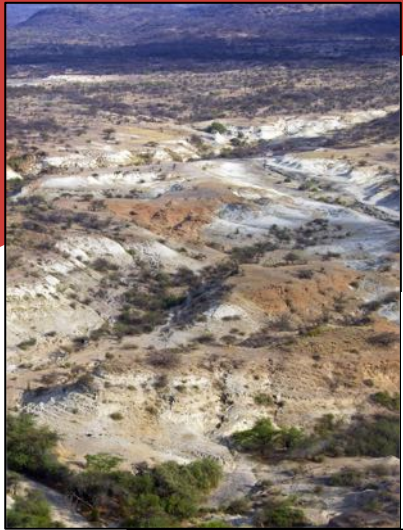




Ask a Geologist: Geology & Paleontology of Kenya

Melissa Boyd



A.K. Behrensmeyer, N.d.



nationalgeographic.org



About Me

Melissa Boyd

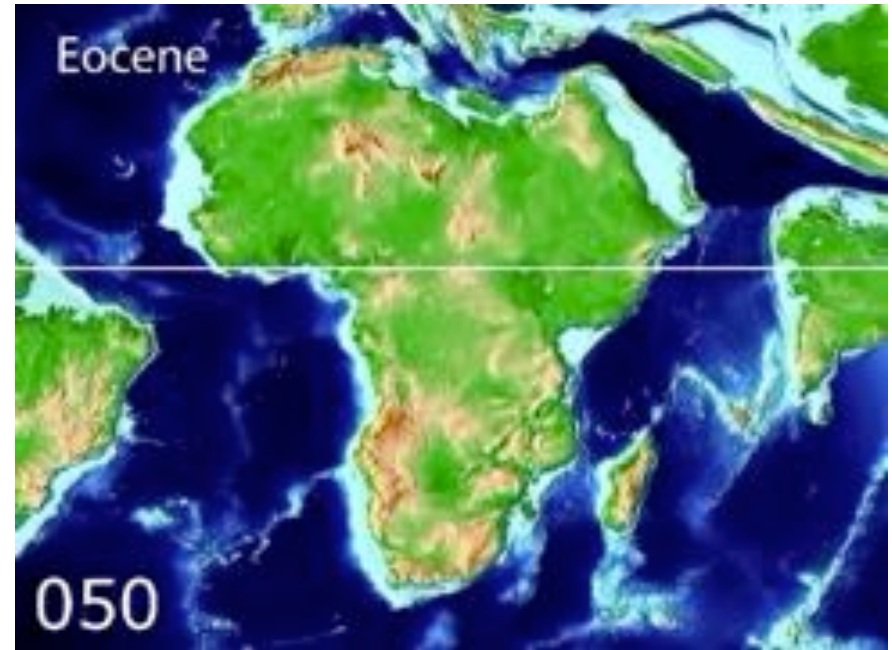
- Graduate student at Rutgers Earth & Planetary Sciences
- Geological context of evolution in East Africa (Kenya)
- I love hiking, running, & cats 🐱💕
- Fave rock: serpentinite



