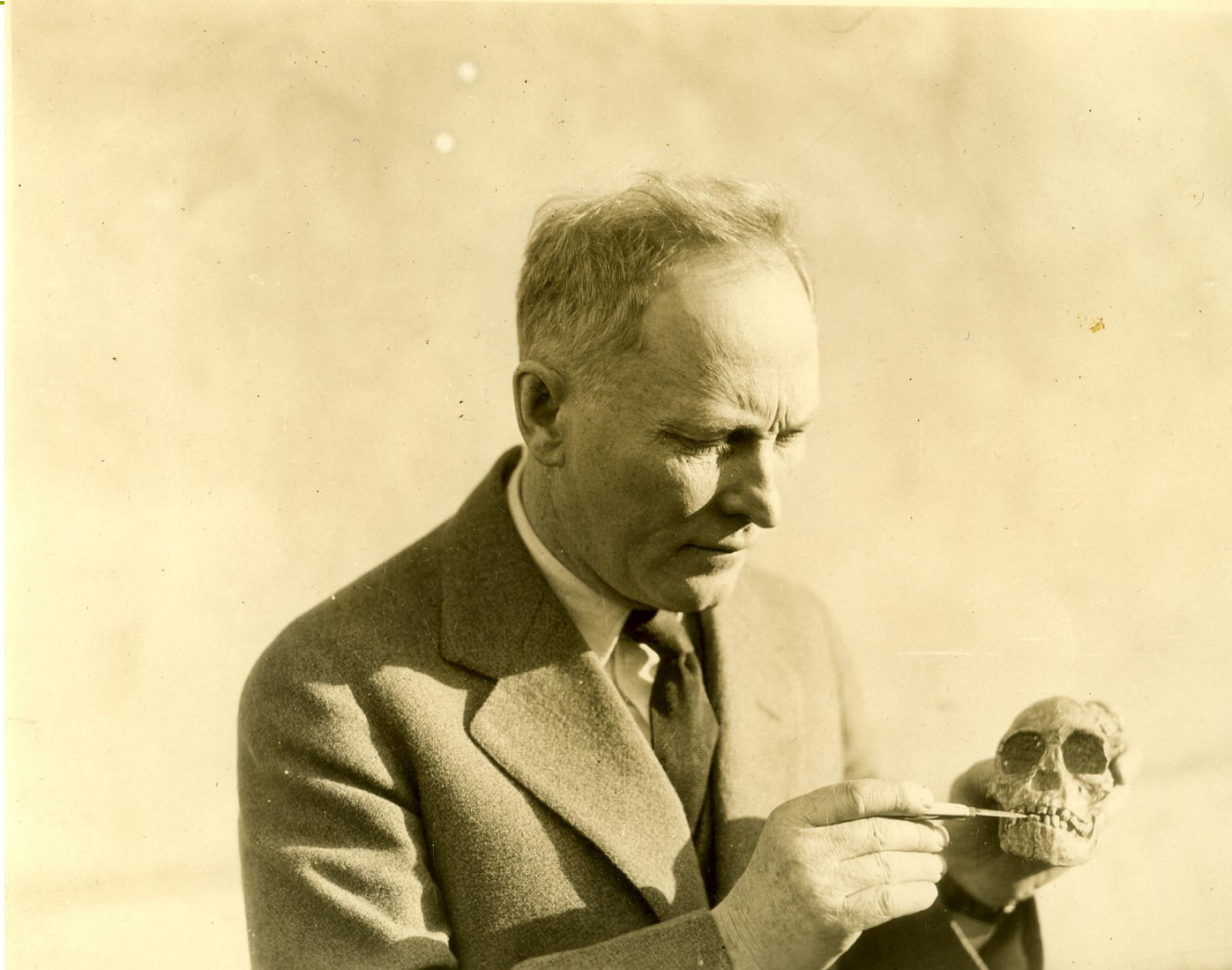


# First virtual reconstructions of the frontal lobe and temporal pole of the Taung (*Australopithecus africanus*) endocast.

DEAN FALK<sup>1</sup>, JOSE BRAGA<sup>2</sup>, BENOÎT COMBES<sup>3,4,5</sup>, GERARD SUBSOL<sup>6</sup> and SYLVAIN PRIMA<sup>3,4,5</sup>. <sup>1</sup>Department of Anthropology, Florida State University, <sup>2</sup>Lab. of Anthropobiology AMIS, University Paul Sabatier, Toulouse, <sup>3</sup>INSERM, U746, F-35042 Rennes, France, <sup>4</sup>INRIA, VisAGeS Project-Team, F-35042 Rennes, France, <sup>5</sup>University of Rennes I, CNRS, UMR 6074, IRISA, F-35042, France, <sup>6</sup>Lab. of Computer Science LIRMM, CNRS/University Montpellier.

