

On human evolution, *Australopithecus sediba* and nation building

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The 09 September 2011 issue of the journal *Science* brought us five papers describing the new specimens of *Australopithecus sediba* from the fossil site of Malapa in the North West Province of South Africa. Each paper underlined not only the great importance of the fossils, but also how the interpretation of their anatomy is going to change the way we think about the progression of human evolution at the dawn of the age of the genus *Homo*.

The authors have chosen four critical anatomical areas to examine: the brain,¹ the pelvis,² the hand³ and the foot.⁴ Each of these anatomical regions is crucial to our understanding of the nature of how humans evolved, and in each paper the authors demonstrate that, in their opinion, the fossils of *Au. sediba*, although still falling within the range of *Australopithecus*, demonstrate a suite of features that links them to the genus *Homo*. The detail contained in these five papers will provide the basis for much debate.

The analyses are thorough and elegant, but are plagued with the palaeoanthropological curse of small sample size. Ultimately, the question must arise as to whether the fine anatomical differences seen in the specimens are reflections of functional anatomy of evolutionary importance, or are of minor differences between specimens in sample sizes of fewer than five individuals. For example, the paper on the brain¹ demonstrates a slightly more posterior position of the olfactory bulbs on the endocast of Malapa Hominin 1 (MH1) – an important trait in humans. Yet the comparative sample of Australopithecines consists of only two other specimens besides MH1. The Malapa brain cast is the most human-like of the three in olfactory morphology but not in size. The authors suggest that the MH1 morphology is ‘possibly foreshadowing elements of the development of a human-like frontal lobe’¹ in the transition from *Australopithecus* to *Homo*. But with a sample of three, it could just as easily be an individual whose anatomy is by chance a little closer to *Homo* than its fellows.

The same conundrum exists for the papers on the hand and foot. In each case, the *Au. sediba* specimens show a mosaic of human and Australopithecine features, but confirming these as being more derived (advanced) than the tiny set of comparative Australopithecine specimens is difficult. Underlying all of these arguments on brains, hands and feet, is the assumption that the fine differences in anatomy that link *Au. sediba* with *Homo* are functionally important and imply that *Au. sediba* is the transformational stage into *Homo*.

The best argument for a transition toward *Homo* is in the paper on the pelvis.² Not only is the comparative sample of fossil specimens larger, but there also is a clear hypothesis to test. Is the pelvic anatomy of *Homo* linked to the larger brain of its newborn offspring, or to the demands of a more modern locomotory stride in the adult? The *Au. sediba* pelvis has an undeniably *Homo*-like anatomical cluster of traits, paired with a small adult brain size, suggesting locomotion is likely to have been more important in shaping the bones than obstetrics. Despite this, the authors carefully hedge their bets by suggesting that *Au. sediba* anatomy could possibly be an independent development from other Australopithecines, although they would prefer an interpretation placing them in ‘close phyletic relationship with *Homo*’².

Pivotal to this argument is the dating of the specimens. The fifth paper⁵ provides the argument that not only is the date for the Malapa site very precise (at exactly 1.98 Ma) but that it predates any site containing the contested *Homo habilis* specimens and therefore is very likely to be ancestral to them. In the view of the authors, the *Au. sediba* specimens demonstrate a gradual progression in anatomical transformation from *Australopithecus* to *Homo* and its position, both in morphology and time, gives us a snapshot of what early humans looked like just as they were taking on the features of the genus *Homo*.

So far, the announcement and description of the *Au. sediba* specimens have gone incredibly smoothly. It has been science in the public eye, managed to perfection by the publicity team from *Science* and by the researchers at the Institute for Human Evolution at the University of the Witwatersrand. The research team leader, Lee Berger, has been in the spotlight now for over a year and he has definitely been enjoying himself. He has told the story of the discovery at

seminar after seminar and has introduced his fossils to visiting politicians, scientists and public figures.⁶ The South African government has taken a special interest in Berger, his team and his discoveries, and the deputy minister of Science and Technology has been prominent in the public promotion of the discoveries.

Watching all of the excitement has made me think about the importance of palaeoanthropology and scientific discoveries in the 'new South Africa'. It also gives me a sense of *déjà vu*. Thabo Mbeki's pro-science administration welcomed research into human origins in southern Africa as part of the 'African Renaissance',⁷ but neither he nor the current president, Jacob Zuma, has been the first South African head of state to promote our scientific achievements in the study of human evolution.