* all photos not credited are my own

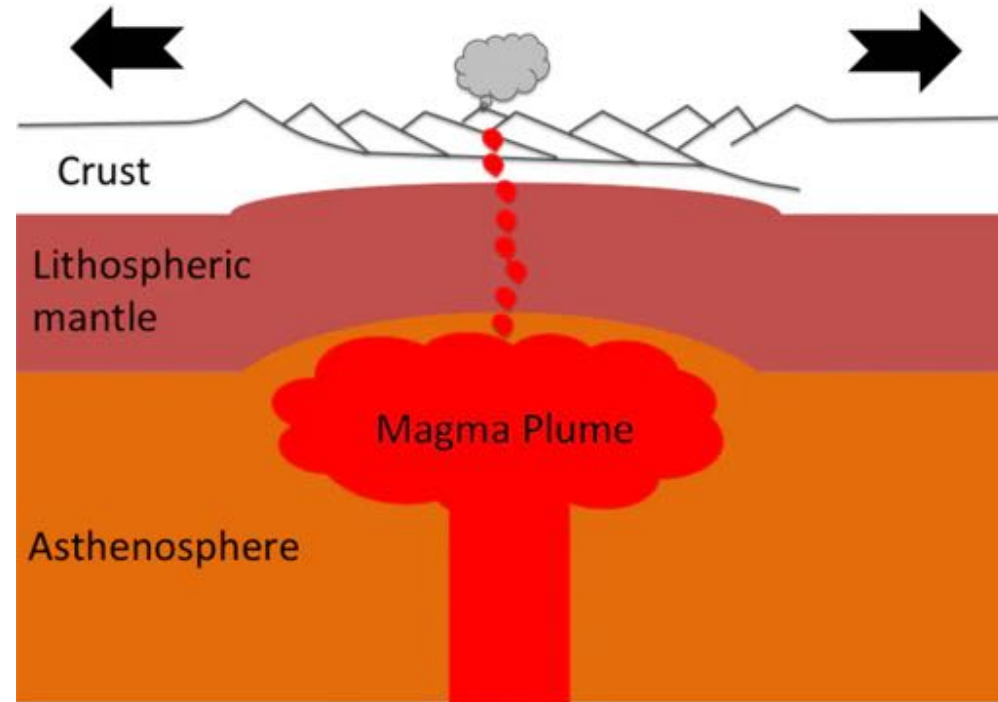


Geology of Kenya



Modified from C. Scotese, [youtube.com/watch?v=9OFyl2hsQ3k](https://www.youtube.com/watch?v=9OFyl2hsQ3k)

East African Rift Valley



<http://www.sciencehub4kids.com/>

mantle plume: narrow stream of hot mantle moving up from the Earth's core-mantle boundary



Consequences of Rifting

VOLCANOES!

subsidence: sinking of the Earth's surface

volcanohotspot.wordpress.com



Nabiyotum, active, 1921

@heatherkhandley



Mt. Kenya

worldatlas.com



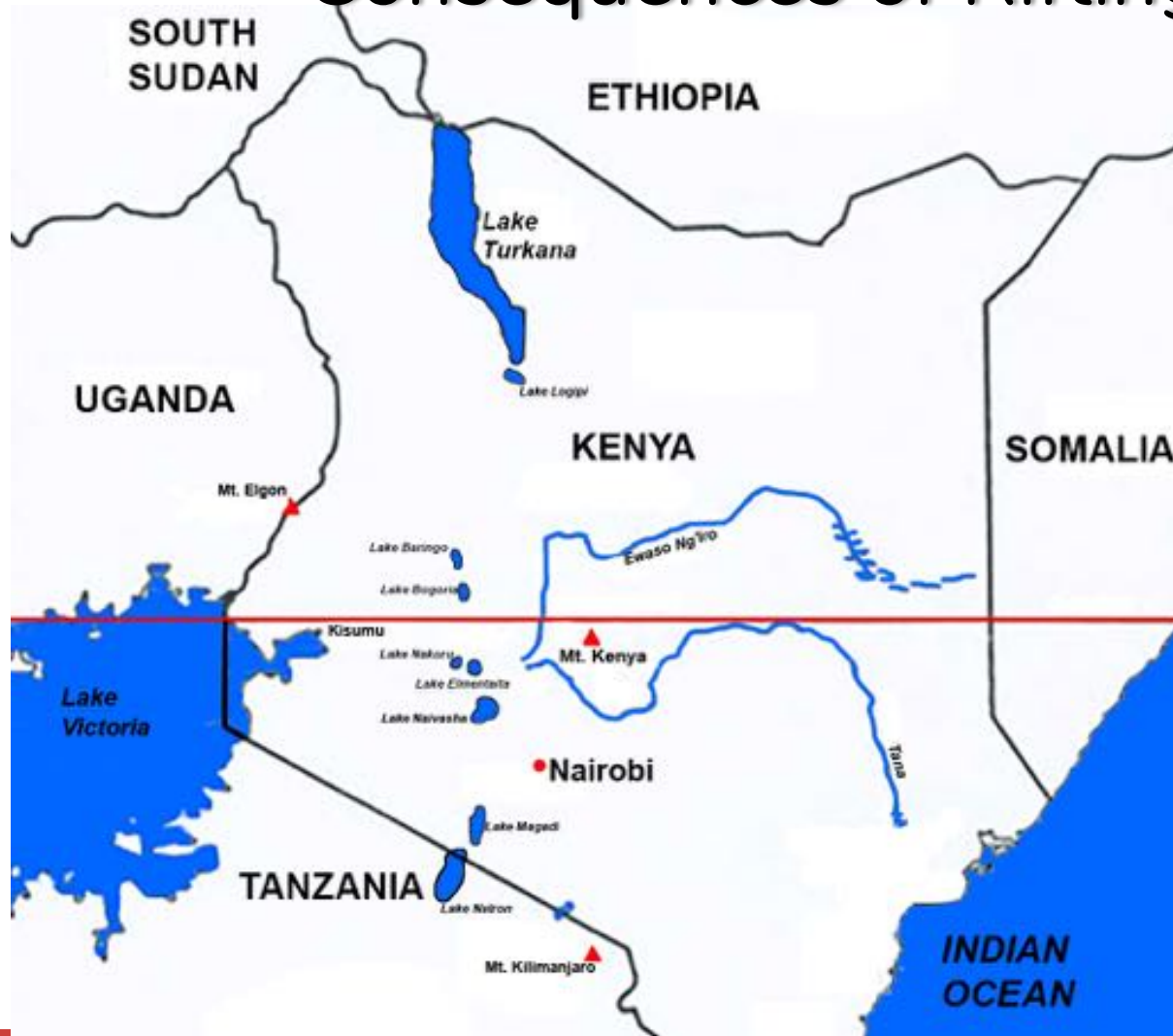
Menengai

Kilimanjaro



Muhammad Mahdi Karim / GFDL 1.2
(<http://www.gnu.org/licenses/old-licenses/fdl-1.2.html>)