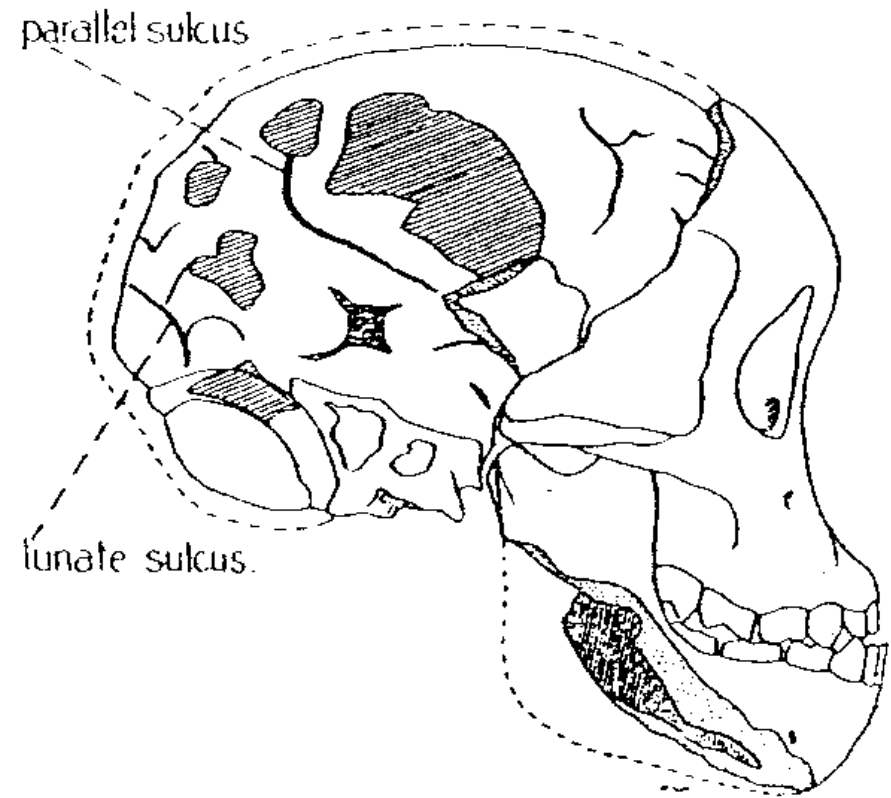
# Raymond Arthur Dart

---

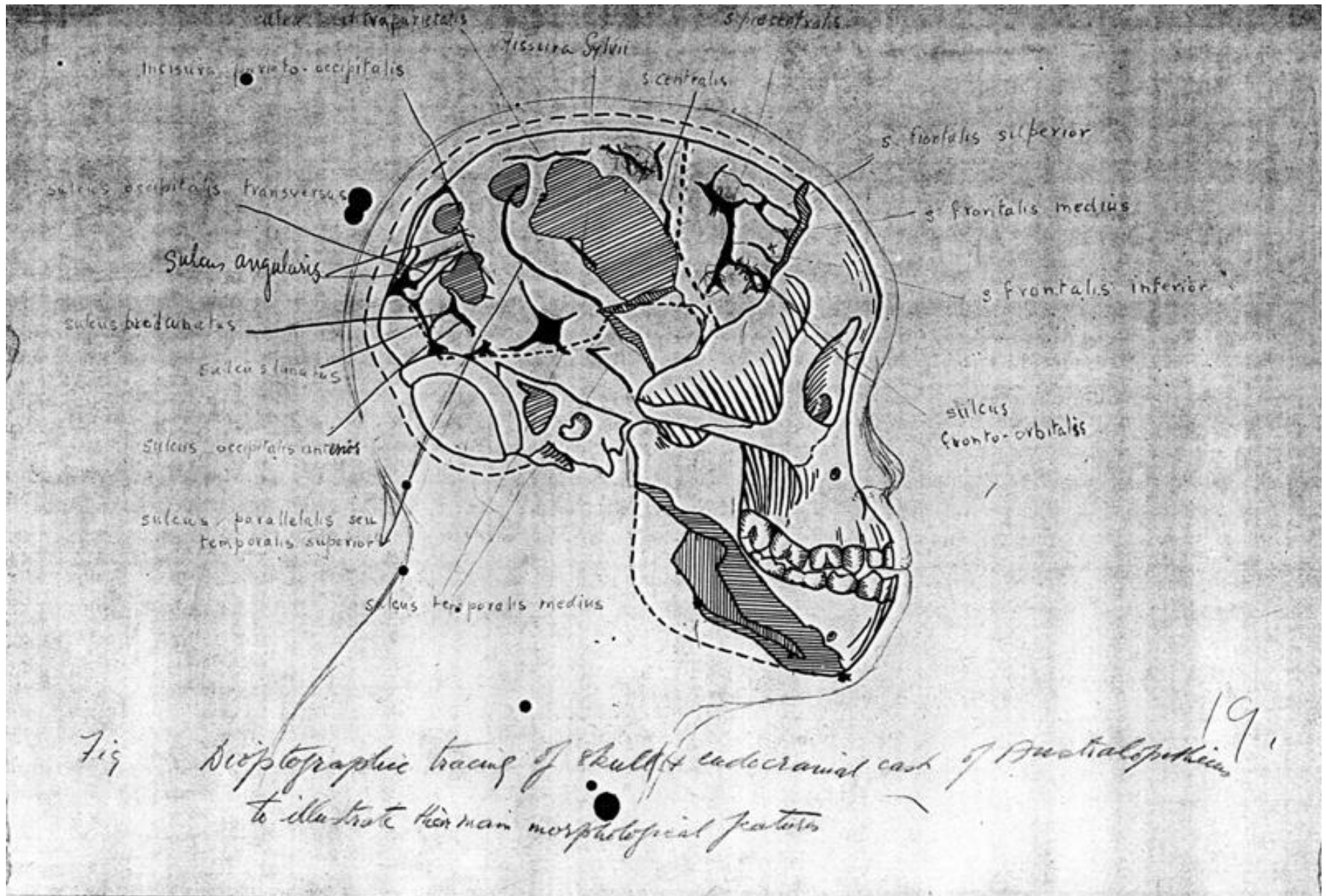


# Dart, 1925 (photo courtesy Bernhard Zipfel)

---