Jan Christian Smuts was a special friend to palaeoanthropology and archaeology in South Africa and he promoted a powerful image of South Africans on the scientific world stage. Smuts went so far as to provide Raymond Dart, Robert Broom and the rest of the South African 'hominid gang' free transport via a South African Defence Force (SADF) plane to the first Pan-African Congress on Prehistory in Nairobi in 1947.⁸ For Smuts, national support of South African science was rooted in the pride of the scientific achievement of an independent White South Africa forged in peace from Briton and Boer after the conflict of 1899 to 1902.⁹ Smuts had a particular soft spot for palaeoanthropology because he considered himself a scholar of evolution and had published his own distinct views on the subject.¹⁰ His idea of holism argued that all organisms developed together through evolution and that the whole was greater than the parts. This overlapped with his outwardly looking political views in which South Africa would be fully integrated into the world of nations as part of the League of Nations and, later, the Commonwealth.¹¹

The open government support for archaeology and palaeoanthropology stopped when Smuts' party lost to the Nationalists in the 1948 general election. The second Pan-African Congress on Prehistory was scheduled to be held in Johannesburg in 1952, but the new government withdrew its funding and the conference was moved to Algeria instead.⁸ But just because the Nationalist Party frowned upon evolution, it did not mean that the party did not see scientific achievement as a national asset. Other less controversial scientific disciplines still got the government nod and financial help when needed. J.L.B. Smith found the SADF to be very accommodating in taking him to the Comoros to pick up the 2nd specimen of the coelacanth discovered in December 1952.¹² Clearly fish were OK, but fossils were not.

What has been dramatically different since 1994 has been the engagement of the South African government at a ministerial level with all things specifically linked to heritage. The apartheid ministers used scientific achievements in engineering and energy production as a way to sidestep economic sanctions, but they showed little interest in things without immediate economic or political benefit. For the post-apartheid ministers, discoveries that help to build national pride, especially for previously disadvantaged South Africans, have become major planks in the construction of a new national identity.

The popularising of palaeontological and archaeological discoveries in post-apartheid South Africa is indeed an important aspect in building a nation from disparate roots.

We now have archaeological and palaeontological sites that are proclaimed UNESCO World Heritage Sites. Rock art, stone tools, pottery, ancient metals as well as early human fossils have all been the subjects of post-1994 stamp and medal issues.



Source: Used with permission of the South African Post Office.

The 2006 commemorative envelope showing some of the fossil discoveries in the 'Cradle of Humankind' and elsewhere in Africa.



The new government is keen to support palaeoanthropological research and has 'put its money where its mouth is'. The government-funded 'African Origins Platform' is providing research money for a wide range of palaeosciences, but most importantly it is concentrating on young researchers. This platform is part of a broader socio-political agenda that sees South Africans at the forefront of palaeoscience research, but unlike the government of Smuts or the National Party that succeeded it, the new agenda aims to involve as many previously disadvantaged researchers as possible, nurtured and mentored by the older established researchers. Just as important, the platform demands that all of its supported projects involve as many South African institutions working together as possible.

Amongst the strategic goals of the platform are two that are of particular importance. One is the commitment to transform the minds of South Africans so that a pride in our African heritage is instilled in all of us. This goal includes popularising discoveries such as *Au. sediba*. The second is the desire of the government to support universities and museums to produce a critical mass of South African researchers at the forefront of research in Africa. In this, the strategy is unequivocal: 'The absence of a strong pipeline from postgraduate student to well-established researcher level has impeded the replenishing of the skills base with young and demographically representative South Africans'¹³.

Of the 21 authors of the five *Science* papers, only a few are South African and even fewer are from previously disadvantaged South African groups. This fact diminishes neither the importance of the discoveries, nor the accolades being given to the discoverers, but it does suggest that the transformation of palaeoanthropology still lags behind the transformation of South African society in general. I doubt that palaeoscience is the only field that has this problem, but the spotlight of the new discoveries at Malapa makes it very visible.

Palaeoscientists should be aware that the requirement is more than to just bring South African discoveries onto the world stage – it is to link this research to building a team of South African scholars, including those who come from previously-disadvantaged backgrounds. The research output will be measured not just by the number of papers in prestigious international journals, but also by the number and quality of local researchers who have been nurtured and by publications that inform the wider South African scientific and lay communities.

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