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Annual Report for the Haasgat Fossil Locality (SAHRA Permit: 9/2/212/0020)

Dr. Galimberti and Dr. Scheermeyer,

Enclosed with this cover letter please find our first annual report on our activities under our current permit to excavate the Haasgat fossil locality within the UNESCO Cradle of Humankind World Heritage Site.

This report fulfills our obligation defined under SAHRA Permit 9/2/212/0020, governing excavation and geological sampling of the Haasgat fossil site granted 06 November 2013 and valid until 30 November 2016. As our current permit represents the first renewal of our original excavation permit (80/10/03/010/51) we do make reference here to our recently filed final report on our original research at the locality.

Please feel free to contact us directly with any questions, comments, or concerns with this final report on our research at the Haasgat fossil site. We look forward to continued research at the Haasgat site and development of the palaeontological record of South Africa.

Sincerely,

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Background

Palaeontological deposits in the Haasgat karstic system (25°51'31"S, 27°50'9"E, Farm Leeuwenkloof 480 JQ) were first noted in 1987, and led to initial geological description (Keyser and Martini, 1991) and faunal analysis (Figure 1; Keyser, 1991; McKee and Keyser, 1994; Plug and Keyser, 1994) of fossils processed from the extensive *ex situ* miner's rubble at the site. The cave system is positioned on the western slope of the north-south running Witwatersrandspruit river valley, on the southern edge of the Schurveberg mountain range (Keyser and Martini, 1991).

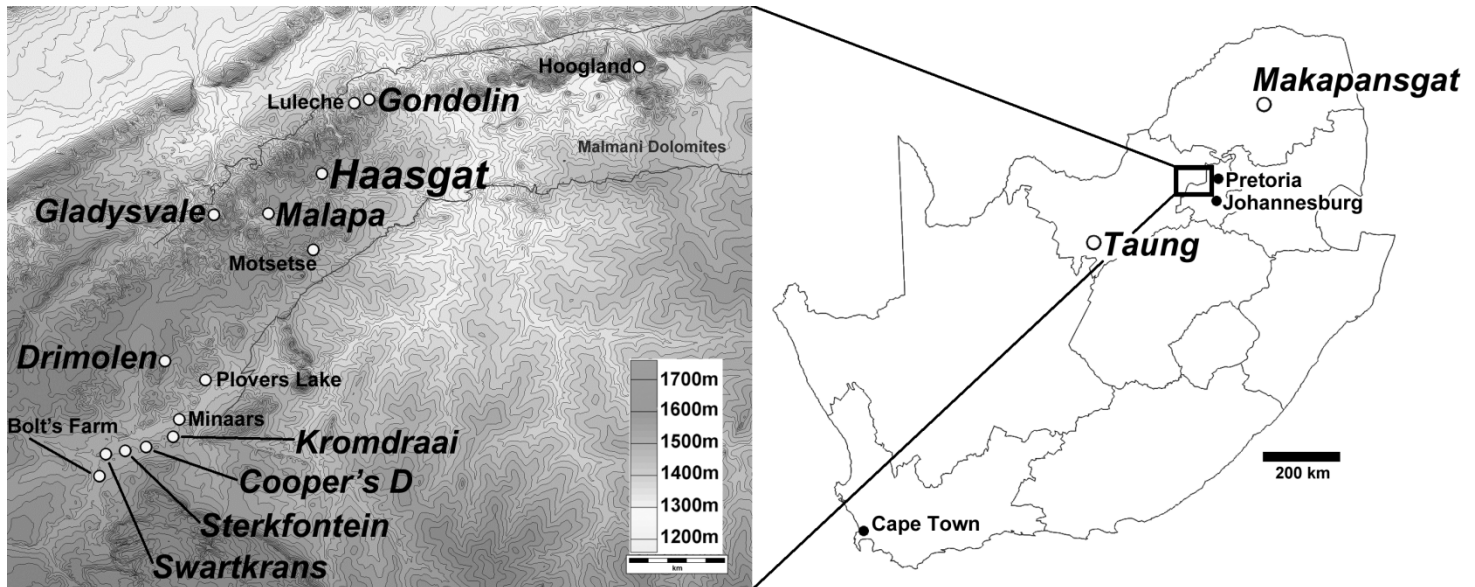


Figure 1. Map of Haasgat relative to other major South African Plio-Pleistocene localities.