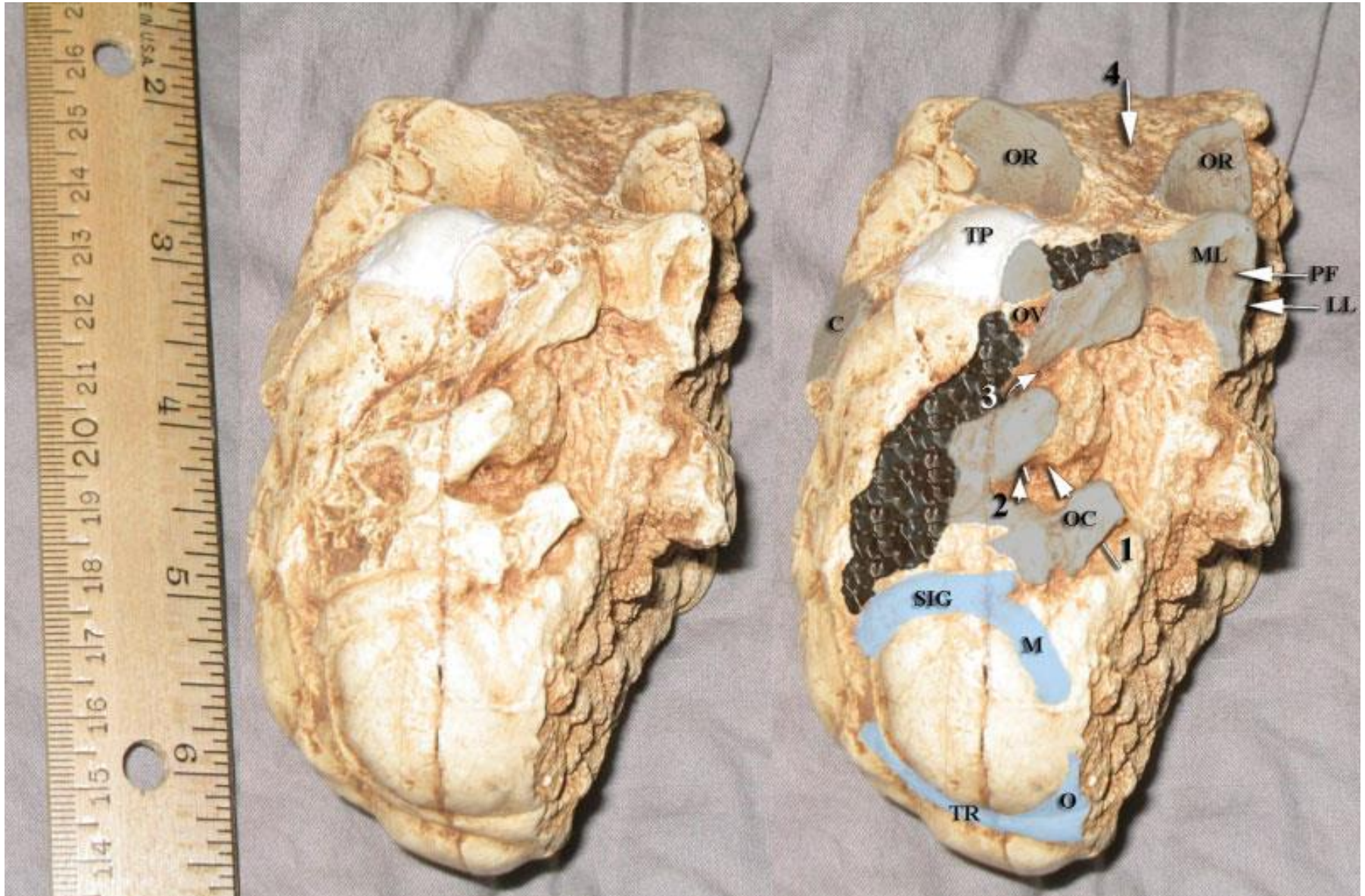
# Dart, 1929 (unpublished); Falk, 2009



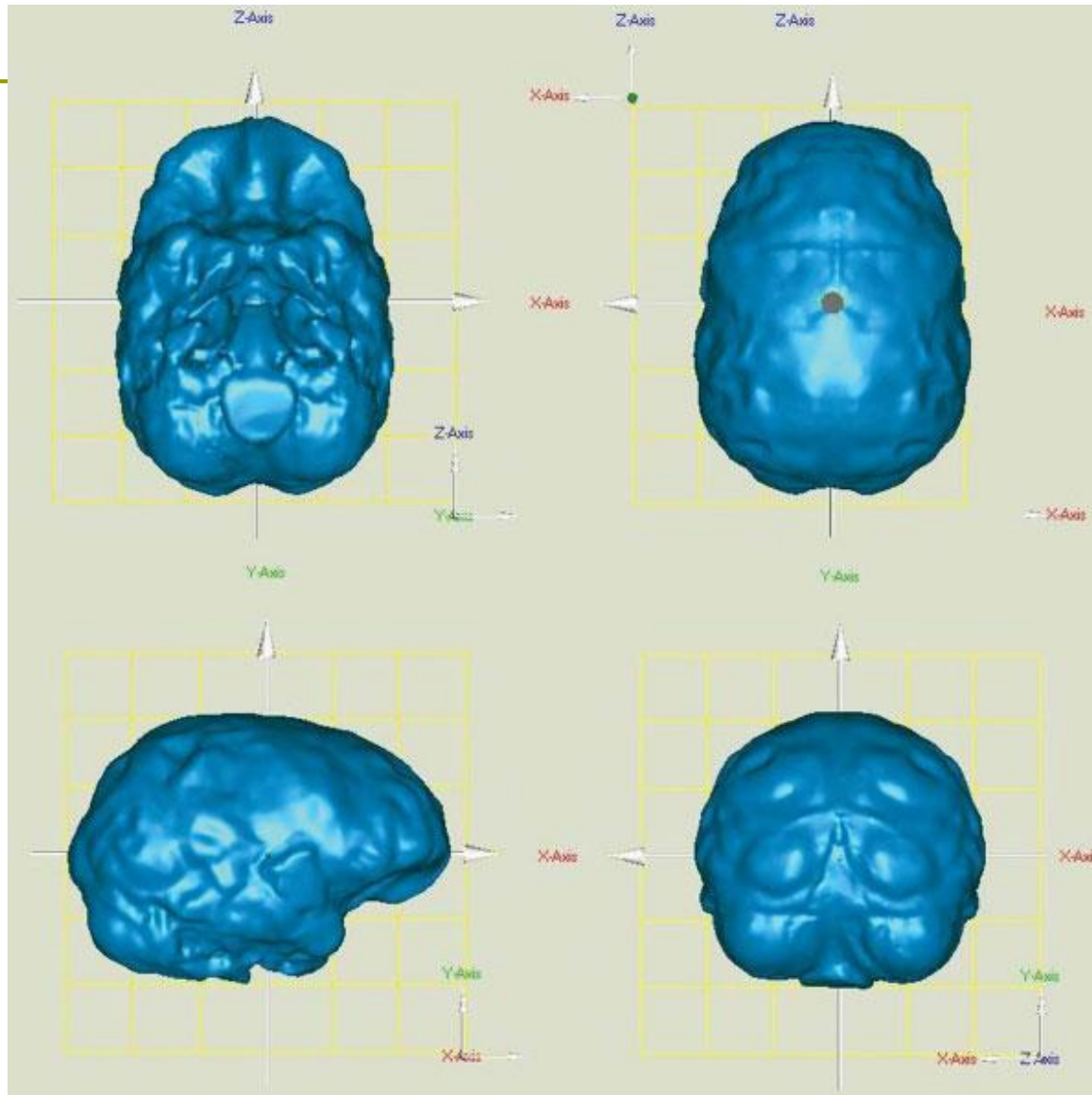
# Ron Clarke's 2007 reconstruction of temporal pole



