulouse in November I served as President of the Jury for Amelie Beaudet's defence of her PhD on South African Plio-Pleistocene primates. The Jury awarded the degree *cum laude*. It was a grand occasion for Amelie's remarkable study of fossils such as *Parapapio broomi* and *Parapapio jonesi*, which have been regarded as two different species but which (as I have suggested at least for the type specimens) might perhaps be males and females of a single species. Broom was a splitter, but we might otherwise be looking at large male (some "*P. broomi*"?) and smaller female (some "*P. jonesi*"?) specimens. This is where it will be fun to apply a statistical (probabilistic)

definition of a species, associated with an approximation of a biological species constant (T = -1.61) ! **Watch *this* space !**

Sue Dykes and I were pleased to have our paper published on "Morphometric analyses of hominoid crania, probabilites of conspecificity and an approximation of a biological species constant".

Thackeray, J.F. & Dykes, S. 2015. *Homo, Journal of Comparative Human Biology*. http://dx.doi.org/10.1016/j.jchb.2015.09.003.

In London in September I attended the ESHE conference (the European Society for the Study of Human Evolution), at the British Museum. I presented my statistical (probabilistic) definition of a biological species, applied to evidence suggesting that there is not a clear boundary between *Australopithecus africanus* and *Homo habilis* (perhaps we should see this transition in the context of a chronospecies). See Thackeray, J.F. 2015. *Homo habilis* and *Australopithecus africanus*, in the context of chronology and climatic change. In: Runge, R., (ed.) Changing climates, ecosystems and environments within arid southern Africa and adjoining regions. *Palaeoecology of Africa* 33:53-58

The ESHE conference coincided with the announcement of *Homo naledi*, the new species described by Lee Berger and his colleagues on September 10, 2015. (I was the only South African palaeo-anthroplogist at the ESHE conference, so I was besieged with questions !). As yet there appears to be no certainty about the age of these fossils, but using my morphometric technique I have estimated an age of 2 million years plus or minus half a million, as a ball-park approximation. See Thackeray, J.F. 2015. Estimating the age and affinities of *Homo naledi*. South African Journal of Science 111 (11-12): 3-4.

2015 was a busy but exciting year. Many thanks to all at the ESI, and to all my wonderful colleagues from around the world, for making it so stimulating. (Palaeo-people do it passionately!)

Francis T

oOo

News from Marion Bamford, ESI, Wits.

In July 2015 I participated in the annual field season at Olduvai Gorge with my usual colleagues, Ian Stanistreet, Harald Stollhofen, Rosa Maria Albert, Jackson Njau and Fidelis Masao. The Leakey camp was quite busy as there were two field schools running at the same time but we continued with our excavations and mapping in the western part of the gorge.

Leakey camp at Olduvai Gorge (left new labs built by Rutgers University; right original buildings from Mary and Louis Leakey's time in the Gorge.

I left before the end of the field season to attend the XIX INQUA conference in Nagoya Japan where over 2400 delegates from all over the world presented their research on anything and everything to do with the Quaternary. My presentation was on some fossil leaves from Lukeino, Kenya. Japan is very clean, efficient and orderly and the conference ran smoothly!

Cape-Karoo Imbizo, end November 2015. Participants studying the coastal Cape deposits.

At the end of November Maarten de Wit and Bastien Linol held a combined Cape Fold Mountain and Karoo meeting at NMMU in Port Elisabeth with geophysicists and palaeontologists discussing their views. It was a very stimulating meeting and concluded with an interesting trip through the Cape Fold Mountains into the southern Karoo. We all nearly expired in the heat! Several researchers from the ESI participated and will be contributing to the book edited by Maarten and Bastien.

There is a growing body of palaeobotanists and palynologists (pollen, phytoliths and diatoms) coming through the ESI with four post docs, five PhDs and two Honours students in 2016. Caroline Philipps is doing a post doc on baboon diets and phytoliths to relate to hominid diets, Natasha is working on the Karoo palynology of southern Africa, Jennifer Fitchett is looking at late Pleistocene-Holocene climate and Joseph Chikumbirike is working on Neogene charcoals from southern Africa. PhD students, Sandra Lennox, Rahab Kinyanjui, Tanya Hattingh and May Murungi should be finishing their theses this coming year, and Jacques Gerber and Elysandre Puech are just beginning their theses. Two new masters (Kierra Mahabeer and Maria Combrink) and one Honours student (Mariska Singh) are also working on palynology projects. Simoné Koch will do a masters project on fossil woods and climate.

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News form Jonah Choiniere, ESI at Wits

What a finish it was to 2015! Early spring started with an intense 7 weeks of Form and Function – a 2nd and 3rd year course I co-teach in the School of Animal, Plant, and Environmental Sciences. Members of my lab, including **Katherine Clayton, Kimi Chapelle, Casey Staunton, Blair McPhee, Kathleen Dollman**, as well as ESI PhD student **Safiyyah Iqbal** performed yeoman service marking papers and leading practicals.

Kathleen Dollman teaches on the finer points of the secondary palate.

Hot on the heels of teaching, Professor Paul Barrett of the London Natural History Museum joined us with his students Matt Baron and Simon Wills for two weeks of Elliot fieldwork in the Free State. We closed out the big quarry at Bramley's Hoek and the Highland Giant site and Kimi Chapelle found another promising area to excavate at Heelbo (Adam Yates' famous locality where *Aardonyx*, *Arcusaurus*, and *Pulanesaura* are from).

End of the quarry: **Kimi Chapelle**, **Simon Wills, Casey Staunton, Paul Barrett** and **Matt Baron** close out the Bramley's Hoek site.

PhD student **Blair McPhee** puts his back into excavating the final bits of the Highland Giant while **Kat Clayton** cheers him on.

When it rains Pommies it seems to pour them. Soon after Paul and his crew left, Dr. Roger Benson of Oxford University and

his students Serjoscha Evers and David Ford joined us for two more weeks of fieldwork in the Elliot Formation of the Eastern Cape.

With my new postdoctoral fellow Christophe Hendrickx also joining our crew, we kept quarrying in the lower Elliot and found new sites near Blikana that should keep us in business for years to come.

Blair McPhee and Dr. Roger Benson keep the quarry going in the lower Elliot Formation of the Eastern Cape.

PhD student **David Ford** clears away debris from an articulated series of vertebrae in the Elliot Formation.

PhD student **Serjoscha Evers** cleans up creatively after an epic plastering session.

Cool drinks by the fire on Hannie and Nelly van Heerden's farm.

We were welcomed home to Wits by the #Feesmustfall campaign, which forced us to think creatively about our academic project. I even held my honours Archosaur Evolution course out of my dining room!

Members of my Honours Archosaur Evolution class crowding my dining room during the #Feesmustfall protests.

In early January, 2016, Professors Corwin Sullivan and Jingmai O'Connor from the IVPP in Beijing joined us in Johannesburg for a few days of fieldwork in the Tritylodon Acme Zone and some specimen work in the collections with their students Wang Yanyin, Yao Xi, and Yang Jiasheng.

Profs Jingmai O'Connor and Corwin Sullivan ride off into the sunrise with our host Cobus near Ladybrand.

The Chinese delegation with the family of the late Dr. Huchzermeyer at the ESI. From left: Yao Xi, Yang Jiasheng, Wang Yanyin, Prof Marie Huchzermeyer, Prof Jingmai O'Connor, Prof Corwin Sullivan, and Dr. Hildegard Huchzermeyer.

Finally, on January 25th, my wife **Dr. Kelsey Glennon** and I welcomed our new baby girl, **Freyja Mae**, happy and healthy!

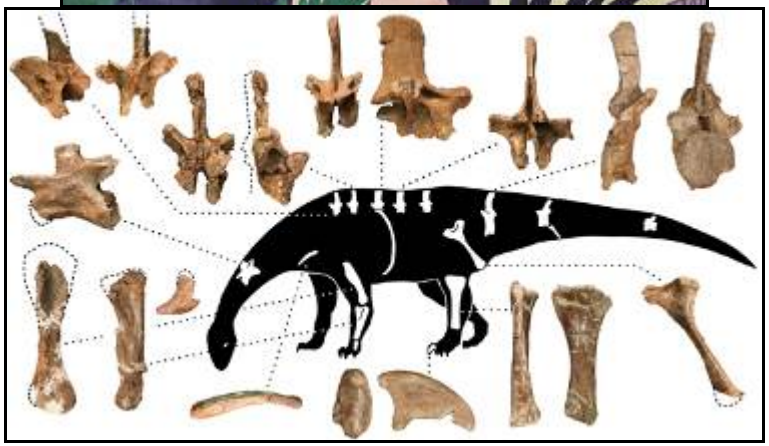
Freyja Mae Choiniere, b. January 25th, 2016 at 8:30pm, 3.5kg.