Since the discovery of Haasgat there have been two phases of palaeontological research conducted at the site. The first, as detailed in our prior final report to SAHRA on the locality, consisted of the sampling of *ex situ* dumpsites in the early 1990s (Keyser, 1991; Keyser and Martini, 1991). This sampling produced a sample of fauna that is curated at the Council for Geosciences (Silverton Facility) and was partially described in McKee and Keyser (1994), Plug and Keyser (1994), and McKee et al. (2011). The second phase of research is that we initiated in 2010 through our first successful permit application through SAHRA. We originally proposed three primary research objectives to initially address at Haasgat: 1) to assess and revise the Council for Geosciences HGD assemblage; 2) survey and map the Haasgat cave system, including geological sampling for dating; and 3) undertake sustainable sampling and processing of *ex situ* dumpsite breccias and the excavation of *in situ* fossil deposits.

Because the Haasgat HGD assemblage was only partially catalogued and described, and significant curatorial issues existed with the sample, redressing the HGD fossils was a significant focus of our 'offsite' research efforts under our first permitted phase of research at the Haasgat site (Adams, 2012; Kegley et al., 2011, in review; Adams et al., 2013). Although we ultimately addressed both survey and geological sampling of Haasgat (Herries et al., 2014) and undertook limited *ex situ* sediment sampling, the initial permitted period concentrated on establishing sufficient faunal and geological context to undertake *in situ* sampling of sediments within the cave system.

Current Permit Research Justifications and Progress to Date

Our current excavation permit was granted based on three primary research objectives: 1) continued sustainable excavation of *in situ* fossil deposits, specifically from the Tobias' Steps and collapsed roof sediments of Tetley's Hall (Figure 2); 2) additional palaeomagnetic and U-Pb sampling of the Haasgat cave system sediments; and 3) initiate long-term site conservation by organising and stabilising the large *ex situ* dumpsite.

In order to undertake our 2014 fieldwork (May-July; planned December 2014-January 2015) at Haasgat to address these research objectives, a series of research grants were submitted in late 2013. Of these, the Leakey Foundation and Monash University (grants secured by JWA) provided funds sufficient to undertake the 2014 field season. Future funding of the Haasgat research objectives for the remainder of the permitted research period will be predicated on obtaining further internal and/or external funds. A substantial Australian Research Council grant currently under consideration (by JWA and Andy I.R. Herries of La Trobe University) would provide funding for 2015-2016 (results to be announced in October 2014).