# Falk & Clarke, 2007

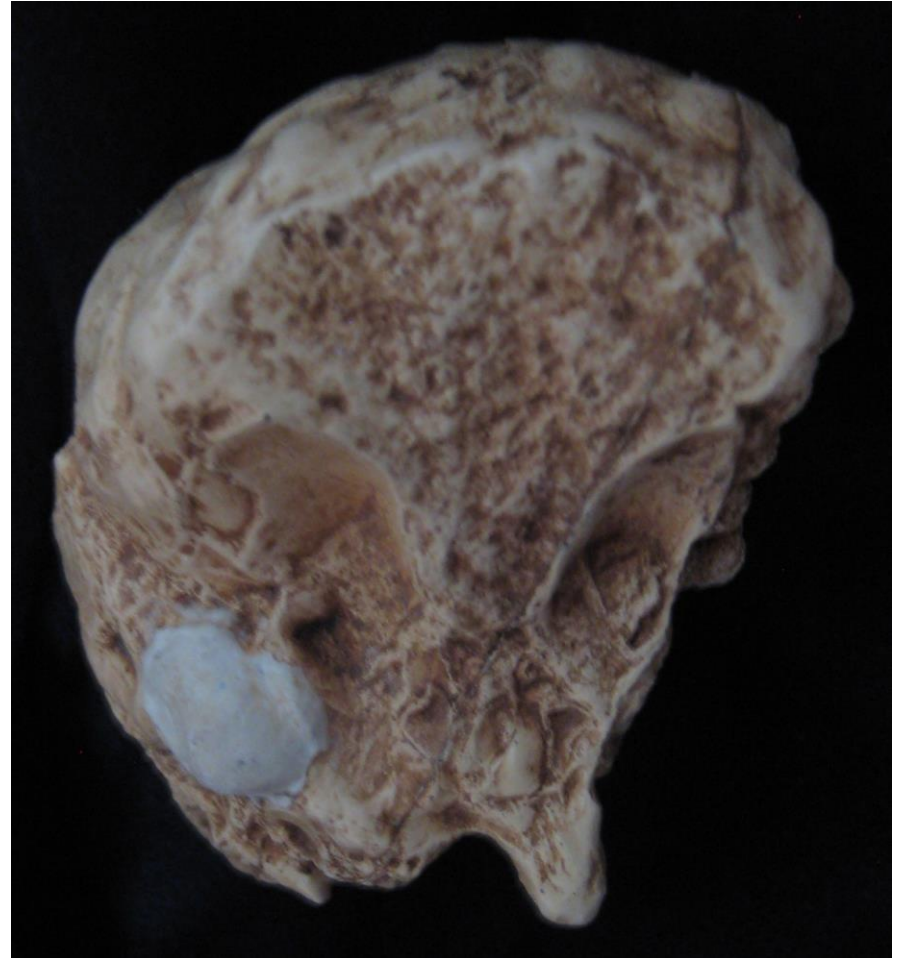
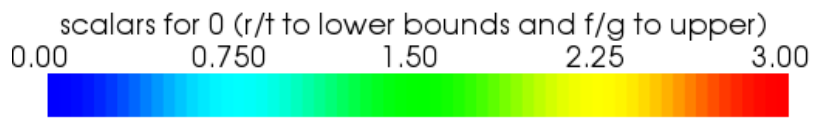
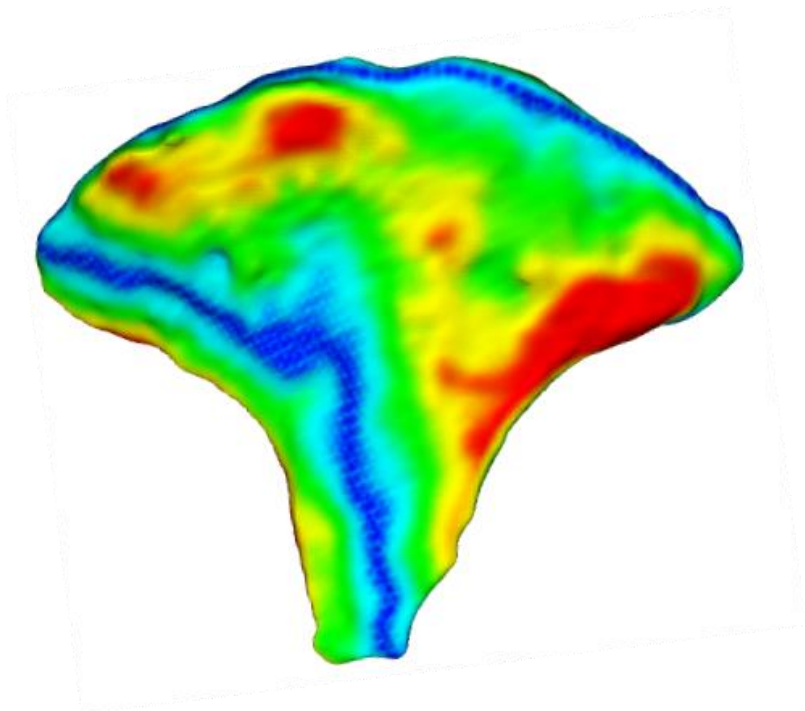


# Falk & Clarke, 2007

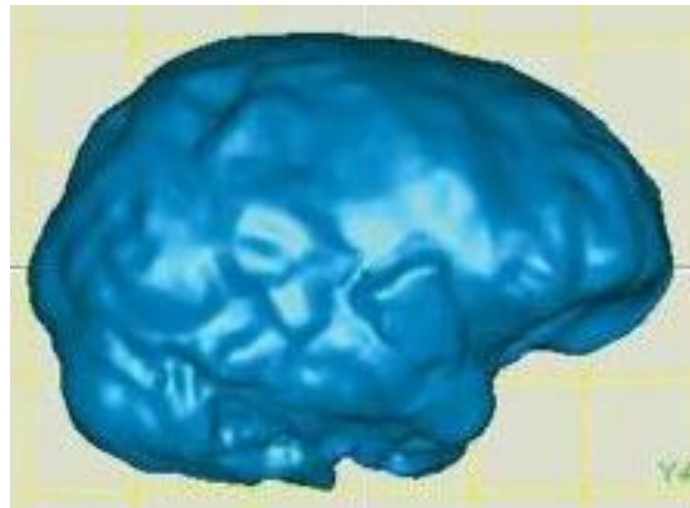
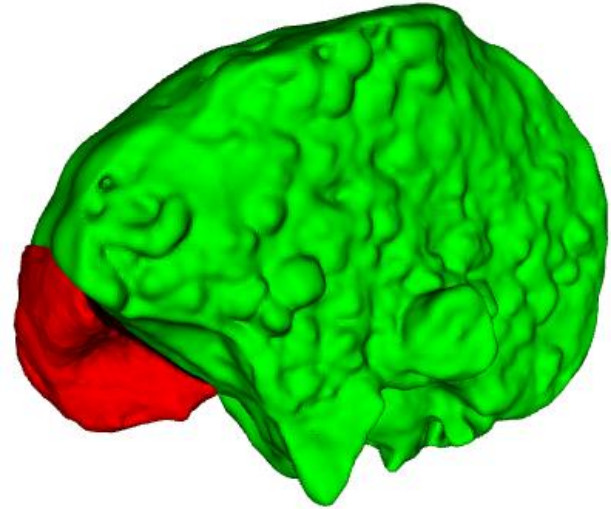
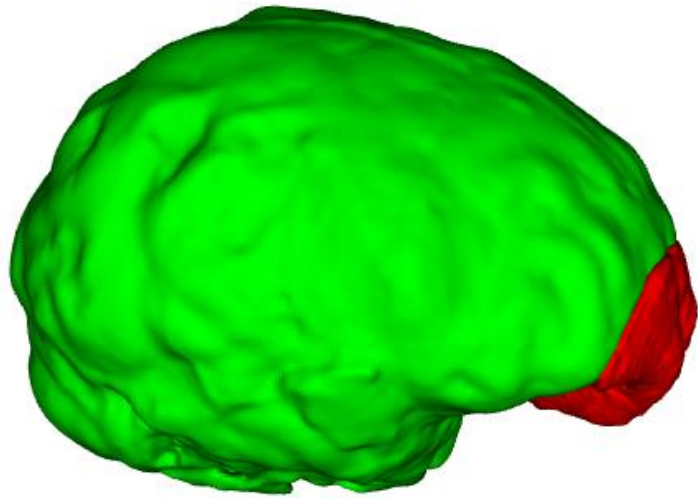