Consequences of Rifting



Modified from J.K. Ngaira, 2012



Swimming in Lake Turkana

Mt. Longonot, active, 1863



Top of Mount Longonot, 9100 ft



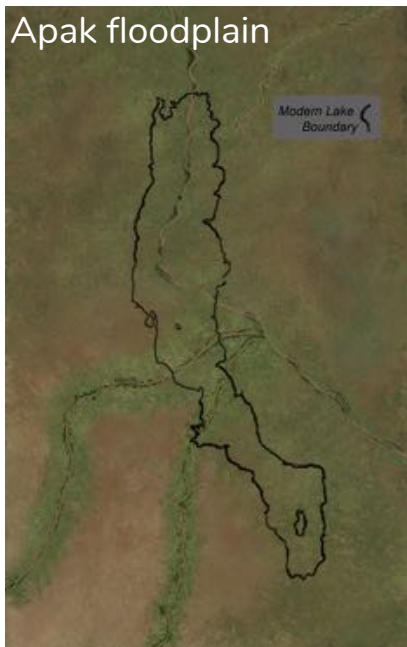
Central Island



Schwindinger and Feibel, 2012



Today



4.5 million years ago



4 million years ago

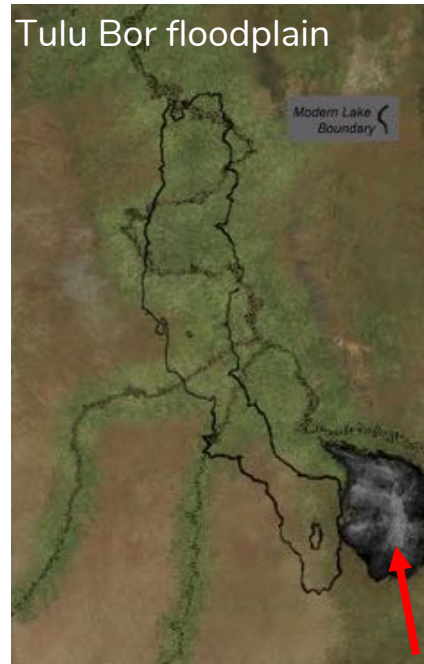


3.5 million years ago

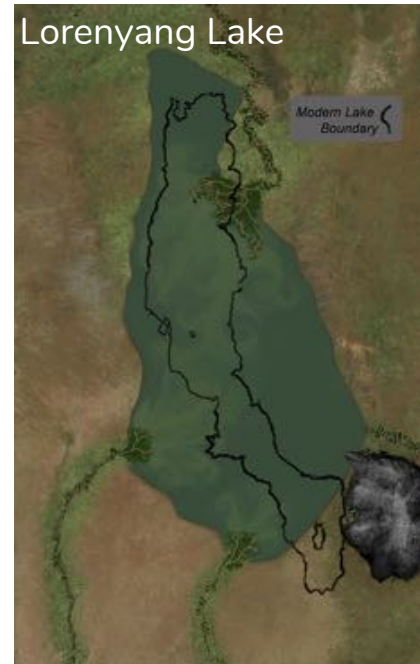
Turkana Basin through Time



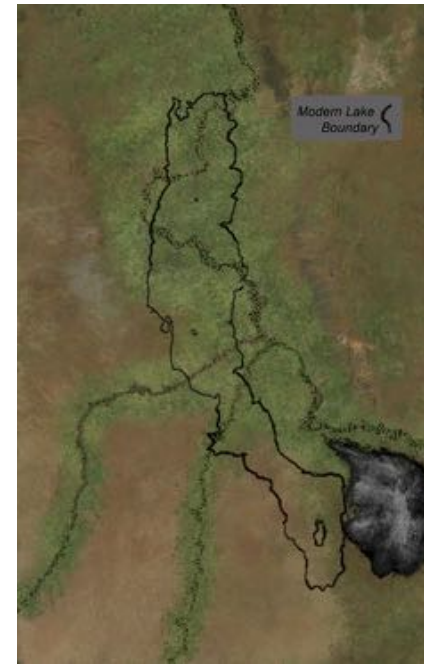
Today



3.4 – 2 million years



2 – 1.6 million years



1.5 - ?

