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HOW TO CITE:

Finch JM, Forssman T. A view from the past: 120 years of palaeoscience in South Africa. *S Afr J Sci.* 2024;120(Special issue: Celebrating 120 years), Art. #19137. <https://doi.org/10.17159/sajs.2024/19137>

ARTICLE INCLUDES:

- Peer review
- Supplementary material

KEYWORDS:

palaeoscience, South Africa, human evolution

PUBLISHED:

07 November 2024



A view from the past: 120 years of palaeoscience in South Africa

Significance:

We provide a brief overview of the history and development of the palaeosciences from the perspective of the *South African Journal of Science*, highlighting key themes and future directions.

Introduction

Over the past century, South Africa has established itself as a global leader and research hub for the palaeosciences. The country is host to one of the richest collections of hominin remains on the planet – the Cradle of Humankind, globally recognised as a UNESCO World Heritage Site and the focus of extensive ongoing excavation. Indeed, a list of sites of international significance might be described as an embarrassment of riches, from the palaeontological discoveries in the Karoo Basin to world-renowned archaeological sites such as Sibhudu Cave and Pinnacle Point. The National Research Foundation’s (NRF) Strategy for the Palaeosciences encapsulates the importance of the field¹ and emphasises the strong geographical advantage of the palaeosciences in South Africa. It is within this broader context that the *South African Journal of Science* (SAJS) finds itself. Since its inception, SAJS has enjoyed strong local and international support from the palaeoscientific community, and continues to publish on new developments, discoveries and debates within the field. In this article, we reflect on the status of the palaeosciences in South Africa, briefly reviewing historical and recent highlights in the field from the perspective of the SAJS. In keeping with uniformitarian principles, we then consider the future trajectory of the discipline in the national context, and how this might be informed by our past.

The historical development of the palaeosciences in South Africa

Since its inception in 1903, the SAJS has been a home for palaeoscience research, including an early description of stone tools from the Albany Museum collection², followed by similar articles over the next few years. The broader field received a boost with the discovery of the Taung Child in 1924, and the increase in local interest in this science is evident in the very many articles on archaeology and our earliest ancestors in the volumes published following the discovery and over the course of the next century. Human evolution research has remained prominent throughout the Journal’s history, covering advances at Swartkrans³, Sterkfontein^{4–6}, and later Drimolen⁷, amongst many others. Such developments in palaeoanthropology have garnered significant interest at local and international levels and remain some of the most well-cited within the SAJS ‘Archaeology, Anthropology and Palaeontology’ portfolio, hereafter grouped under the umbrella of palaeosciences for brevity.

Since those early published studies on stone implements, archaeological research yielding insights into technological advances and cultural development of modern humans has flourished. Coastal cave sites, for example, have contributed to our understanding of Middle Stone Age advancements, including the valuable multidisciplinary approach employed at Sibhudu and Border caves.^{8–10} These ‘marvellous millennia’, as Wadley described them in 2015¹¹, have been presented and argued for in the pages of SAJS, and through these publications their significance in human social development has been demonstrated.

South African scientists have taken a leading role in the development of the isotope sciences and their application within the palaeosciences. In particular, Vogel and colleagues helped establish the regional distribution of C₃ and C₄ grasses across South Africa and implications for isotope research^{12,13}, helping to lay the foundation for future applications to understanding palaeodiet^{14,15}, and palaeoenvironments¹⁶. Isotopes were later applied to a stalagmite series from the Makapansgat Valley to yield first insights into regional temperatures during important global climate events, namely the Little Ice Age and Medieval Climate Anomaly.^{17,18} The field continues to thrive, and is currently serviced by laboratories at the University of Cape Town, iThemba, and the University of Pretoria. The establishment of an Accelerator Mass Spectrometer and associated cosmogenic nuclide capabilities at iThemba is an important addition to these facilities^{19,20}, making dating more accessible and affordable for local scientists.