# Alignment of frontal lobe with rest of endocast. Red = greatest distance between the two surfaces.

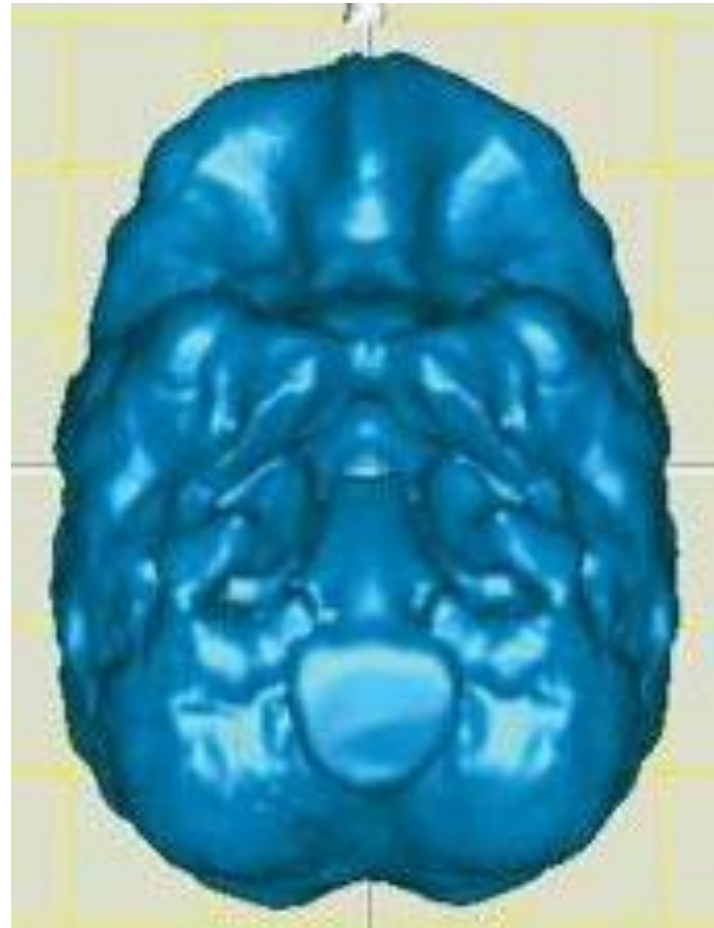
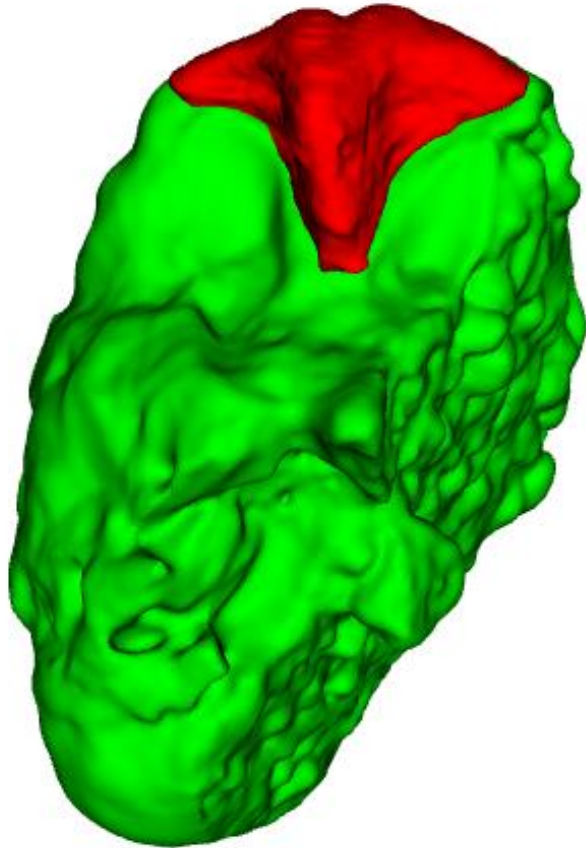
---



