

APPLICANT DETAILS

Applicant's name (First name, Surname / Family Name): Bruce Rubidge

Capacity if acting on behalf of another:

Primary institutional affiliation/Business entity: Evolutionary Studies Institute., Wits University

Contact details: email (e.g., bruce.rubidge@wits.ac.za), phone number (e.g., 011 717 6685), fax number (e.g., 011 717 669485)

Local contact details (phone number): (e.g., 011 717 6685)

Local address (South African place of residence/business: (e.g., Evolutionary Studies Institute, University of the Witwatersrand, Johannesburg, PO Wits 2050)

REQUEST DETAILS

Is this an academic or commercial proposal?(Academic)

Is the proposed scanning for dissertation research (Y/N)? (N)

Proposed dates of work: (End July 2014)

Please briefly describe the Object(s) to be scanned (i.e., specimen catalogue numbers, composition, dimensions, etc.):

The specimen comprises a block of siltstone (7x6cm) containing the fossilised sacral and caudal regions as well as the hind limbs and pes of a small tetrapod. Based on the morphology of the pes, the specimen may represent a diapsid. Given its Middle Permian age, this would represent the earliest fossil of a diapsid from the Karoo Supergroup. The specimen was collected on an expedition organised by Bruce Rubidge to the Abrahamskraal Formation of the Beaufort group in the district of Beaufort West in the western Cape Province.

Specimen number: BP/1/7280

Please indicate any specific requirements/requests in terms of scan parameters:

The specimen is preserved in a homogeneous siltstone matrix and I suspect there may be metallic oxides

How much scan time are you requesting? -35hrs

If the Object is from Wits fossil collections, do you have permission from the relevant committee to conduct the study (e.g., the Fossil Access Committee)? If the Object(s)

is/are not owned by or otherwise lawfully under your custody and control, or that of the entity on whose behalf you act, then we require sufficient proof that the owner of the custodian approves scanning of the Object(s). Please note that it is the responsibility of the applicant to provide proof of permission (Y/N). Y I have permission to study the specimen as I collected it in 2013.

PROPOSAL DETAILS (2 PAGES MAXIMUM)

Proposal summary (200 words or less; please include aims of the project):

For more than 2 decades Bruce Rubidge has systematically been collecting fossils from the Lower Beaufort Abrahamskraal Formation with the intention of understanding Middle Permian biodiversity in the continental realm of Gondwana. This has involved extensive fieldwork and redescription of fossil taxa (eg. Angielczyk & Rubidge 2013; Day et al. 2013; Rubidge et al 2013; Rubidge 2005a&b; Smith et al. 2012). In 2013 members of our team discovered the first fossil of what appears to be a diapsid from the Middle Permian of South Africa. This would represent the earliest known representative of Diapsida from South Africa and the southern hemisphere (Modesto & Reisz 2002; Mueller 2004; Reisz et al. 2011). As such, it is an extremely important fossil with potential to shed light on diapsid origins and early biogeography. This proposal is for scanning of the specimen to enable us to undertake a complete morphological and taxonomic description.

Briefly summarize relevant previous scientific work:

To date, apart from temnospondyl amphibians, synapsids and parareptiles no diapsids have yet been discovered from the Middle Permian Karoo Supergroup of South Africa (Rubidge 2005). The earliest previously discovered diapsid from the Karoo is Youngina which is from the Late Permian Teekloof Formation (Smith & Evans 1996; Reisz et al. 2000; Ezcurra et al. 2014).

Results expected:

This particular project will provide a full morphological and taxonomic description of what may be the earliest diapsid fossil from the Karoo Supergroup of South Africa. This will in turn add to the long term project of Rubidge to understand Middle Permian biodiversity change in the continental realm of Gondwana (Cisneros et al 2011; 2012; Rubidge 2005). The research is expected to generate a publication in a leading international journal.

Significance of results for the relevant field of research:

The description of this early diapsid from the Karoo is of significance, not only to understand Middle Permian biodiversity in southern Africa, but will also assist with biostratigraphic correlation of fossil tetrapod bearing deposits of Gondwana (eg. Cisneros et al 2011; 2012; Rubidge 2005). In addition

the specimen has the potential to provide the first information on the diversity, biogeography and morphology of the Middle Permian diapsids of Gondwana.