Depositional Environments



River (fluvial)

Murray Foubister / CC BY-SA 2.0

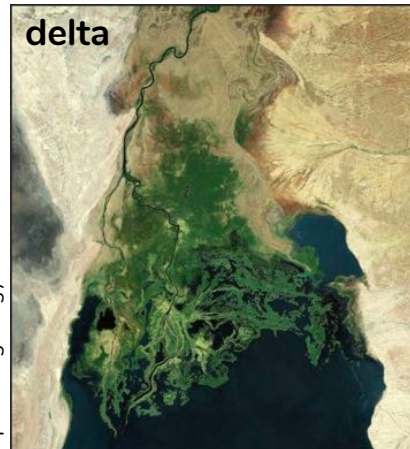


Lake (lacustrine)



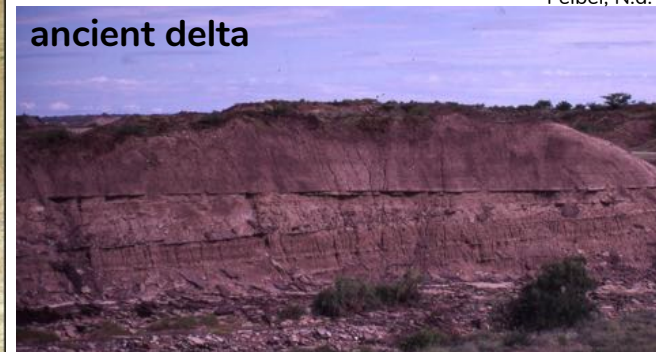
Alluvial Fan

pages.uoregon.edu



delta

impossiblegeology.com



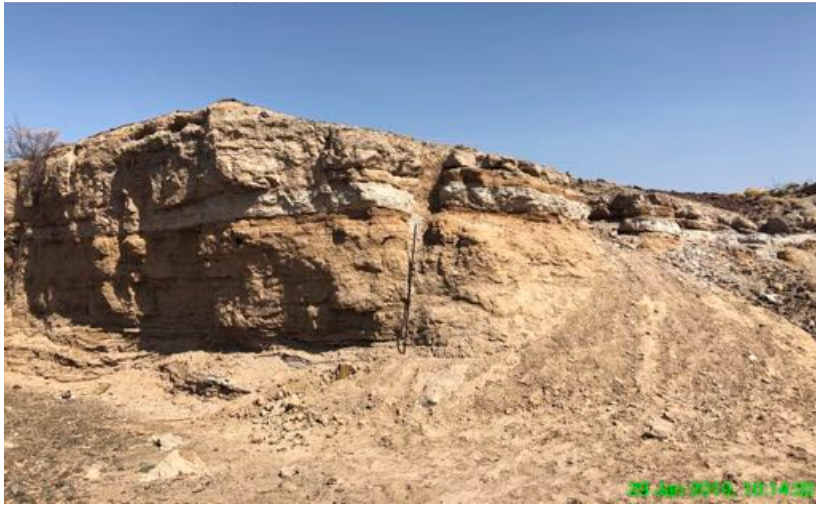
ancient delta

Feibel, N.d.



Volcanic Tuff

Lomekwi – Lokalalei Tuff



Tephra—a general term for pyroclastic material erupted explosively from a volcano.

Kalochoro – G-3 Tuff



Lomekwi – Tulu Bor Tuff



Tuff—a sedimentary rock consisting of more than 50% volcanic material such as ash