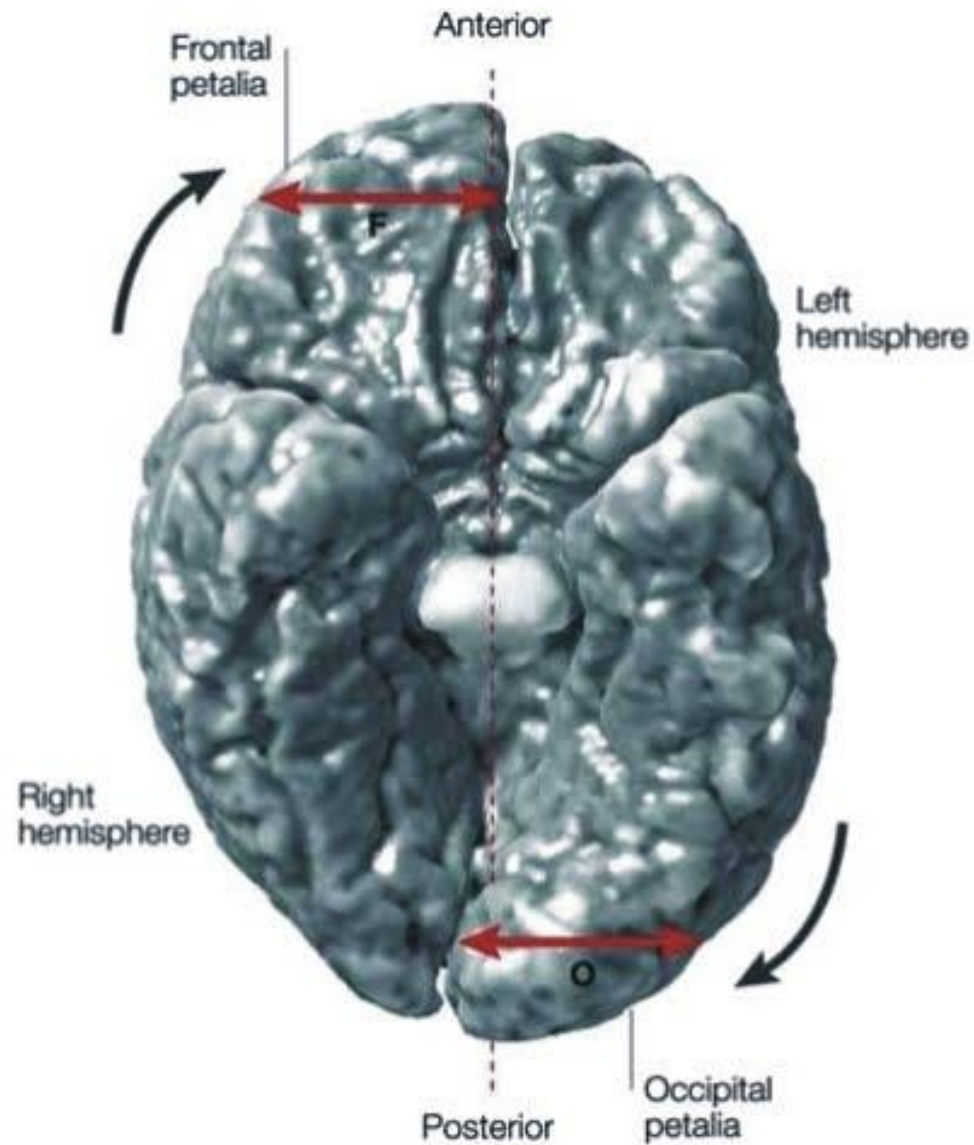




**Virtual frontal lobe reconstruction (left) compared with hand reconstruction of Falk & Clarke (right). Notice similar shapes, slight asymmetry of frontal lobe projections.**



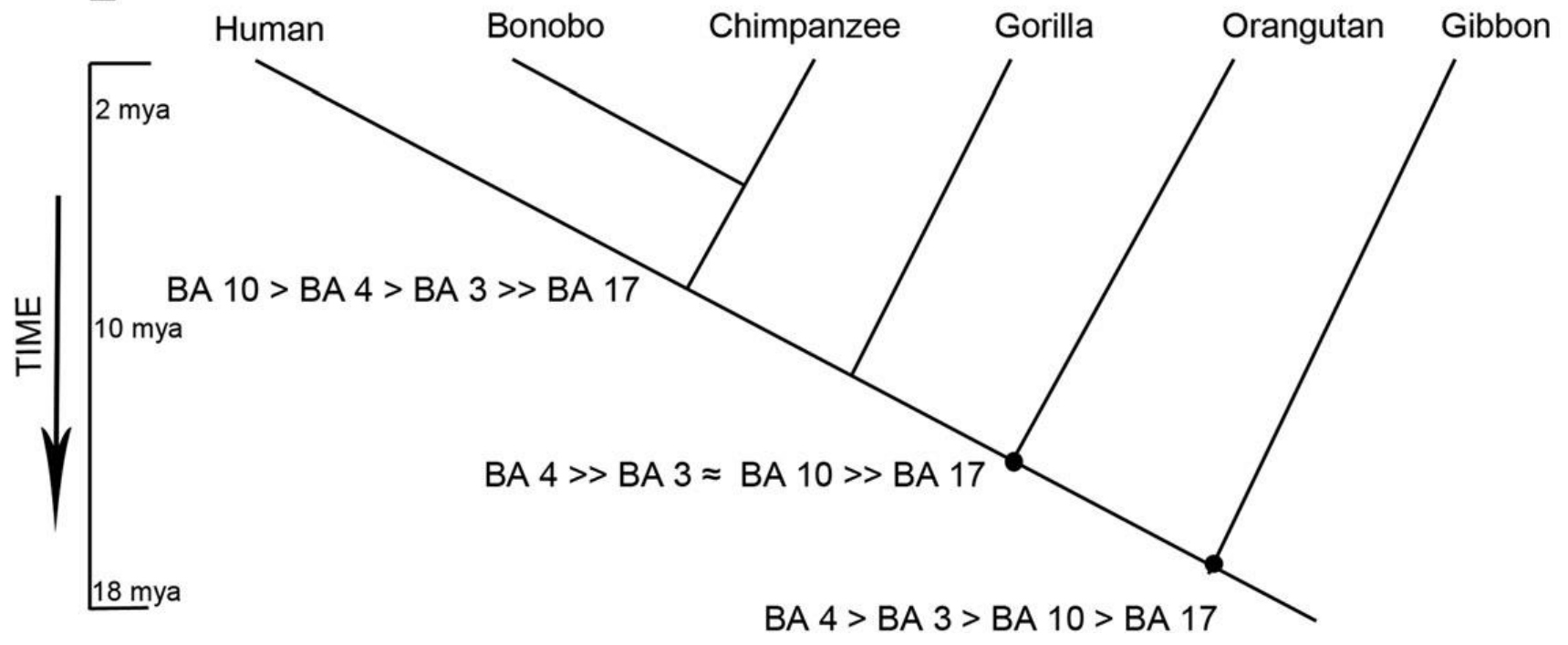
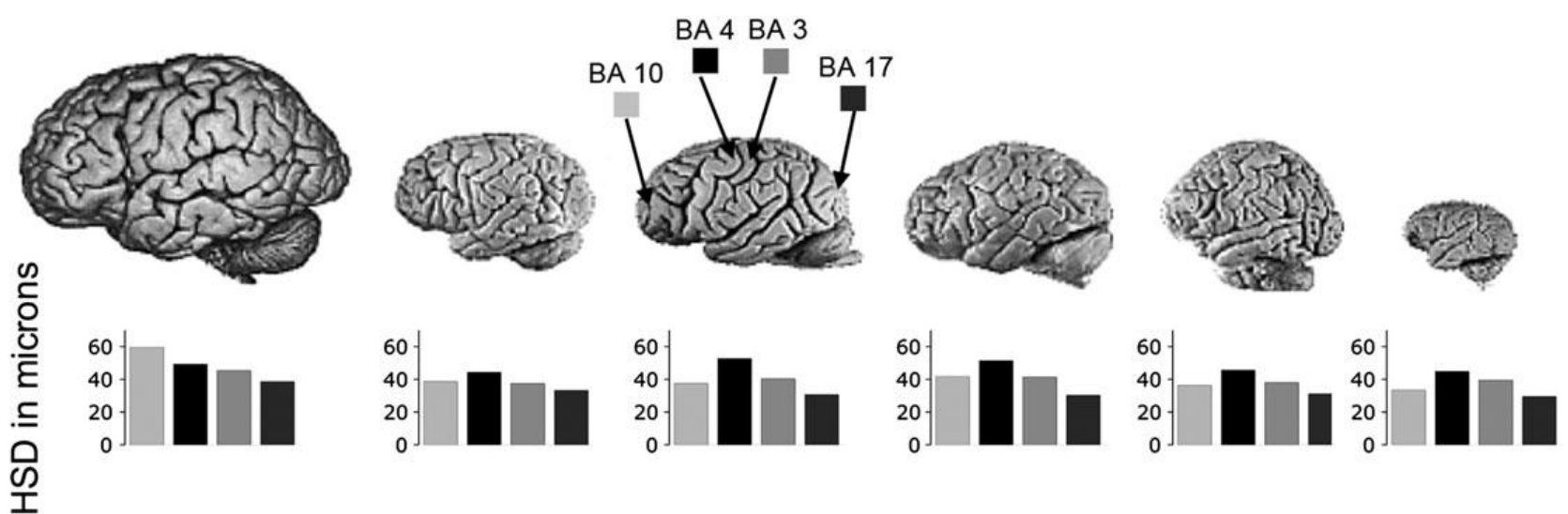
# Petalias and brain lateralization