Student news:

A special welcome to my Centre of Excellence Postdoctoral Fellow **Dr. Christophe Hendrickx**, who's working on gomphodont tooth complexity and the assembly of the theropod dental toolkit.

Christophe Hendrickx, Postdoctoral Fellow.

PhD student **Blair McPhee** had an outstanding year, with three publications including one naming *Pulanesaura*, one of the first sauropod dinosaurs. This discovery made it to #61 on the top 100 science stories of 2015!



Top: Discovery Magazine's reconstruction of *Pulanesaura*; Bottom: from Blair McPhee's Scientific Reports paper describing the new sauropod.

MSc student **Kimi Chapelle** is writing up her thesis now on cranial growth in *Massospondylus*. She's received a highly competitive Centre of Excellence grant to fund her PhD this year, which will be co-advised by me and Prof Paul Barrett!

MSc student **Kathleen Dollman** is working on two publications using her CT skills to glean new information from South Africa's earliest crocodylomorphs. She's started a new, and hopefully fruitful collaboration with Prof Corwin Sullivan of the IVPP in Beijing.

MSc student **Casey Staunton** is continuing her work on sauropodomorph forelimb evolution, and has nearly completed her data collection.

MSc student **Katherine Clayton** found lots of great fossils in Kruger National Park and will be completing her MSc on the Lebombo/Tshipise Basin in the upcoming months.

And last but by no means least, a big congratulations to **Nadia Afonso**, who successfully graduated with her honours degree after writing a thesis on a putative burrow from Cynognathus subzone C!

oOo

Pia Viglietti – ESI, Wits University

My life up has not been worth writing home about recently, due to the fact that I spent a good part of 2015 locked in my office writing up the PhD. The field seems like a distant dream now…

The write up station.
Now I understand why nobody ever does a second PhD!

However, as of this month I have officially completed and submitted! With graduation on the horizon the next question is what's next for me, and I don't know but that is alright with me.

For now I'll update you on some of my activities, most notable is that I published a part of the doctorate work, and spoiler alert, the *Dicynodon* Assemblage Zone (DiAZ) is no more! Recently *Daptocephalus leoniceps* was revived by Christian Kammerer and colleagues. Thanks to Christian, Kenneth D. Angielczyk, and Jörg Fröbisch who kindly shared this updated database information from fossil collections both globally and locally, I was able to update the stratigraphic ranges of latest Permian fauna for the DiAZ and discovered something very interesting. Index fossils currently used to define the Assemblage Zone (*Dicynodon lacerticeps*, *Theriognathus microps*, and *Procynosuchus delaharpeae*) have first appearance datums below its traditionally recognized lower boundary and have ranges mostly restricted to the lower portion of the biozone, well below the Permo-Triassic Boundary. Only *Da. leoniceps* was restricted to the entire range of the biozone and therefore we re-established *Da. leoniceps* as an index fossil for this stratigraphic interval, and reinstated the name *Daptocephalus* Assemblage Zone (DaAZ) for this unit. Furthermore, the FAD of *Lystrosaurus maccaigi* only in the uppermost reaches of the biozone calls for the establishment of a two-fold subdivision into a lower and upper DaAZ. You can read more about the updated biostratigraphy in the publication: Viglietti, P. A., Smith, R. M. H., Angielczyk, K. D., Kammerer, C. F., Fröbisch, J., Rubidge, B. S., 2015. The *Daptocephalus* Assemblage Zone (Lopingian), South Africa: A proposed biostratigraphy based on

a new compilation of stratigraphic ranges. Journal of African Earth Sciences, 113, 1-12.

(Left) Brachiopod fossils found in the Bokkeveld Group near Uitenhage. (Right) Floriskraal Formation (Witteberg Group) that behaved like putty during the Carboniferous-Permian Gondwanide Orogeny.

However between the 24th and 30th November I did manage to get some time away from the office to present my recent findings at the Imbizo Cape-Karoo Conference, hosted by Maarten De Wit's lab at the Nelson Mandela Metropolitan University in Port Elizabeth. The ESI as always had much to offer to the table, and talks by Bruce Rubidge, Marion Bamford, Jonah Choiniere, Natasha Barbolini, Michael Day, Blair McPhee, and Cameron Penn-Clarke were very well received. Additionally it was a fantastic opportunity to network and catch up with colleagues and friends from across the country. A post-conference fieldtrip into the hinterland ended off the trip well.

I hope next time I will have more to write about. With the PhD behind me I am certain 2016 will take me somewhere exciting!

Enjoying sundowners at the Sundays River Mouth (left) and Valley of Desolation (right) with Chris Van der Linde, Mhairi Reid, and Cameron Penn-Clarke.

oOo

Mike Day – ESI, Wits University

Well the latter half of 2015 was quite a year for me, with enough office absences to make even Jonah Choiniere feel sedentary. It began in July with a plane ticket to Russia, where I met up with Fernando Abdala in the Hotel Uzkoye in Moscow. Fernando had been there visiting the Palaeontological Institute (PIN) in the southern (and brutally soviet-looking) suburb of Yasyanyevo and I joined him for a second week to explore the weird and wonderful European counterparts to our more familiar Karoo beasts. We were graciously hosted by Andrey Sennikov

and Valeriy Golubev, the former of whom shared with us the Russian passion for soup at lunchtimes. Apart from making a thorough inspection of the biarmosuchians the PIN had to offer, Fernando and I had time to make a quick tour into the great city of Moscow, visit the mausoleum of Lenin, roam around the Kremlin and have a taste of the local tipple, by which I mean the truly vast array of vodkas.

Before long, however, we embarked on a field trip to visit the Permian succession along the Severnaya Dvina and Sukhona rivers, together with a number of other delegates that would be attending the XVIIIth International Congress on the Carboniferous and Permian in the city of Kazan. This ten-day journey took us to a number of important fossil localities from which famous specimens had come and for where a couple of Russian assemblage zones had been named. More vodka was consumed and river banks unsuccessfully excavated but we gained a sound understanding of how fieldwork was accomplished in Russia. Fossils, when found, were mostly fragments of bone in channel sandstones that were so soft they could be excavated with a spade; a very different experience to the Karoo. In the end we made in to Kazan, the capital of Tatarstan, where we joined the hundreds of eager stratigraphers to discuss the chronology, environments and ecosystems of the Permian and Carboniferous. The radiometric ages from the Beaufort Group were very well received.

From Kazan I bid Fernando good-bye and made my way to Oxford to spend some time with Roger Benson and Christian Kammerer, just catching the biennial conference of the Systematics Association. We wanted to work with the high-resolution stratigraphic occurrence data for the mid-Permian tetrapods of the Karoo as a way of exploring evolutionary rates during this time. This was an interesting experience and produced promising results, so watch this space.

In September I was back in South Africa but it wasn't long before our Russian colleagues came over for their reciprocal visit. In early November I spent a few days in Cape Town to look at some specimens, during which time I was able to spend some time with Roger Smith and get to know Brandon Peecook. I then met up with Bruce Rubidge, Elena Boiarinova, Valeriy Golubev, Mariia Naumcheva, Andrey Sennikov and Frank Scholtze to take a comprehensive tour through the Karoo succession from the Dwyka to the Drakensberg. We managed to see most of the formations there were to see, visit some of the best localities and even had a drive through some game reserves. Amarula now replaced vodka.