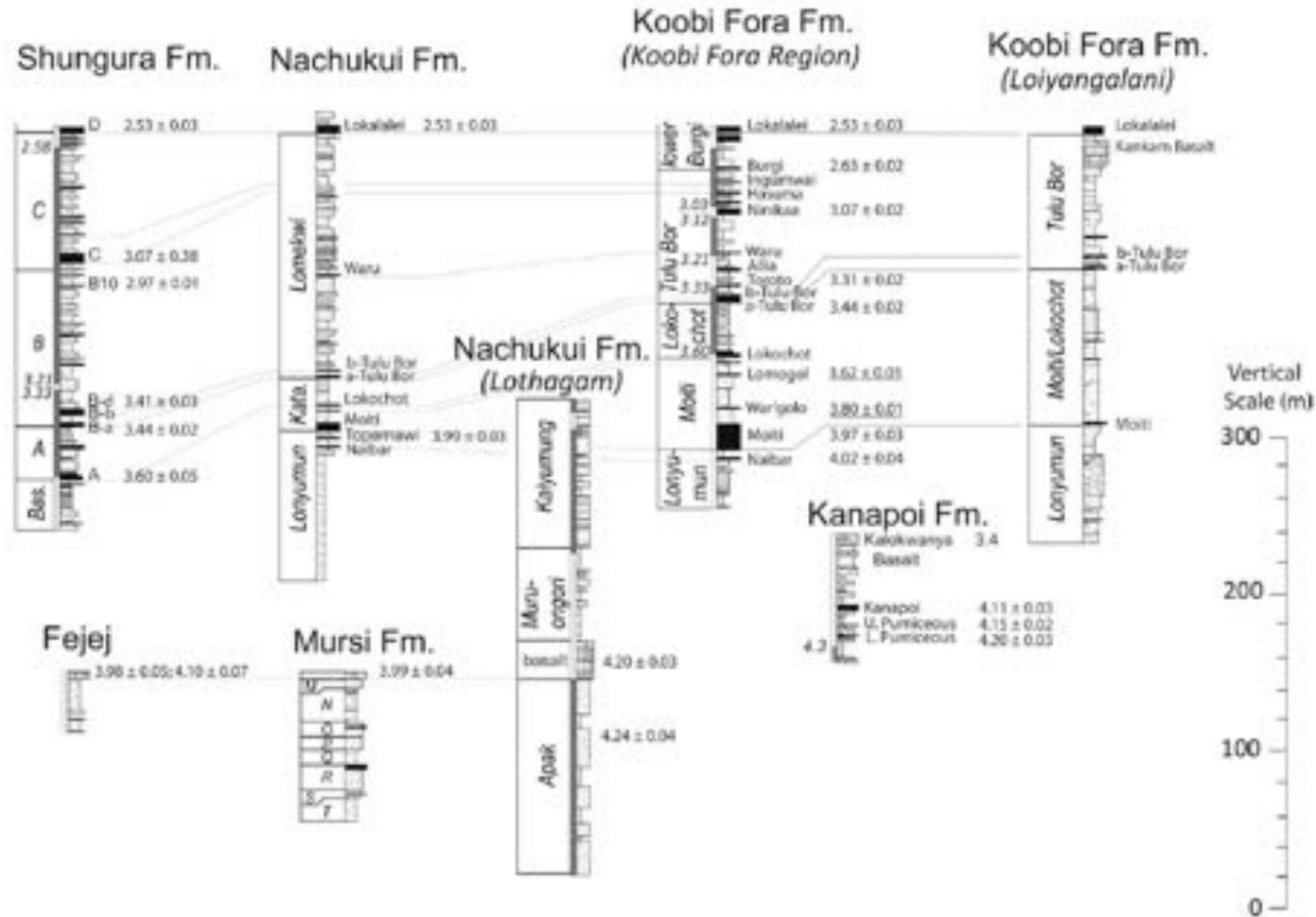
pumice

Robert DuHamel, CC BY-SA 3.0





Tephrostratigraphy



Brown and McDougall, 2011

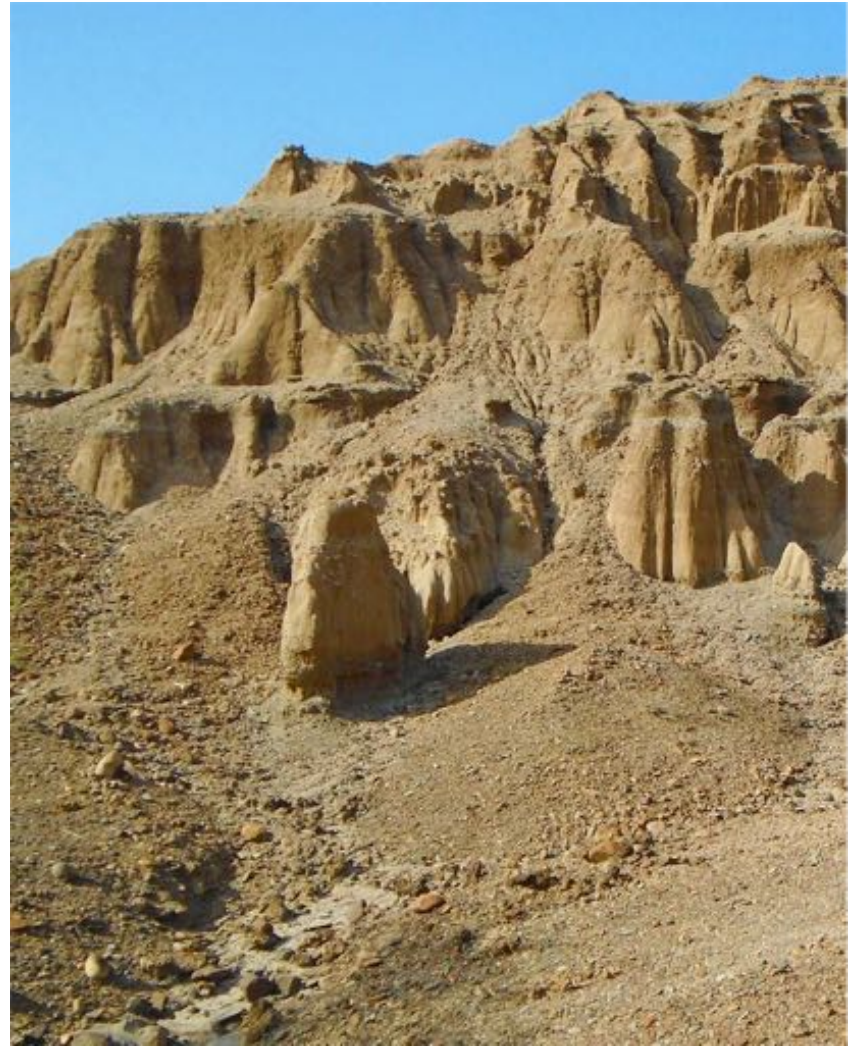


Turkana Geology

Lomekwi



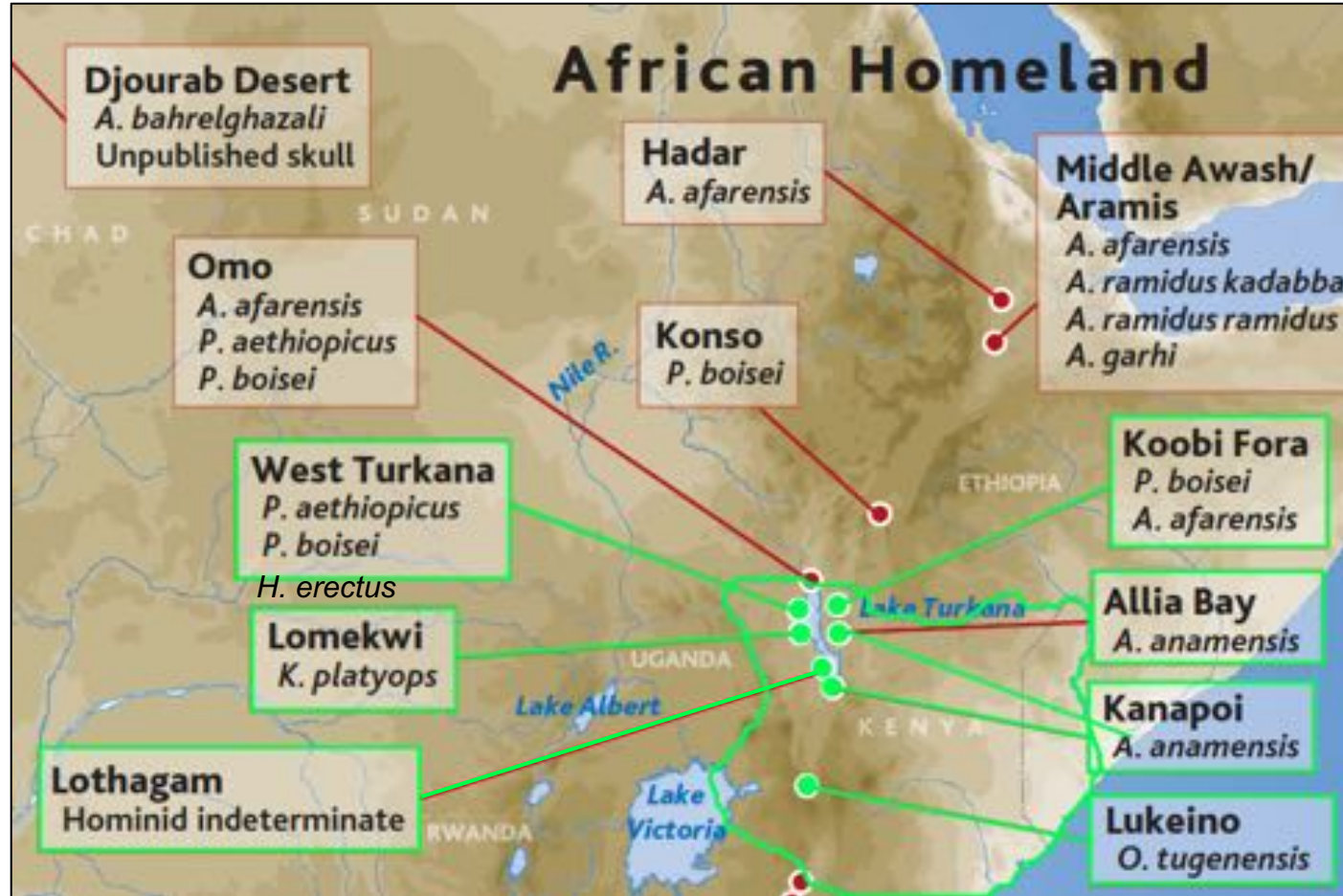
Lomekwi





Hominins of Kenya

modified from Gibbons, 2002



Hominid: orangutans, gorillas, chimpanzees, and human beings

Hominin: human



Geology of Hominin Fossil Discoveries

TUGEN HILLS, Lukeino Formation

6 million years old!