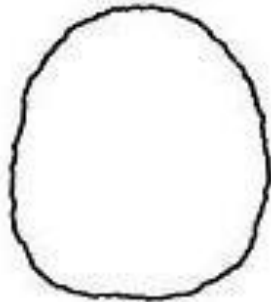
**PhD dissertation of Fernando Ventrice;  
2011, U. of Zürich & Natural History  
Museum, Paris (Ventrice is preparing  
article detailing his results)**

---

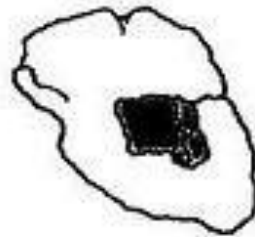
- ❑ **PHD Title: “Modern human brain growth and development: Contribution to brain evolution in hominids”**
- ❑ **Finding: In human infants and juveniles, petalia patterns are typically reversed from the statistically most frequent adult pattern!**
- ❑ **Brain lateralization, thus, appears to alter dynamically during early development**



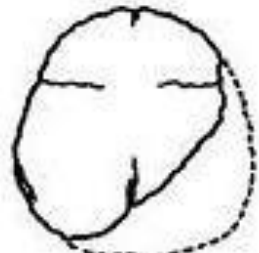
*A. africanus*



Sts 5



Sterk. No. 2

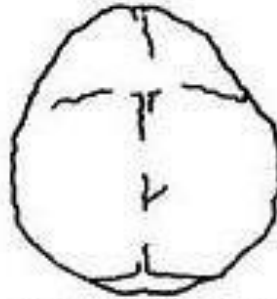


Sts 60

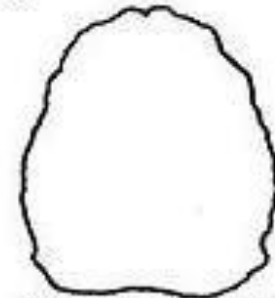


Stw 505

*Paranthropus*



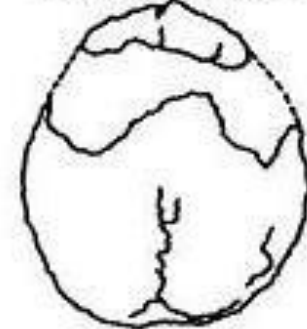
KNM-ER 23000



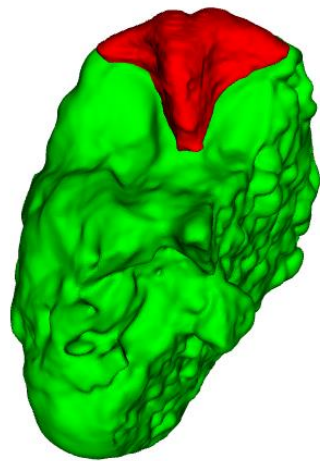
KNM-WT 17000

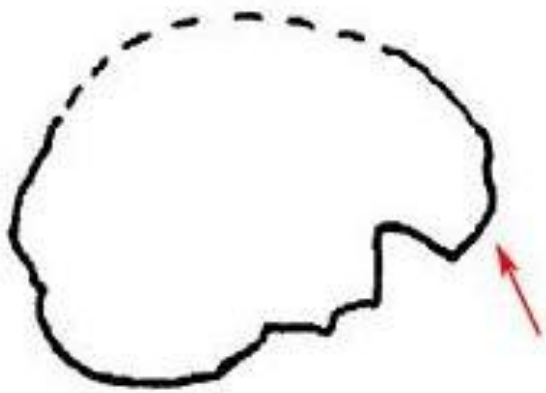


KNM-WT 17400

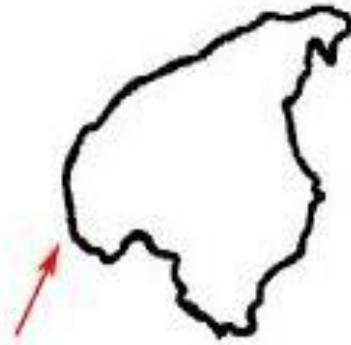


OH 5

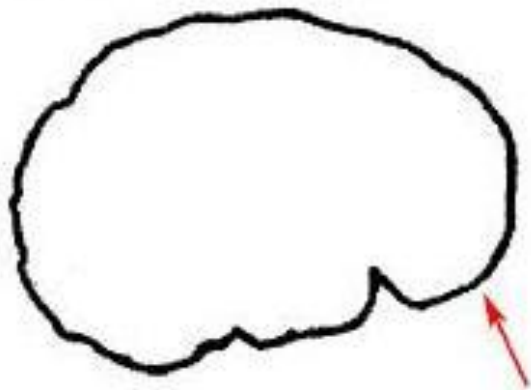




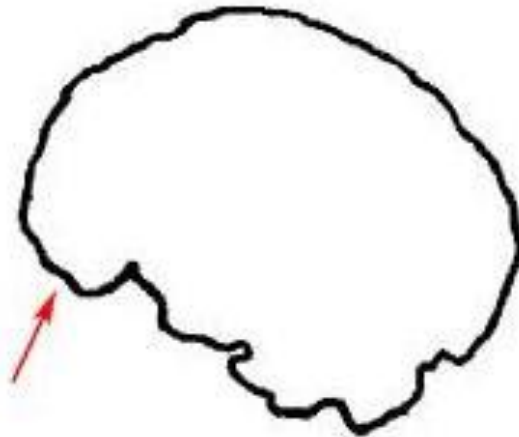
KNM-WT 17000