After being back for only a day I was then off with Marc van den Brandt to spend some field time with Roger Smith and the Iziko party in the Nuweveld at Amandelboom. This was my opportunity to impress his seasoned team with my fossil collecting skills. Unfortunately, I found very little but was privileged to watch the masters in action. Marc and made the 1000 km journey in one heroic day and were back in Jo'burg just in time to fly out to Port Elizabeth for the Cape-Karoo Imbizo at NMMU. This was a great meeting with a number of familiar

faces and ultimately proved successful in advancing the field of Karoo basin geology. It has even resulted in a spontaneous book chapter for a number of us ESI people.
This year is expected to be a bit more office-based, so I can write up some of the data that fills my hard drive and a dozen field notebooks. Fieldwork in March and the conferences of the winter will be exceptions to this, so I'd better get cracking.

When working at the PIN, one is continuously subject to the bemused frown of the late M. F. Ivakhnenko; synonymise at your peril.

Mike Day and **Fernando Abdala** before the gates of the Famous Palaeontological Institute, Russian Academy of Sciences, Moscow. What treasures dwelt within they were soon to discover.

Fernando Abdala shows off his ESI apparel at the site of a recent assassination/murder near the Kremlin and St Basil's Cathedral. Central Moscow had a very grand and classically European appearance that belied its communist history.

The field trippers (minus Fernando Abdala) at the site of Amalitzky's great excavation on the east bank of the Severnaya Dvina River in Arkhangelsk Oblast, Russia. It was here that a great number of late Permian fossils, including the pareiasaur *Scutosaurus karpinskii*, were recovered during the early 20th Century.

An exuberant Russian demonstrates a pareisaur gait at the Ustie Strelny locality on the Sukhona River, Vologda Oblast.

Liu Jun and Tian Li looking less impressed than they should at a remarkably well-preserved specimen of *Deltavjatia vjatkensis* at the Kotel'nich Museum. This entire room was filled with incredible specimens of tetrapods that have given their name to the Kotel'nich subassemblage.

Oliver Hampe, Ute Gebhardt and Fernando Abdala being whisked along the Sukhona River on a speedboat. This was just one of many modes of transport (including a hovercraft) that ferried the assorted palaeontologists between the Permian localities of the area.

Delegates of the Systematics Association Biennial Conference crowd round the hors d'oeuvres in the banqueting hall of Christchurch College, Oxford. Mike Day had decided against dining at tables that had seen the likes of John Locke, William Buckland, Sir Robert Peel, Richard Curtis and most recently, Harry Potter, but had no qualms with taking advantage of the open bar next door.

Andrey Sennikov explaining something, presumably a size or altitude, to Bruce Rubidge on the farm Heelbo in the Free State Province. This concluded their Karoo tour and they were initially excited, until we broke it to them that there were only some rubbish dinosaurs from this locality.

All aboard the *Aulacephalodon* express. Here Elena Boiarinova, Valeriy Golubev, Mariia Naumcheva, Andrey Sennikov and Frank Scholtze are seen cramming themselves into the highest seats of a jeep as they took a ride up into the Sneeuberge to visit the *Aulacephalodon* footprints on the farm Asante Sana. Thanks to its remote location, the Russians (and German) got an impromptu mini-safari. All in a day's work for **Bruce and Mike**.

Despite concerted efforts to protect them, the footprints *Aulacephalodon* footprints at Asante Sana are suffering badly from weathering. Nevertheless they remain enough to warrant a photograph or two.

Helical *Diictodon* burrow near the house at Amandelboom, where **Roger Smith** and Team were camping. A number of fantastic *in situ Diictodon* skeletons were discovered during the trip (which Roger will probably elaborate on) but it should be noted that none of them were found by Mike Day.

Compensating for his lack of palaeontological success in the field, **Mike** partially redeemed himself with costume creativity on the last night. There were superior displays but only by individuals with too much self-respect to be seen thusly attired in PalNews.

oOo

Herbie Klinger (retired), Ex-Iziko Museum, Cape Town

Life out here in Porterville is nice and quiet. I enjoy sitting on the stoep looking at the mountains rather than being stuck in the traffic and avoiding the taxis. I have finally managed to get my ammonite literature in some sort of order and can do some research. Apart from editing African Natural History, I have been kept busy reviewing articles for Acta Geologica Polonica. I was sent some photographs of ammonites from the Congo Brazzaville to identifyby a student at UWC. The preservation is poor, but they seem to be texanitids of Santonian age. Jim Kennedy and I submitted a paper on Prionocycloceras for the Bill Cobban memorial volume in Acta Geologica Polonica. His passing is a sad day for palaeontology in the USA, but we can be grateful for all the pioneering work he did on the Cretaceous of the USA – especially the detailed ammonite zonation of the US Western Interior, and his meticulous description of the scaphitids and Baculitids. Apart from ammonites, Bill also recorded the inoceramids from the USA.

Anusuya Chinsamy-Turan invited me along with Ryan Tucker and Christen Shelton to look for dinosaur material in Zululand. Years ago I had found some bone fragments on the Nibela Peninsula which Anusuya had identified as dinosaur remains. It was a very short trip, but we managed to find some more fragments, in addition to some reptilian remains Jim Kennedy and I had come across in 1971 near Lister's Point .Due to the very low water levels in the lake, I found some beautiful specimens of a large Platyceramus in the Santonian exposures north of Lister's Point. In the previous volume of Palnews Martin Pickford had a photograph of specimens of Placenticeras merenskyi from the Wanderfeld IV locality near Bogenfels in Namibia, and questioned whether they were in situ or reworked. When I visited the locality in the early 70'ies, I found no ammonites, but abundant Rhynchostreon bivalves. Ian McMillan collected samples from the same locality, and on the basis of microfossils, gave a date of Santonian for the locality. He also found a fragment of a heteromorph ammonite, Glyptoxoceras, which we described (Palaeontogia Africana 42: 25-27).This all seems to indicate that the exposure is indeed in situ, and not reworked.

Above is a photograph of the locality taken by Haughton when he discovered the ammonite. I remember asking Dr Haughton about the locality when we were both working at the Geological Survey in Pretoria, and according to him, he and Rogers made a toilet pit-stop, and in the process, fortuitously came across the ammonite.
I have finally managed to get permits from Western Cape Heritage and Cape Nature to collect Ordovician fossils in the Groot Winterhoek nature reserve in the mountains near Porterville. Up to now it has been too hot to do any work but I intend to start as soon as the weather permits. I serve on the council of the local, Jan Danckaert Museum, and intend to do a small display on the fossils of the Cederberg Fm.

oOo

Anusuya Chinsamy-Turan, UCT'. Palaeobiology Res. Group

Emil Krupandan is currently in the final stretch of his PhD research. He has completed the assessment of the sauropodomorph material from Maphutseng, Lesotho, which appears to be referable to *Antetonitrus ingenipes* or a very closely related taxon. Histological analysis of the long bones indicates an intermediate growth pattern between the zonal growth seen in basal sauropodmorphs and the generally uninterrupted growth seen in larger sauropods. He is currently assessing whether *Plateosauravus* is a valid taxon and trying to provide a formal diagnosis, in part, to determine whether material assigned to the "waste-basket" taxon, *Euskelosaurus* can be referred to any southern African sauropodomorphs. Recent highlights include co-authoring a paper describing a new South African sauropodiforme dinosaur called *Sefapanosaurus zastronensis*. He is in the process of submitting two papers on the anatomy and bone histology of the material from Maphutseng.

Matthew Scarborough is also at the 'writing up stage' of his PhD thesis. A recent highlight was his first published paper from his PhD on Pleistocene elephants from the Mediterranean islands. Along with co-supervisors Anusuya and Maria Palomo they described some very interesting anatomical features in the ankle-joint of the 1m-tall dwarf elephant *Palaeoloxodon falconeri* from the island of Sicily. They propose that the anatomical differences *between P. falconeri* and the 3,5m-tall ancestral species *P. antiquus* may have to do with the hilly topography of Sicily, or a reduction in body mass or possibly both.