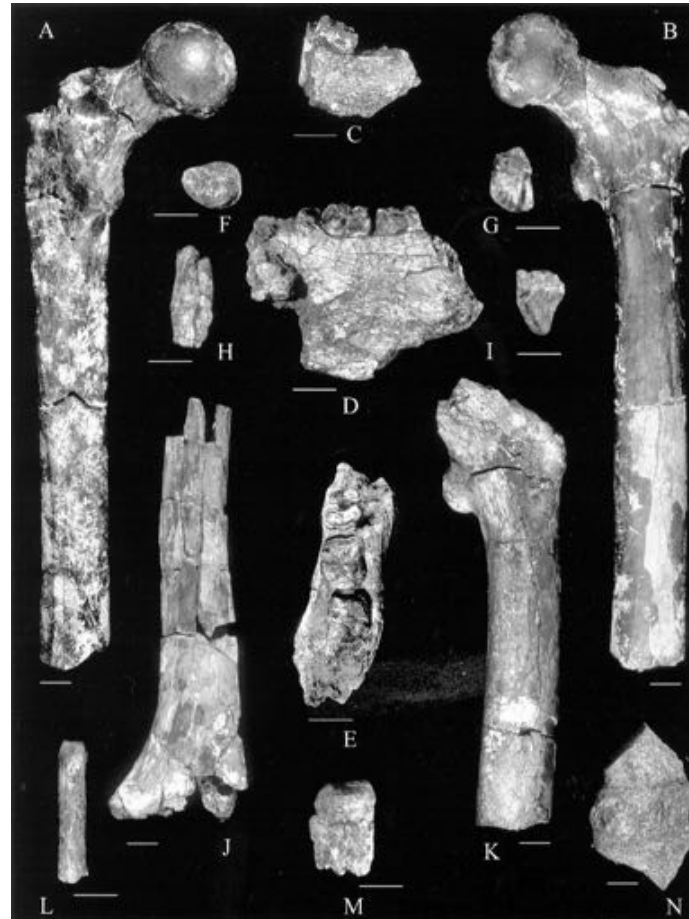
Orrorin tugenensis

- Geology here is between 14 and 4 million years old
- Lake and river deposits
- Big dolerite **sill** stuck in the sedimentary deposits

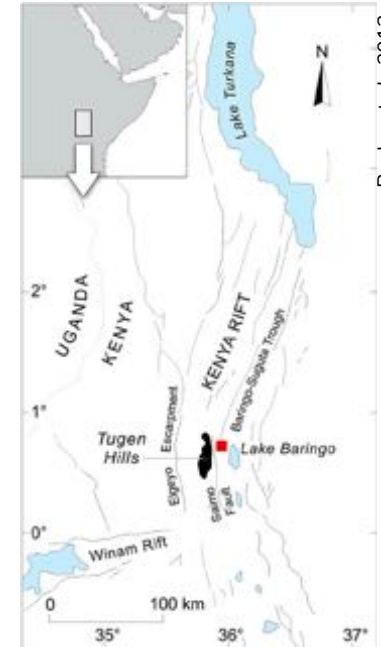
deviantart.com/sameerprehistorica



Deinotherium bozasi



Senut et al., 2001



Roche et al., 2013

The fossils are stored at a secret bank vault in Nairobi!



Geology of Hominin Fossil Discoveries

KANAPOI

Australopithecus anamensis

- there are 3 main layers: river → lake → river
- Lots of **tuff** (rock made from ash from a volcano)

4 million years old!



C.S. Feibel, 2014

Kalakwanya **basalt**

Kanapoi **tuff**

river and lake sediments



Ghedoghedo / CC BY-SA



Matt Crow/Cleveland Museum of Natural History, John Gurche (Facial Reconstruction); Dale Ombi/Cleveland Museum of Natural History



Hominins of Kenya

Turkana Boy – *Homo erectus*

- Most complete human skeleton ever found!
- Found by Kamoya Kimeu on Nariokotome River floodplain