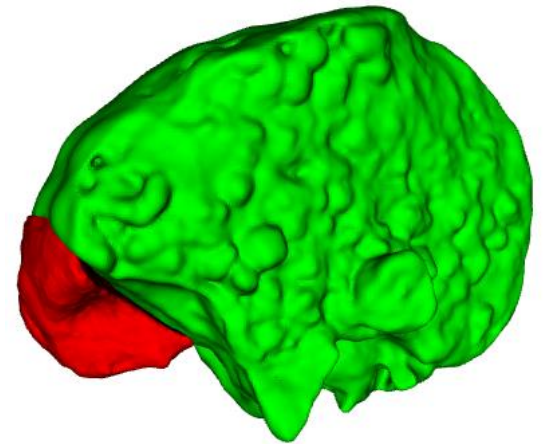
KNM-WT 17400



Sts 5

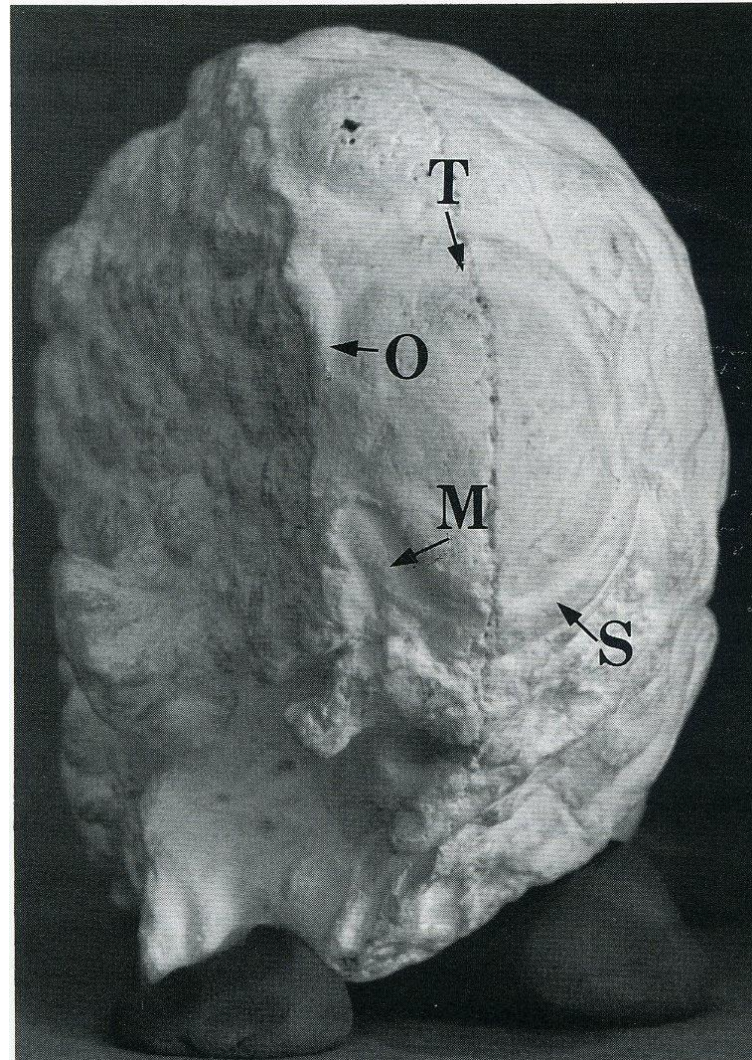


Stw 505



# Taung has a *Paranthropus*-like enlarged O/M venous sinus (Tobias & Falk, 1988)

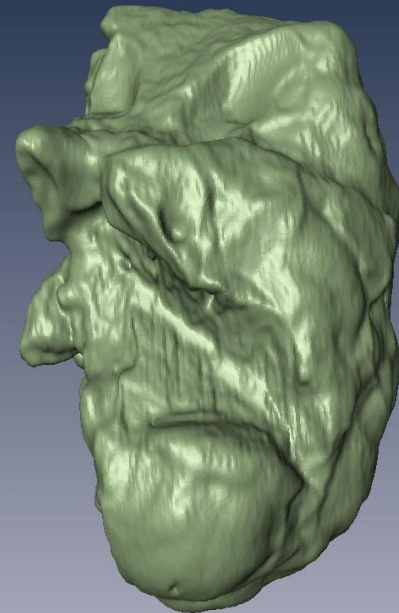
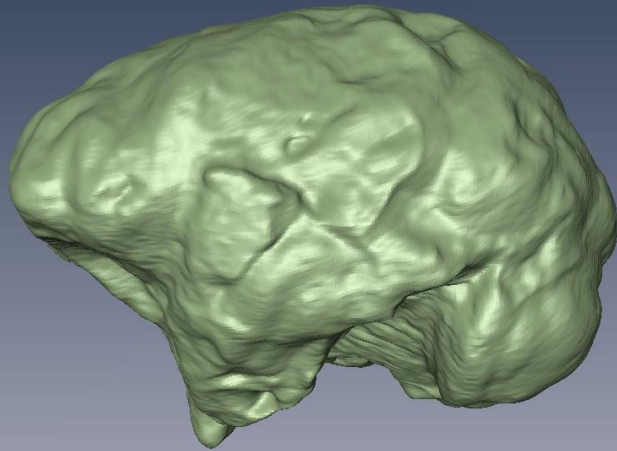
---





# In progress: removal of petrosal bone & matrix at base

---



# Summary & Conclusions

---

- ❑ **The rostral frontal lobes of Taung were extracted from its fossilized face and virtually reconstructed.**
- ❑ **Taung has a slight left frontal petalia, which new evidence suggests may be typical of human infants.**
- ❑ **Taung's frontal lobes are derived in the shape of the prefrontal cortex (squared in front) and in the expansion of the orbital surface.**
- ❑ **These findings suggest that the frontal lobes of *A. africanus* may have been undergoing reorganization toward a derived human pattern—just as Raymond Dart speculated in his 1929 (unpublished) monograph!**

# Acknowledgments

---

- **University of Witwatersrand**
- **Ron Clarke**
- **INRIA and the 3D-MORPHINE project**  
(<http://3dmorphine.inria.fr>)