Germán Montoya Sanhueza, completed his MSc at the University of Cape Town (UCT) with Distinction in 2014. He investigated ontogenetic patterns of bone growth and

development of the African Cape dune molerat, *Bathyergus suillus* (Bathyergidae), and as part of this research histological, skeleto-metabolic and growth patterns provided important insight in to the biology of the skeletal system of these animals. During 2015 he returned to Chile, and had the opportunity to join a paleontological expedition to the desert of northern Chile (Putre, Caragua). This Miocene locality close to the border with Bolivia in the Altiplane, produced several new mammal species, as well as invertebrate ichnofossils. Germán is currently registered for a PhD program at UCT with the intention of researching the skeletal biology of fossorial mammals.
Vidushi Dabee has had to extend her MSc because she and her husband welcomed a lovely baby, Emma, into their family! Vidushi made substantial progress with her research on bone depositional rates in crocodiles, but her work has understandably taken a back seat for now! She has taken 6 months leave of absence from her MSc, and when she returns she will just need to write up her research.

We currently have two new postdocs in our lab: Chris Shelton and Delphine Angst. Chris Shelton completed his PhD at the University of Bonn on pelycosaurs. Upon his arrival in Cape Town in April 2015, he spent time visiting the Dinocephalian collections at Iziko Museums in Cape Town, ESI in Johannesburg, and the Geological Survey in Pretoria. He has had a tough time grappling with the new SAHRA polices on destructive analyses to obtain permits, but thankfully that is mostly done, and he has been frantically processing fossil bones for histological analyses. He and Bob Bakker are currently editing a volume on the proceedings of the 2015 Synapsid symposium for PlosOne. Delphine Angst completed her PhD at the University of Lyon on giant groundbirds. She recently published a new method to estimate the locomotion type of large ground birds using tarsometatarsus measurement. She also published two papers with Eric Buffetaut of description of some new specimens of Gargantuavis, a large Cretaceous bird from Southern France and Northern Spain. During her postdoc here in our lab, she is studying the bony crest of the Guinea fowl in terms of ontogenetic development and sexual dimorphism. She is also working with Anusuya and Aurore Canoville, a former postdoc from our lab, on understanding the link between locomotion and the bone microstructure on giant extinct and extant ground birds. Additionally she is also involved in a collaborative project on the bone histology of Dodos from Mauritius with Anusuya, and British researchers, Lorna Steel and Julian Hume (from BMNH).

Anusuya Chinsamy-Turan has had a hectic final year as Head of Department of the Biological Sciences. She has nevertheless somehow managed to do some exciting research on bone microstructure of various fossil and extinct animals (see publications below). She and Ignacio Cerda have been doing some fascinating work on the biology of sauropodomorph dinosaurs. Anusuya presented some of this work at the Palaeohistology meeting in Bonn in June last year where she focused on the unusual endosteal bone deposition in a basal

sauropodomorph dinosaur from Argentina. One of the highlights of 2015 was being invited as a keynote speaker to the CAVEPS meeting in Alice Springs, Australia. The meeting was altogether fabulous, and she was thrilled to connect with so many people whom she had known only by their names and publications, and of course, to meet many new palaeontologists! She was especially delighted to catch up with "PSSA friends", Adam and Celeste Yates, as well as John Long!

Publications:

Angst D., Buffetaut E., Lécuyer C. & Amiot R. (**2015**). A new method for estimating locomotion type in large ground birds. *Palaeontology* (online DOI: 10.1111/pala.12224).

Angst D., Amiot R., Buffetaut E., Fourrel F., Martineau F. & Lécuyer C. (**2015a**). Diet and climatic context of giant birds inferred from $\delta^{13}C$ and $\delta^{18}O$ values of Late Paleocene and Early Eocene eggshells from southern France. *Palaeogeography, Palaeoclimatology, Palaeeoecology* 435: 210-221

Bekker, A., Cloete, T. J., **Chinsamy-Turan**, A. Nurick, G. N., S. Kok. 2015. Constant strain rate compression of bovine cortical bone on the Split-Hopkinson Pressure Bar. Materials Science & Engineering: C. DOI: 10.1016/j.msec.2014.10.071

Buffetaut E., **Angst D.**, Mechin P. & Mechin-Salessy A. (**2015**). New remains of the giant bird *Gargantuavis philoinos* from the Late Cretaceous of Provence (south-eastern France). *Palaeovertebrata* 39(2) (online DOI: 10.18563/pv.39.2.e3

Canoville, A., and A. **Chinsamy**. 2015. Bone Microstructure of the Stereospondyl Lydekkerina Huxleyi reveals adaptive strategies to the harsh post Permian-extinction environment: Bone microstructure of *Lydekkerina huxleyi*. Anatomical Record 298: 1237-1254.

Otera, A., **Krupandan,** E., Pol, D., **Chinsamy**, A., and J. Choiniere. 2015. A new basal sauropodoform and the phylopgenetic relationship of basal sauropomorphs. Zoological Journal of the Linnean Society 164: 589–634. . doi: 10.1111/zoj.12247

Scarborough, M. E., Palombo, M. R. and **Chinsamy**, A. 2015 Insular adaptations in the astragalus-calcaneus of Sicilian and Maltese dwarf elephants. *Quaternary International*

Konietzko-Meier, D., **Shelton**, C., and Sander, M. The discrepancy between morphological and microanatomical patterns of anamniotic stegocephalian postcrania from the Early Permian Briar Creek Bonebed (Texas). Comptes Rendus Palevol. http://www.sciencedirect.com/science/article/pii/S1631068315001189

oOo

John Anderson – Pretoria. Honorary Research Associate (Palaeobotany), ESI, Wits; AEON, NMMU, PE.

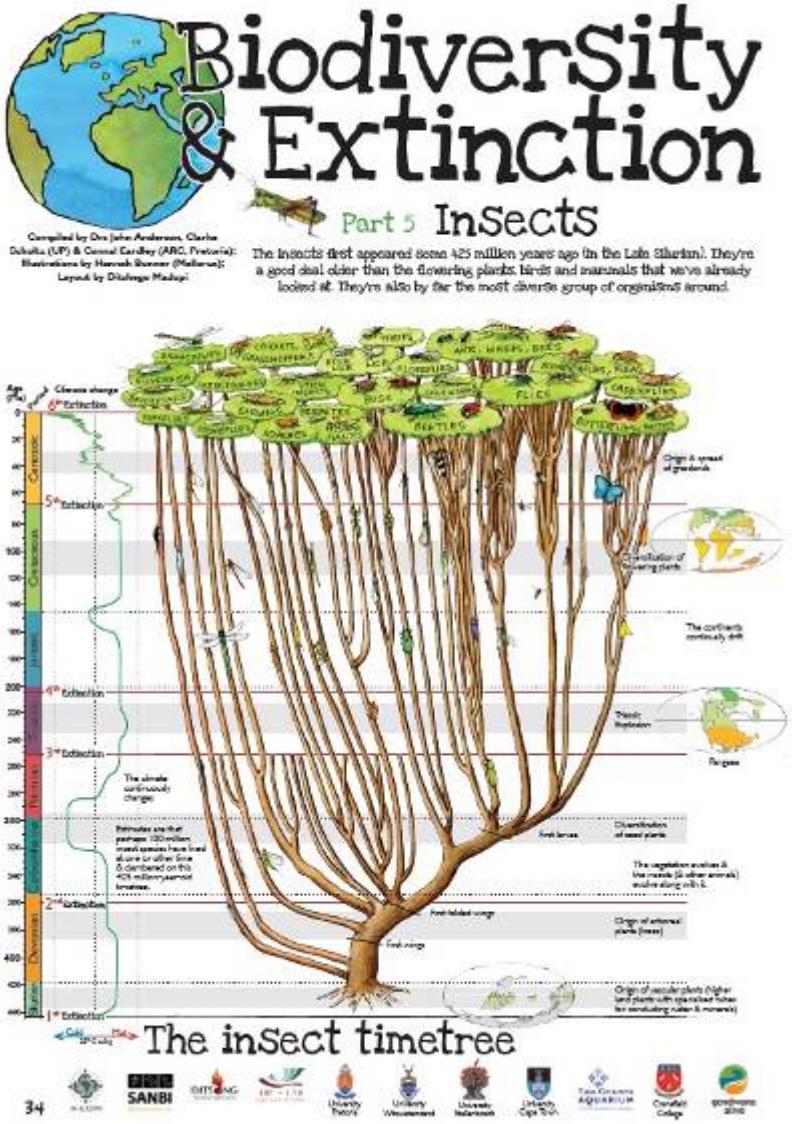
'Biodiversity & Extinction'

Starting in May 2015, we've been running a series under this title (appearing every 2 months) in the South African school-kid magazine **Supernova**. So far the series has included an '*Introduction*' (Part 1), followed by '*Mammals*' (Pt 2), '*Birds*' (Pt 3), '*Mammals*' (Pt 4); and now, appearing this month, '*Insects*' (Pt 5, as illustrated here). In each case I have authored these spreads together with two specialist scientists in the particular field. The aim is that a range of the major universities and museums across the country will in this way have participated directly in the initiative! By the completion of the series (mid-2017), we plan to have covered the major terrestrial and marine, plant and animal groups. Next in line will be the '*Molluscd* (with a focus on the marine shells).