A decade of palaeosciences at SAJS: 2014–2024

To obtain an overview of recent developments in the palaeosciences published in the SAJS, we collated ‘front-section’ and Research Article titles published within the Archaeology, Anthropology and Palaeontology portfolio for the period 2014–2024. We then reviewed prominent themes and keywords occurring within the article titles. This exercise revealed a strong bias towards palaeoanthropological themes, with a slightly lesser focus on archaeology and palaeontology. Quaternary palaeoclimatic and palaeoenvironmental themes are rather lacking. Such imbalances may stem from a tendency for certain fields to publish in more specialist or international journals, or may relate to the sheer volume of research associated with understanding human evolution. Nevertheless, a review of the past decade of the Journal’s archive shows that the SAJS is generally well supported by the palaeoscience community, including many original research articles but also many commentaries and other front-section articles highlighting key debates in the field. These submissions include a high proportion of international authors and multinational and multidisciplinary research teams, reflecting positively on the health of the discipline and the standing of the Journal. In a nod to the historical importance of the Journal as a venue for early research, we also see authors returning to the Journal to publish the results of renewed excavations following up on early publications from the same site (e.g. Bader and Will²¹).

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In 2015, we saw one of the most exciting recent developments in human evolution research, the description of a new hominin species, *Homo naledi*, from the Dinaledi Chamber of the Rising Star cave system by Lee Berger and colleagues²². Laudably, the scientific process, from excavation of this rich fossil assemblage through to analysis, was openly shared on social media²³ and garnered wide public interest. In the words of Randolph-Quinney^{24(p.1)}, these scientific developments “definitely put South African palaeoanthropology back on the world stage, and more importantly, encouraged the public to engage directly with the science”. Like many scientific discoveries, research on *Homo naledi* has been subject to its fair share of debate^{24–28} and controversy²⁹, particularly regarding the widely publicised mortuary behaviour of this small-brained hominin.

A fascinating emerging theme describes ichnofossil remains preserved in Pleistocene aeolianites created by a diverse suite of probable trackmakers, including giraffe³⁰, reptiles^{31,32} and indeed hominins^{33,34}. Reaching much further back in time to the Jurassic, ichnological investigations have revealed tiny theropod dinosaur trackways³⁵, and, with the aid of field measurements and 3D modelling, were used to estimate such technical parameters as step length, stride, and speed.

Another rapidly developing technique is the extraction of ancient DNA from archaeological specimens in what Morris described in 2015 as “a rush for knowledge in a new field”^{36(p.1)}. This work progressed from analysing a subset of genetic information such as that contained within mitochondrial DNA, to full genome sequencing, yielding potential to understand population genetics of prehistoric individuals (e.g. Lombard et al.³⁷). As available databases of modern human DNA continue to grow, so too does our ability to not only understand and ask questions around human ancestry³⁸, but also to make comparisons with ancient genetic material, lending insight to archaeological studies.

The future of the palaeosciences in SAJS

Juxtaposed against a rich history of origins science is a growing awareness of the lingering impact of colonial practices, and the need to redress the imbalances of the past through careful and reflexive scientific conduct and engagement, and ethical practice (e.g. Sealy³⁹). Issues around parachute science, a broad term for power imbalances between researchers from the Global North and South, still persist, as do passport privileges⁴⁰ and other forms of inequality in what is also an often male-dominated field. Importantly, the conversation around these critical issues has opened, with growing awareness and recognition of their impact, and initiatives to improve the way we do science.

Targeted funding initiatives for the discipline have begun to tackle imbalances in the field by supporting transformation, science communication and engagement initiatives. These include, among others, the NRF African Origins Platform, and GENUS Centre of Excellence for the Palaeosciences.⁴¹ The Palaeontological Scientific Trust (PAST), a local NPO, has been a strong advocate for the palaeosciences that supports capacity building of the next generation of Stone Age researchers, and educational outreach through the Walking Tall Educational Theatre Project.⁴² International teams now commonly invite applications from African postgraduate students to participate in archaeological digs (e.g. the HOMER Project). Such networking and training opportunities promote inclusivity by opening doors for local students who may lack field exposure, travel opportunities or the chance to connect with established scientists and students from other countries. Ongoing engagements and collaborations hopefully will lead to further advancements in skills transfer as well as other support structures to foster student pathways throughout their university careers, such as providing funds, research materials, and infrastructure support.

In a country where deep historical divisions persist, origins science may have a growing role as a unifying lens for humanity, embodied in the PAST All From One™ movement: “All told, you will see that shared origins is a potent force for tolerance, unity, collaboration and conservation.”⁴³ SAJS will continue to support these important conversations, and scientific advances, as we move towards a deeper understanding of our past.

Acknowledgements

We thank Trevor Hill for insightful comments on an early draft.

Declarations

J.M.F. is the SAJS Associate Editor and T.F. is the SAJS Associate Editor Mentee for Archaeology, Anthropology and Palaeontology. There are no competing interests to declare. There is no AI or LLM use to declare.

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