References (please include no more than 15):

ANGIELCZYK, K. D., & RUBIDGE, B. S. 2013. Skeletal morphology, phylogenetic relationships and stratigraphic range of *Eosimops newtoni* Broom, 1921, a pylaeecephalid dicynodont (Therapsida, Anomodontia) from the Middle Permian of South Africa. *Journal of Systematic Palaeontology*, 11(2), 191-231.

CISNEROS, J.C., ABDALA, F., ATAYMAN, S., RUBIDGE, B.S., ŞENGÖR, C. & SCHULTZ, C.L. 2012. A carnivorous dinocephalian from the Middle Permian of Brazil and tetrapod dispersal in Pangaea. *Proceedings of the National Academy of Sciences* 109 (5), 1584–1588.

CISNEROS, J.C., ABDALA, N.F., RUBIDGE, B.S., DENTZIEN-DIAS, P.C. & BUENO, A. DE O. 2011. Dental occlusion in a 260-million-year-old therapsid with saber canines from the Permian of Brazil. *Science* 331, 1603–605.

DAY, M., RUBIDGE, B.S., ALMOND, J. & JIRAH, S. 2013. Biostratigraphic correlation in the Karoo: the case of the Middle Permian parareptile *Eunotosaurus*. *South African Journal of Science*. 109(3/4), Art. #0030, 4 pages. <http://dx.doi.org/10.1590/sajs.2013/20120030>

EZCURRA, M.D., SCHEYER, T.M. & BUTLER, R.J. 2014. The origin and early evolution of Sauria: reassessing the Permian saurian fossil record and the timing of the crocodile-lizard divergence. *PLoS ONE* 9, e89165.

MODESTO, S.P. & REISZ, R.R. 2002. An enigmatic new diapsid reptile from the Upper Permian of Eastern Europe. *Journal of Vertebrate Paleontology* 22, 851–855.

MUELLER, J. 2004. The relationships among diapsid reptiles and the influence of taxon selection. In *Recent Advances in the origin and early radiation of vertebrates* (eds Arratia, G., Wilson, M.V.H. & Cloutier R.), pp. 379–408. Munich, Germany: Verlag Dr. Freidrich Pfeil.

REISZ, R.R., MODESTO, S.P. & SCOTT, D. 2000. *Acanthotoposaurus bremneri* and the origin of the Triassic archosauromorph reptile fauna of South Africa. *South African Journal of Science* 96, 443–445.

REISZ, R.R., MODESTO, S.P. & SCOTT, D.M. 2011. A new Early Permian reptile and its significance in early diapsid evolution. *Proceedings of the Royal Society B* 278, 3731–3737.

RUBIDGE, B.S. 2005. Re-uniting lost continents – fossil reptiles from the ancient Karoo and their wanderlust. *South African Journal of Geology* 108 (3), 135–172. (64 citations)

RUBIDGE, B.S. 2005. Middle-Late Permian tetrapod faunas from the South African Karoo and their biogeographic significance. *New Mexico Museum of Natural History and Science Bulletin* 30, 292–294.

RUBIDGE, B.S., ERWIN, D.H., RAMEZANI, J., BOWRING, S.A. & DE KLERK, W.J. 2013. High-precision temporal calibration of late Permian vertebrate biostratigraphy: U-Pb constraints from the Karoo Supergroup, South Africa. *Geology*. DOI 10.1130 G33622.1.

SMITH, R.M.H & EVANS, S.E. 1996. New material of *Youngina*: evidence of juvenile aggregation in Permian diapsid reptiles. *Palaeontology* 39, 289–303.

SMITH, R.M.H., RUBIDGE, B.S. & VAN DER WALT, M. 2012. Therapsid biodiversity patterns and palaeoenvironments of the Karoo basin, South Africa. In: Chinsamy-Turan, A. (Ed.), *Forerunners of Mammals: Radiation, Histology, Biology*. Indiana University Press, Bloomington, USA, pp. 223–246.