This new series is a counterpart to the 12-part monthly series, '***Earth Alive; 101 Strategies towards stemming the Sixth Extinction & global warming***', that we ran in the other South African school-kid magazine, **MiniMag** (April 2007-April 2008). A booklet and pack of playing cards covering the full series was launched at the '*International Year of Planet Earth*' (IYPE) Conference held in Arusha, Tanzania, 6-9 May 2008.

The Supernova and MiniMag series are for the kids of the world; ours and your kids and grandkids! All kids of the world, today and tomorrow! They are a call '*for action to steer us away from the dangerous course of business-as-usual* (Kofi Annan) for '*the children of today's world and the children of tomorrow's world* (Nelson Mandela). Quotes from endorsements in our '*Towards Gondwana Alive*' (1999).

John M Anderson


Biodiversity & Extinction
Part 5 Insects
The insects first appeared some 425 million years ago (in the Late Silurian). They're a good deal older than the flowering plants, birds and mammals that we've already looked at. They're also by far the most diverse group of organisms around.
The insect timetree
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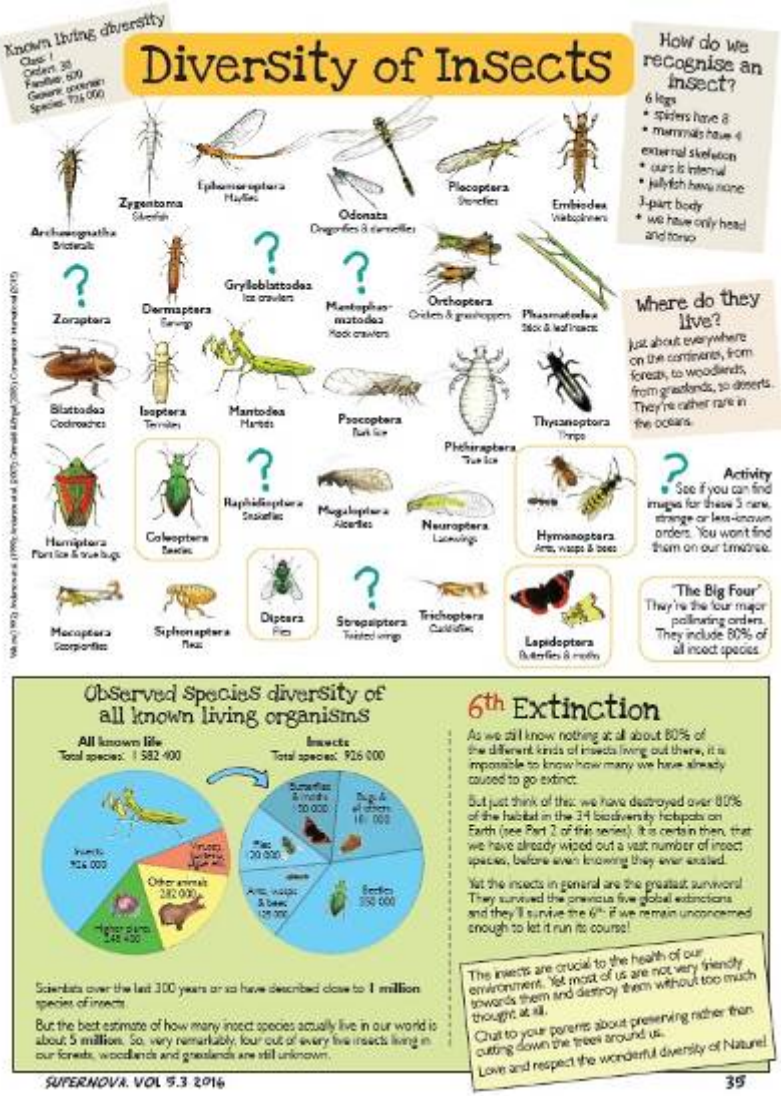
Known living diversity
Diversity of Insects
How do we recognise an insect?
6 legs
* spiders have 8
* mammals have 4
external skeleton
* ours is internal
* jellyfish have none
3-part body
* we have only head and torso
Where do they live?
Just about everywhere on the continents, from forests, to woodlands, from grasslands, to deserts. They're rather rare in the oceans.
Activity
See if you can find images for these 5 rare, strange or less-known orders. You won't find them on our timetree.
'The Big Four'
They're the four major pollinating orders. They include 80% of all insect species.
Observed species diversity of all known living organisms
All known life
Total species: 1 582 400
Insects
Total species: 926 000
6th Extinction
As we still know nothing at all about 80% of the different kinds of insects living out there, it is impossible to know how many we have already caused to go extinct.
But just think of this: we have destroyed over 80% of the habitat in the 34 biodiversity hotspots on Earth (see Part 2 of this series). It is certain then, that we have already wiped out a vast number of insect species, before even knowing they ever existed.
Yet the insects in general are the greatest survivors! They survived the previous five global extinctions and they'll survive the 6th if we remain unconcerned enough to let it run its course!
Scientists over the last 300 years or so have described close to 1 million species of insects.
But the best estimate of how many insect species actually live in our world is about 5 million. So, very remarkably, four out of every five insects living in our forests, woodlands and grasslands are still unknown.
The insects are crucial to the health of our environment. Yet most of us are not very friendly towards them and destroy them without too much thought at all.
Chat to your parents about preserving rather than cutting down the trees around us.
Love and respect the wonderful diversity of Nature!
SUPERNOVA. VOL 5.3 2016
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Comparison between cranial measurements of *Homo naledi* and those of other hominins.

Jaap Kool (Leiden, The Netherlands), Eddie Odes (School of Anatomical Sciences, University of the Witwatersrand), Sue Dykes (Evolutionary Studies Institute, University of the Witwatersrand) and J. Francis Thackeray (Evolutionary Studies Institute, University of the Witwatersrand).
Corresponding author: francis.thackeray@wits.ac.za
9 February 2016

Berger et al (2015) have published the discovery of 15 individuals of a new hominin species attributed to *Homo naledi*, from the site of Rising Star in the Cradle of Humankind. These individuals are represented by more than 1500 fossils, which (at the time of writing) are not yet dated using absolute dating techniques. Berger et al (2015) published a relatively small number of cranial measurements of *H. naledi* in comparison with mean values for homologous measurements obtained from other taxa. These data were used by Thackeray (2015) to indicate (from morphometric analyses) that *H. naledi* was indeed different from other hominin taxa, such that the creation of a new species appeared to be warranted. A second conclusion reached by Thackeray (2015) was that (although different at a species level), *Homo naledi* appeared to be most similar to *H. habilis*, *H. rudolfensis* and *H. erectus*. However, these conclusions were based on less than 15 measurements per specimen, using published data. Ideally this needs to be increased.

A reconstruction of the cranium of *H. naledi* has been based on the morphology of the type specimen (DH1) as well as that of other specimens from the Dinaledi Chamber (including DH2, DH3 and DH4), taking advantage of mirror-imaging. A cast of the reconstruction was purchased at the Marapo facility at Sterkfontein. As an exercise, more than 50 measurements were obtained from this cast for purposes of comparison with corresponding measurements obtained from other specimens, including *Paranthropus robustus* from Swartkrans (SK 48), *P. boisei* (OH 5) from Olduvai Gorge in Tanzania, *Australopithecus africanus* (Sts 5, "Mrs Ples") from Sterkfontein, *A. prometheus* (Sts 71) also from Sterkfontein, *A. sediba* from Malapa, *H. habilis* (KNM-ER 1813 from East Turkana in Kenya), *H. rudolfensis* (KNM-ER 1470 from East Turkana) and *H. erectus* (KNM-ER 3773 also from East Turkana). Measurements from the cast of the reconstruction of *H. naledi* were obtained by Eddie Odes and Jaap Kool. Data published by Wood (1991) were used for purposes of comparison with particular specimens representing *H. habilis, H. erectus, H. rudolfensis* as well as *P. boisei, P. robustus* and *A. africanus*. Measurements of *A. sediba* were based on data published by Berger et al (2010).

