18-month renewable *Post-doctoral Fellowship* position at the Evolutionary Studies Institute, the University of the Witwatersrand, South Africa

Functional adaptations of the orofacial skeleton in Plio-Pleistocene hominins – what lies beneath.

Diet underpins all aspects of an animal's biology. Determining the dietary niche(s) of extinct taxa is therefore at the heart of many hominin evolutionary studies. Approaches to ascertain the dietary adaptations in early hominins vary but they generally center around detailed analyses of the external morphology of teeth and jaws and/or on an assessment of chemical signals, i.e. isotopes. What has received relatively little attention thus far is the study of internal structures. This is surprising, because the masticatory system is a partially closed biomechanical system, which makes it well-suited for the exploration of the stress flow within the tissue. Put simply, forces are transmitted from the muscle attachments to the bite point(s) and the resulting loads are then dissipated from the bite point(s) through the tooth roots into the tissue to prevent catastrophic failure. A reconstruction of these pathways promises to shed light on the dietary adaptations of early hominins and should clarify whether the great variability of the oro-facial skeleton observed among Plio-Pleistocene hominins reflects different ecological niches (and hence species) or whether different morphologies converge on the same outcomes, i.e. the same niche. To study (infer) the stress flow within the masticatory system of early hominins is the aim of this post-doctoral fellowship, initially available for 18 months with the potential for extension.

The fellowship is based at the University of the Witwatersrand, Evolutionary Studies Institute under the directorship of Prof. Marion Bamford (https://www.wits.ac.za/esi/) and will be carried out in collaboration with Mr. Gideon Chinamatira, CT Manager. This project is part of and is funded by ERC_101141770_PLIODIS (https://pliodis.github.io). The Postdoctoral Fellow will therefore also interact and work with other members of this larger team.

The work involves:
- CT scanning of relevant fossils, i.e. mainly those that preserve (parts of) the upper and lower jaws.
- Virtual reconstruction of distorted and/or incomplete specimens
- Segmentation of relevant morphological features for further analyses.
- Determine/analyse:
  - (a) the trabecular orientation beneath the temporo-mandibular joint to determine whether the system was habitually subjected to axial or multi-directional loading
  - (b) determine of the main line of action of the muscles of mastication
  - (c) document trabecular orientation emanating from the alveolae
  - (d) assess tooth root splay and orientation
  - (e) measure the distribution of cortical thicknesses in targeted areas relevant for load transfer
- Preparing results for publication and presentation at (inter)national conferences
- Liaising with members of the team and help convert the virtual reconstructions to biomechanical models for further testing.

The candidate is expected:
- to have a PhD or equivalent in biological/natural sciences, anatomy, palaeontology or related subject
- prior experience with CT scanning and segmentation
- a working knowledge of functional analyses and/or (bio)mechanics
- some knowledge in geometric morphometrics would be advantageous
- good communication skills
- be computer literate
- meet deadlines

To be considered for the position submit your full cv, names and addresses of two potential referees and a short motivation statement. For further information contact Marion.Bamford@wits.ac.uk or Gabriele.Macho@vub.be.

Applications will be accepted until the position has been filled.

May 2026