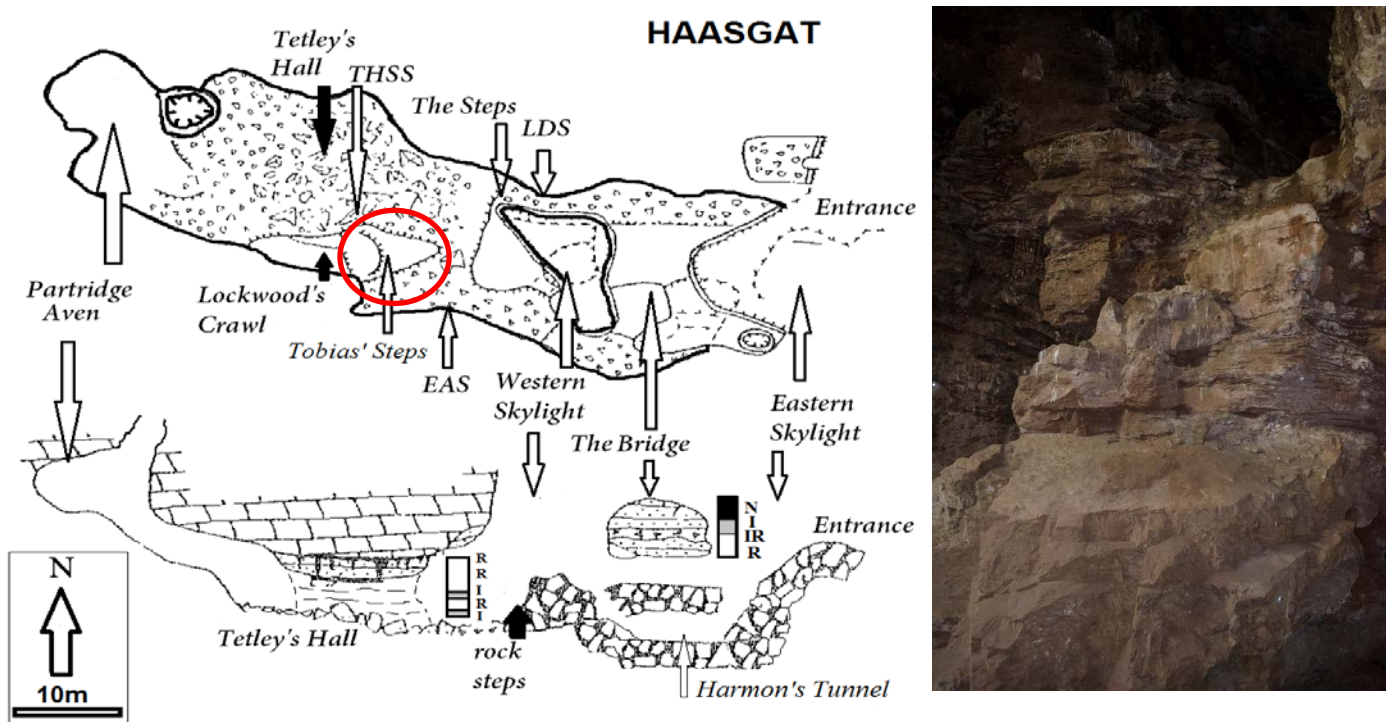


Figure 2. Left, site plan of Haasgat, with the current *in situ* excavation area highlighted. Right, picture of Tobias' Steps during excavation in 2014.

During this first year of the renewed permit, we have begun to address two of the primary research objectives. In May-July 2014 we initiated the first excavation of *in situ* calcified and decalcified sediments at Haasgat. As originally proposed, our focus of *in situ* excavation was the fossiliferous Tobias' Steps central column sediments. During the course of our excavation we removed ~2m³ of calcified sediments using a Hilti© TE 30-A36 cordless combihammer fitted with chisel bits. Ultimately, 14 large *in situ* blocks were extracted sequentially from the column after establishing the 3D coordinates of each block with a Topcon© GPT7500 reflectorless total station. These blocks were manually reduced both on site and at the Ditsong National Museum of Natural History (Pretoria) prior to being

acetic acid processed. Processing of these blocks is ongoing from July 2014 until the blocks have been completely reduced and all fossil specimens extracted.

Excavation of the Tobias' Steps region in 2014 also exposed several isolated pockets of the decalcified sediments. The 3D coordinates of these pocket contours were mapped using the Topcon© total station and the fossiliferous sediments from these pockets were sifted using 1mm mesh screens. All specimens within these sediments (including probable modern microfaunal materials) were collected and brought to the Ditsong National Museum for cleaning, sorting, identification and cataloging. The identification and cataloging process has begun, however the bulk of that work will be undertaken during a separate data collection trip in December 2014 and via a proposed exportation permit for primary identification and sorting (application in preparation).

During excavation several potential areas for expanding palaeomagnetic and U-Pb sampling were identified. Prior palaeomagnetic sampling was successful (Herries et al. 2014), however a limited number of U-Pb specimens were found to be contaminated and unsuitable for dating purposes. New areas to sample were identified in 2014 and will be extracted during a proposed 2015 field season for analysis by Dr. A. I. R. Herries and Dr. R. Pickering. At present, the focus of geologic research at Haasgat is on microstratigraphic interpretation of palaeomagnetic samples previously extracted during the first phase of sampling in 2010-2012. Only after this process is completed will we determine if further sampling for microstratigraphic interpretation (and palaeomagnetic sequence development) are necessary.

Summary

As reported here, the first year of the renewed permit to excavate Haasgat has successfully followed our proposed research schedule. We have started addressing two of the three research objectives; with the third (stabilizing the Haasgat *ex situ* dumpsites) requiring further coordination with both the landowner and CMA to identify the best strategy. We have undertaken a sustainable level of *in situ* sampling at the site, only removing as much calcified sediment as can be currently accommodated at the Ditsong National Museum acetic acid preparation laboratory. This sample, combined with the decalcified fossil specimens recovered in 2014 and *ex situ* fossil specimens derived from our first sampling of the dumpsites, is generating the first comprehensively sampled and integrated faunal sample from the site. Ongoing analysis of this material will provide the first data on the depositional history, timing, taphonomy and palaeoecology of the Haasgat deposits.