The cranial measurements of *H. naledi* were compared to corresponding measurements of other taxa, using a morphometric method previously applied by Thackeray (2015). Pairs of specimens were compared, using least squares linear

regression to quantify the degree of scatter around a regression line associated with the general equation y= mx + c, where m is the slope and c is the intercept. For pairs of specimens of the same (modern) species, Thackeray *et al* (1997) reported central tendency of the log-transformed standard error of the m-coefficient, known as "log sem". Central tendency has been confirmed with larger samples, associated with a mean log sem value of -1.61 (Thackeray, 2007; Thackeray and Dykes, 2016). The mean log sem value of -1.61 +/- 0.1 can be used as a probabilistic definition of a species. If pairs of specimens have a log sem value that falls within the 95% confidence limits of this mean value of -1.61, it may be inferred that there is a high probability of conspecificity (Thackeray and Dykes, 2015). Conversely, if pairs of specimens have a log sem value that falls outside the upper 95% confidence limits of the mean value of -1.61, it may be inferred that there is a high probability that the two specimens being compared are dissimilar. In the latter case, log sem may be used as a dissimilarity metric, although it must be recognized that boundaries between species may not necessarily be clear, especially when two specimens represent populations (palaeodemes) that are close to a point of divergence, in evolutionary time or geographical space.

Pairwise comparisons can be made with specimen A on the x-axis and specimen B on the y-axis, and *vice versa*. The two regression analyses yield two log sem values. The absolute difference between these is called "delta log sem". The difference is small when conspecific pairs of specimens are compared. Delta log sem is large when two different species are compared, especially when two specimens being compared are different in size as well as shape. The delta log sem statistic, when used together with log sem, serves to address certain criticisms raised by Gordon and Wood (2013)

The results of our study (comparing *Homo naledi* against other specimens) are summarized below.

Table 1. Mean log sem and Delta log sem values for pairwise comparions, using the reconstructed cranium of H. naledi as the reference specimen in each case.

	Mean log sem	**Delta log sem**	**No. of measurements in common**
Paranthropus robustus, SK 48	-1.332	0.120	30
Paranthropus boisei, OH 5	-1.282	0.112	66
Australopithecus africanus, Sts 5	-1.378	0.005	74
A. prometheus, Sts 71	-1.290	0.145	52
Australopithecus sediba, MH 1	-1.224	0.075	19
Homo rudolfensis, KNM-ER 1470	-1.350	0.129	55
Homo habilis, KNM-ER 1813	**-1.458**	0.026	70
Homo erectus, KNM-ER 3733	**-1.456**	0.155	71

These results generally confirm the view that *H. naledi* is warranted as a species different from other hominin taxa that

have been included in this kind of analysis. Also, although different, *H. naledi* appears to be most similar to *H. habilis* (represented by KNM-ER 1813) and *H. erectus* (represented by KNM-ER 3733), as reflected by log sem values of -1.458 and -1.456 respectively (highlighted in bold in the Table above). These values are near the upper 95% confidence limit for conspecificity. KNM-ER 1813 and KNM-ER 3733 are both dated circa 1.6 million years ago. Relative to *H. naledi*, the next most similar specimens are KNM-ER 1470 (dated at 2 million years BP) and Sts 5 (dated > 2 million years ago). Taken together, the log sem and delta log sem values obtained from this study indicate that (in terms of morphometric analysis of cranial data), *Homo naledi* is more similar to *H. habilis* than it is to *H. erectus*, *H. rudolfensis* or *A. africanus.* This is consistent with an earlier study of the affinities of *H. naledi,* using a smaller number of measurements for each specimen (Thackeray, 2015). We are grateful to Brendon Billings (School of Anatomical Sciences) for providing measuring equipment for our exploratory study.

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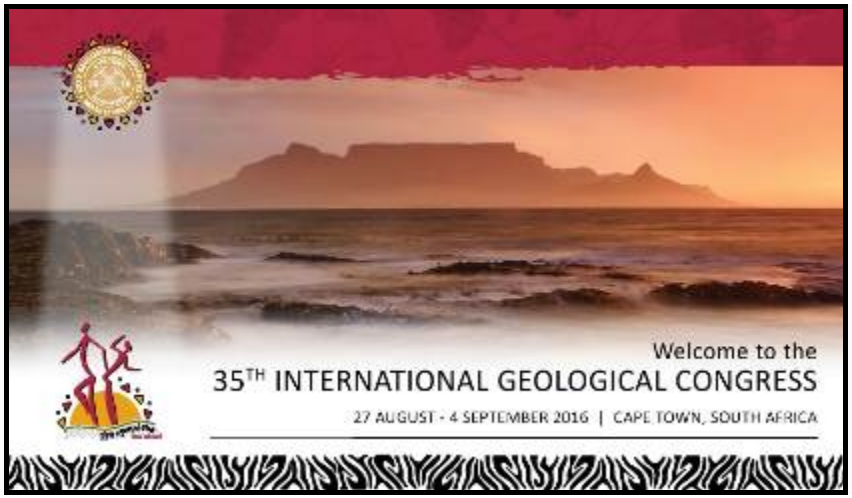
Conferences

35TH INTERNATIONAL GEOLOGICAL CONGRESS

27 AUGUST - 4 SEPTEMBER 2016 | CAPE TOWN, SOUTH AFRICA



More information - www.35igc.org

There will be several sessions on palaeontology at the IGC'16 so please consider presenting some papers of international significance.

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REGISTRATION OPENS

Preparations for the 35th IGC are progressing well and judging from the 220 symposium proposals that have been submitted to date, the scientific programme will be diverse and comprehensive. Additional detail regarding the programme themes, registration, field trips and accompanying persons programme will be included in the Third Circular, to be distributed on 1 October 2015.

The three core topics of the 35th IGC are:

Geoscience for Society Geoscience in the Economy Fundamental Geoscience.

The 49 themes that have been developed are convened by some 180 'champions' who are experts in their field and are drawn from over 30 countries world-wide - they will coordinate the themes, develop the slate of symposia and allocate contributions. You are encouraged to communicate your interests through the theme pages: http://www.35igc.org/Themes

The IUGS collaborative programme "Resourcing Future Generations" will be an over-arching theme in the scientific programme.

The "Call for Abstracts" opened on 1 July 2015 and online submission is through the portal: http://www.35igc.org/Verso/211/Submit-an-Abstract.

The "**Super Early Bird**" registration opens on 1 September 2015. This special registration rate will only be available until 1 November 2015, so get your registration in as soon as possible to benefit from this limited offer. Super Early Bird registration is R8,500 (inclusive of VAT); Pensioner/Student/YES Network rate is R5,500 (inclusive of VAT). Every effort has been made to keep the congress registration rates as affordable as possible.

Plans for the array of Field Trips in Southern, West and East Africa are progressing well. Please respond using the Expression of Interest form to show the organising committee where your interests lie. You could win a free congress registration! https://www.allevents.co.za/ei/getdemo.ei?id=222&s=_2P0029KKS

A diverse programme of short courses and workshops is taking shape and details are available on: http://www.35igc.org/Verso/210/Workshops-Short-Courses. Please contact the 35th IGC Secretariat at Barnardo@geoscience.org.za if you experience any problems or if additional information is required.

We look forward to seeing you in Africa!

Greg Botha (gabotha@geoscience.org.za) –Secretary-General, 35th IGC

Recent fossil discoveries & press cuttings.

Antarctic Peninsula Palaeontology Project – AP°3

http://antarcticdinos.org/

Scientific expedition to Antarctica will search for dinosaurs and more (1st Feb'16) http://m.phys.org/news/2016-02-scientific-antarctica-dinosaurs.html **OR** http://www.jsg.utexas.edu/news/2016/02/scientific-expedition-to-antarctica-will-search-for-dinosaurs-and-more/

On the AP°3 is our very own Dr Jubair Jinnah from Wits

Wits geologist joins fossil hunt in Antarctica

Scientists hope to shed light on dinosaur evolution

JAN CRONJE

A SOUTH African scientist is among a group of international researchers headed for James Ross and other islands in Antarctica to search for dinosaur fossils.

Dr Zubair Jinnah, a lecturer at the University of the Witwatersrand, is a member of the 12-person team that will spend almost five weeks on the frozen continent.

Although 99 percent of Antarctica is covered by ice today, million of years ago the continent enjoyed a warmer and greener environment.

On Monday, February 15, the team will head to James Ross Island, one of the few areas of Antarctica where fossil-bearing rocks are not covered in layers of ice.

Writing from Punta Arenas, Chile, the team's last staging post, Jinnah said the scientists could hardly wait to board the research vessel, the Nathaniel B Palmer.

"I've been looking at lots of pictures and both the rocks and the landscapes look amazing," Jinnah said.

"Right now we're doing a week's worth of training and preparation and everyone is stoked to get on the ship."

Jinnah, 31, completed his PhD at Wits in 2011, after which he lectured at the university's School of Geosciences.

He is one of two geologists on the team, while the rest are palaeontologists.

Jinnah said professionals in his field were motivated by "some pure geological goals".

"The job of the geologists is to provide information to contextualise fossil discoveries, for example how old the fossil is and what the environment was like.

"We are working in a type of sedimentary basin named a back-arc basin and comparatively little is known of how they form and fill," Jinnah said.

Team member and palaeontologist Matthew Lamanna, assistant curator at the Carnegie Museum in Pittsburgh, Pennsylvania, said the team would search for fossils that dated between 100 million to 40 million years ago "at the very end of the Age of Dinosaurs".

The general consensus among scientists is that non-avian dinosaurs became extinct about 66 million years

VOYAGE OF DISCOVERY: Wits University geologist Zubair Jinnah in Punta Arenas, Chile. The research vessel Nathaniel B Palmer is in the background. PICTURE: ZUBAIR JINNAH

ago after a devastating asteroid impact

The researchers hope their discoveries will shed light on what role Antarctica played in the evolution of vertebrate animals.

"We (want to) learn more about how the devastating extinction, that happened right afterward, might have affected polar ecosystems," said Lamanna.

To aid the team's search for the answers of ancient Antarctica, the Nathaniel B Palmer has been fitted with Zodiac inflatable boats, a metal-hulled landing craft and two helicopters.

Team member Julia Clarke, a professor and palaeontologist at the Austin Jackson School of Geosciences at the University of Texas, said the helicopters would expand their search.

"A single new discovery from this period in the high southern latitudes can change what we know," she said.

The expedition is part of the Antarctic Peninsula Palaeontology Project, or AP3, an initiative funded by the National Science Foundation in the US.

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PAST is pleased to share an article published in the Business Day (Oct'15) by our Chief Scientist, Prof. Rob Blumenschine entitled 'We must all act to stop extinctions'. Well worth reading!

www.bdlive.co.za/opinion/2015/10/12/we-must-all-act-to-stop-extinctions

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Illustrated Guide to PhD. **For those who have completed & also those who are contemplating – ed.**

http://www.businessinsider.com/the-illustrated-guide-to-a-phd-2014-12

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A humungus cladogram of all life. Thanks Mike Raath

www.popsci.com/sites/popsci.com/files/styles/large_1x_/public/images/2015/05/evolution-rainbow.gif

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Extracts from GSAf Newsletters - Lopo Vasconcelos

Africa's earliest known coelacanth found in Eastern Cape

Serenichthys coelacanth holotype. Credit: Wits University

September 21, 2015

Various specimens of Africa's earliest coelacanth have been found in a 360 million year-old fossil estuary near Grahamstown, in South Africa's Eastern Cape.

More than 30 complete specimens of the new fossil species, *Serenichthys kowiensis*, were collected from the famous Late Devonian aged Waterloo Farm locality, by palaeontologist Dr Robert Gess and described by him in collaboration with Professor Michael Coates of the University of Chicago.

Gess did the research whilst he was completing his PhD at the Evolutionary Studies Institute at the University of the Witwatersrand. An article describing the new species will be published in the in the prestigious *Zoological Journal of the Linnean Society of London* on Monday, 21 August.

"Remarkably, all of the delicate whole fish impressions represent juveniles. This suggests that *Serenichthys* was using a shallow, waterweed-filled embayment of the estuary as a nursery, as many fish do today," says Gess.

The fossils come from black shales originally disturbed by road works at Waterloo Farm. These shales are the petrified compacted remains of mud, which was deposited in the quiet reaches of an estuary not unlike some of those along the Eastern Cape coast today.

"This earliest known record of a coelacanth nursery foreshadows a much younger counterpart, known from the 300 million year old Mazon Creek beds of Illinois in the United States," says Gess.

"This glimpse into the early life history of ancient coelacanths raises further questions about the life history of the modern coelacanth, *Latimeria*, which is known to bear live young, but whether they, too, are clustered in nurseries remains unknown," explains Coates.

360 million years ago, Africa was part of the southern supercontinent Gondwana, made up of Africa, India, Australia, Antarctica and South America. At that time, the rocks of Waterloo Farm were forming along the shores of the semi-enclosed Agulhas Sea, not far from the South Pole.

Gess originally identified coelacanth remains from the locality whilst carrying out excavations at Waterloo Farm in the mid-1990s under the supervision of Dr Norton Hiller, of the Rhodes University Geology Department. These fossils were not, however, well enough preserved to be reconstructed and described. His painstaking excavation of tons of shale salvaged during subsequent roadworks has now shed light on dozens more specimens, a few of which are preserved in exquisite detail.

These were prepared under a microscope and have allowed the species to be reconstructed in minute detail. They prove to be a new genus and species.

Coelacanths are believed to have arisen during the Devonian Period (about 419.2 ± 3.2 million years ago), however only five species of reconstructable Devonian coelacanths have previously been described, in addition to a number of very fragmentary remains. None of these came from Africa but rather from North America, Europe, China and Australia. The new species gives important additional information on the early evolution of coelacanths.

More at http://phys.org/news/2015-09-africa-earliest-coelacanth-eastern-cape.html

Fossilised remains of world's oldest flower discovered in Spain

An artist's reconstruction of Montsechia vidalii. The plant is thought to have male and female flowers and to have released seeds directly into water to fertilise other plants. Illustration: O. Sanvicente, B.G., and V.D.G. PNAS

Helen Thomson 18 August 2015

Ancient aquatic plant thought to be world's first flower; studying it could provide a solution to modern pollination issues linked to decline of bee population

A beautiful aquatic plant, dating back to the start of the Cretaceous period, is believed by scientists to be the oldest flowering plant on Earth.

Montsechia vidalii lived alongside the dinosaurs of the Cretaceous period. The researchers say the plant can tell us more about the early development of flowering plants and the role they played in the evolution of animal life. Photograph: Gomez et al/PNAS

New analysis of the fossilised remains from central Spain and the Pyrenees show that the plant is about 130 million-years-old, meaning it was around at the same time as feathered dinosaurs.

The plant, *Montsechia vidalii*, resembles the modern-day coontail - commonly used to populate aquariums - and is thought to have grown underwater in shallow lakes.

The plant snatches the title of world's oldest flower from the hands of another ancient plant, *Archaefructus sinensis*, discovered in 125 million-year-old fossils from Liaoning Province in China.

"The 'first flower' is a bit of a poetic concept, but that aside, we do believe this is the oldest we have discovered so far," says David Dilcher at Indiana University, who led the analysis.

To study the ancient plant, Dilcher and his team slowly dissolved the limestone around more than 1000 fossils. This left them with small fragments of the plant that could then be bleached and their structure examined using powerful microscopes.

The plant appears to have had no roots or petals. Its leaves were arranged in two forms: either in a spiral or opposite one another along an axis. The plant sprouted several tiny flowers, each of which contained a single seed.

Animals in this time period hadn't developed any role in the dispersal of seeds, says Dilcher. Instead, the plant is thought to have separate male and female flowers. It seems likely that the seeds were released straight into the water, where they floated off to fertilise another plant.