We have also initiated further microstratigraphic analysis of sedimentary deposits previously excavated during our first period of excavation (a process expedited this year through funding by the Leakey Foundation). During June-July 2014 we undertook more extensive mapping of the deposits and have completed the basemap of the cave system as part of our first phase of *in situ* excavation. Most of the proposed further palaeomagnetic and U-Pb sampling of the Haasgat *in situ* deposits is scheduled to be undertaken in 2015.

In addition to the permit-based research progress, our team has continued to translating our Haasgat-focused research program into peer-reviewed publications. Since the onset of our renewed permit, we have continued to publish data on the Haasgat faunas and geology (Adams et al., 2013; Herries et al., 2014), submitted manuscripts (Kegley et al., in review) and presentation abstracts for the 2015 American Association of Physical Anthropology Meetings (Adams et al., in review; Olah et al., in review). Data collected during the 2014 field season has already shaped several manuscripts currently in preparation (for submission in 2015) on the craniodental and postcranial adaptations of the Haasgat primates and non-primate faunas. Continued support by both the Haasgat landowners and SAHRA is also allowing us to integrate graduate students into our research program, with two PhD

candidates (Mr. Douglass Rovinsky/Ms. Georgia Zadow) at Monash University currently applying to begin work on the site as part of their degrees.

References

Adams JW. 2012. A revised listing of fossil mammals from the Haasgat cave system *ex situ* deposits (HGD), South Africa. *Palaeontologia electronica* 15, Issue 3; 29A, 88p.

Adams JW, Kegley ADT, and Krigbaum J. 2013. New faunal stable carbon isotope data from the Haasgat HGD fossil assemblage, South Africa, including the first reported values for *Papio angusticeps* and *Cercopithecoides haasgati*. *Journal of Human Evolution* 64: 693-698.

Adams JW, Olah A, McCurry MR, Tallman M, Kegley ADT, Potze S, Kgasi L, Herries AIR. In review. Newly discovered *in situ* primates and mammals from the early Pleistocene Haasgat deposits, South Africa. 2015 American Association of Physical Anthropology Meetings, St. Louis, MO.

Herries AIR, Kappen P, Kegley A, Paterson D, Howard D, de Jonge M, Potze S, and Adams JW. 2014. Palaeomagnetic and synchrotron analysis of >1.95 Ma fossil-bearing palaeokarst at Haasgat, South Africa. *South African Journal of Science* 110; Issue 3/4:12pp.

Kegley ADT, Hemingway J, Adams JW. Reassessment of *Cercopithecoides haasgati* and the evidence for multiple fossil colobine species at Haasgat, Cradle of Humankind, South Africa. Submitted 07/2014, *Journal of Human Evolution*.

Kegley A, Hemingway J, **Adams JW**. 2011. Odontometric analysis of the reanalyzed and expanded *Cercopithecoides* sample from the Haasgat fossil assemblage, Cradle of Humankind, South Africa. 2011 American Association of Physical Anthropology Meetings, April 13-16 2011, Minneapolis, MN.

Keyser, A.W. 1991. The palaeontology of Haasgat: a preliminary account. *Palaeontologia africana*, 28: 29-33.

Keyser, A., Martini, J. 1991. Haasgat: A new Plio-Pleistocene fossil occurrence. In: Heine, K (ed) *Palaeoecology of Africa*, 21. A. A. Balkema, Rotterdam, pp 119-129.

McKee, J., Keyser, A.W., 1994. Craniodental remains of *Papio angusticeps* from the Haasgat Cave Site, South Africa. *Int. J. Primatol.*, 15: 823-841.

McKee, J., Von Mayer, A., Kuykendall, K., 2011. New species of *Cercopithecoides* from Haasgat, North West Province, South Africa. *J. Hum. Evol.* 60: 83-93.

Olah A, McCurry MR, Adams JW. In review. Establishing the orientation and biobehavioural implications of the semicircular canals of *Cercopithecoides haasgati*. 2015 American Association of Physical Anthropology Meetings, St. Louis, MO.

Plug, I., Keyser, A.W., 1994. Haasgat Cave, a Pleistocene site in the central Transvaal: geomorphological, faunal and taphonomic considerations. *Ann. Transvaal Mus.*, 369: 139-145.