"This is a fascinating and provocative analysis of the new fossils," says Sam Brockington, a research fellow in the department of plant sciences at Cambridge University. "It has always been difficult to say whether the first flowering plants emerged in aquatic conditions, but this paper emphasises how important aquatic environments were for the earliest flowering plants."

Sometime in the middle of the Cretaceous period the diversification of the flowering plant population exploded, developing into the beautiful blooms we know today, as well as influencing the wildlife that evolved alongside. Dilcher says that we wouldn't be here at all if it weren't for plants like *Montsechia vidalii*. "We are a product of the many stages of evolution that went hand-in-hand with the evolution of flowering plants," he says.

Bernard Gomez of Claude Bernard University, Lyon, and co-author of the paper, which is published today in PNAS, says that there may yet be an even older flowering plant. There's evidence of pollen dispersed in fossils that are around 140 million years old, he says.

One thing is for sure, says Dilcher, "we need to understand as much as we can about flowering plant evolution because right now we're facing a world crisis." Most modern flowering plants need animal pollinators to reproduce, with bees serving that role for many of our most important crops. Yet bees are declining in the US and Europe.

"This plant shows us where it all began," says Dilcher. "If we know more about their evolution, we might come across alternative pollinators that are hidden out of sight today but played a role in the past that we could encourage again."

More at http://www.theguardian.com/science/2015/aug/17/fossilised-remains-worlds-oldest-flower-discovered-cretaceous?CMP=fb_a-science_b-gdnscience

www.theguardian.com/science/2015/aug/17/fossilised-remains-worlds-oldest-flower-discovered-cretaceous

Fossil study: Dogs evolved with climate change

Two early dogs, Hesperocyon, left and the later Sunkahetanka, were both ambush-style predators. As climate changes transformed their habitat, dogs evolved pursuit hunting styles and forelimb anatomy to match. Credit: Mauricio Anton

2015.08.20

Old dogs can teach humans new things about evolution. In Nature Communications a new study of North American dog fossils as old as 40 million years suggests that the evolutionary path of whole groups of predators can be a direct consequence of climate change.

"It's reinforcing the idea that predators may be as directly sensitive to climate and habitat as herbivores," said Christine Janis, professor of ecology and evolutionary biology at Brown University, who worked with lead author Borja Figueirido, a former Brown Fulbright postdoctoral researcher who is now a professor at the Universidad de Málaga in Spain. "Although this seems logical, it hadn't been demonstrated before."

The climate in North America's heartland back around 40 million years ago was warm and wooded. Dogs are native to North America. The species of the time, fossils show, were small animals that would have looked more like mongooses than any dogs alive today and were well-adapted to that habitat. Their forelimbs were not specialized for running, retaining the flexibility to grapple with whatever meal unwittingly walked by.

But beginning just a few million years later, the global climate began cooling considerably and in North America the Rocky Mountains had reached a threshold of growth that made the continental interior much drier. The forests slowly gave way to open grasslands.

Pups of the plains

Did this transition affect the evolution of carnivores? To find out, Figueirido and the research team, including Jack Tseng of the American Museum of Natural History in New York, examined the elbows and teeth of 32 species of dogs spanning the period from ca. 40 million years ago to 2 million years ago. They saw clear patterns in those bones at the museum. At the same time that climate change was opening up the vegetation, dogs were evolving from ambushers to pursuit-pounce predators like modern coyotes or foxes – and ultimately to those dogged, follow-a-caribou-for-a-whole-day pursuers like wolves in the high latitudes.

"The elbow is a really good proxy for what carnivores are doing with their forelimbs, which tells their entire locomotion repertoire," Janis said.

The telltale change in those elbows has to do with the structure of the base where the humerus articulates with the forearm, changing from one where the front paws could swivel (palms can be inward or down) for grabbing and wrestling prey to one with an always downward-facing structure specialized for endurance running. Modern cats still rely on ambush rather than the chase (cheetahs are the exception) and have the forelimbs to match, Janis said, but canines signed up for lengthier pursuits.

In addition, the dogs' teeth trended toward greater durability. Figueirido's team found, consistent perhaps with the need to chow down on prey that had been rolled around in the grit of the savannah, rather than a damp, leafy forest floor.

Not an 'arms race' of limbs

The study, with some of Janis' prior research, suggests that predators do not merely evolve as an "arms race" response to their prey. They don't develop forelimbs for speedy running just because the deer and the antelope run faster. While the herbivores of this time were evolving longer legs, the predator evolution evident in this study tracked in time directly with the climate-related changes to habitat rather than to the anatomy of their prey species.

After all, it wasn't advantageous to operate as a pursuit-and-pounce predator until there was room to run.

"There's no point in doing a dash and a pounce in a forest," Janis quipped. "They'll smack into a tree."

If predators evolved with climate change over the last 40 million years, the authors argue, then they likely will have to continue in response to the human-created climate change underway now. The new results could help predict the effects we are setting in motion.

"Now we're looking into the future at anthropogenic changes," Janis said.

Reference:

B. Figueirido, A. Martín-Serra, Z. J. Tseng, C. M. Janis. Habitat changes and changing predatory habits in North American fossil canids. Nature Communications, 2015; 6: 7976 DOI: 10.1038/ncomms8976

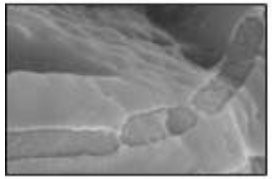
Note: The above post is reprinted from materials provided by Brown University.

At http://www.geologypage.com/2015/08/fossil-study-dogs-evolved-with-climate.html#ixzz3jMMhUgMj

3 billion-year-old fossils show early microbes lived in cavities

Image: Martin Homann/Freie Universität Berlin

Daily News; 16 December 2015



It seems the microbes that formed Earth's first ecosystems looked for shade when the sun was strong, just like we do.

Fossils found in South Africa suggest that cavities in tidal sediments might have provided refuge from deadly solar rays during the Archaean aeon when we think that life emerged on Earth.

At this time, between 4 billion and 2.5 billion years ago, Earth was scorched by intense UV radiation, and had no ozone layer to protect it – a bit like Mars is today.

So life at the surface would have found survival a challenge.

Some of the oldest fossil cells are around 3.43 billion years old, and thought to have lived on sand grains that might have been covered by shallow water and overlying grains.

At the Barberton greenstone belt in South Africa, an area where ancient volcanic rock has been pushed to the surface, there are thin layers of rock thought to be 3.22 billion-year-old microbial mats – sheets of microbes that covered tidal areas of the seashore.

Now fossilised bacteria have been discovered underneath the mat in cavities covered by a thin layer of sediment. The bacteria are rod-shaped, growing end-to-end in long filaments like many bacteria do today.

Like modern microbes

"The shape is quite uniform," says co-author Alessandro Airo, whose colleague Martin Homann at the Free University of Berlin, Germany, analysed the fossils. "It appears that by that time, they were already able to biochemically control diameter and length, and coordinate themselves into a chain. That's what modern microbes do all the time."

David Wacey, a palaeobiologist at the University of Bristol, UK, says the evidence from the new study looks robust.

"They have studied the geology in detail so we know that the environment was habitable for life, and the interpreted setting is closely comparable to where we would expect to find such structures today," he says.

"The record of Archaean microfossils is sparse and controversial," says Birger Rasmussen at Curtin University, Australia, who previously reported the discovery of cavity-dwelling microbes in 2.7 billion-year-old sediments in Australia. "This is an exciting find as it extends the record of possible life in this habitat a further 500 million years."

The atmosphere and UV radiation during this period of Earth's history are thought to have been similar to conditions on Mars. Airo says that understanding how life could have survived in this time could give us clues about what sort of life might be found on Mars and where to look.

"This study shows that very close to the surface, life was possible back then," he says, "so it could well be that microbes thrived even on the surface of Mars and not necessarily only in deep water or the subsurface."

Journal reference: Geology, DOI: 10.1130/G37272.1

At https://www.newscientist.com/article/dn28678-3-billion-year-old-fossils-show-early-microbes-lived-in-cavities/

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http://www.greenhumour.com/2011_01_01_archive.html

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