floodplain: ground next to a river, formed of river sediments and floods often

SGT R.A. WARD / Public domain



Claire Houck / CC BY-SA2

West Turkana
P. aethiopicus
P. boisei
H. erectus

Lomekwi
K. platyops

Lothagam
Hominid indeterminate

RWAND

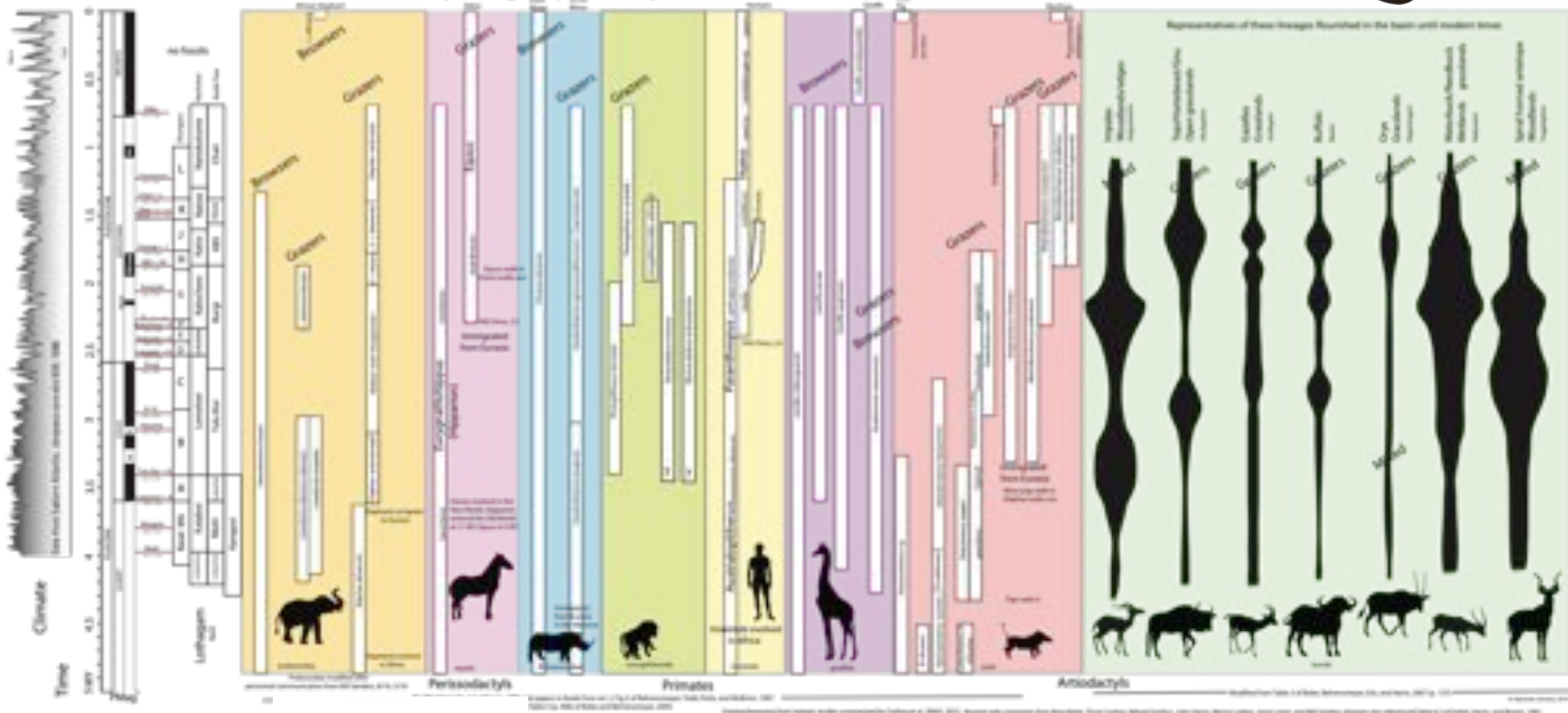
modified from Gibbons, 2002

Other animals discovered in Kenya



turkanastratigraphy.org

Fauna distribution in the Turkana Basin, 5 million years ago to present day



phys.org



CC BY-SA/4.0



wikiwand.com



vignette.wikia.nocookie.net



Dinosaurs of Kenya



Pterosaur

Azhdarchidae sp.



Mark Witton, CC BY-SA 4.0

Titanovenator kenyaensis



Roberto Murta / Public domain

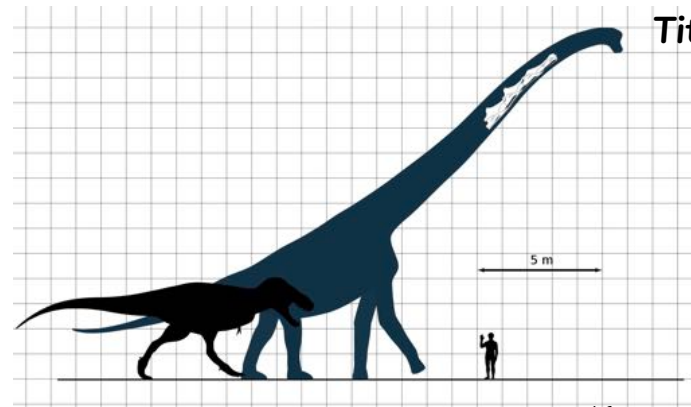
Abelisauridae gen. et sp. nov

Spinosaurus sp.



livescience.com

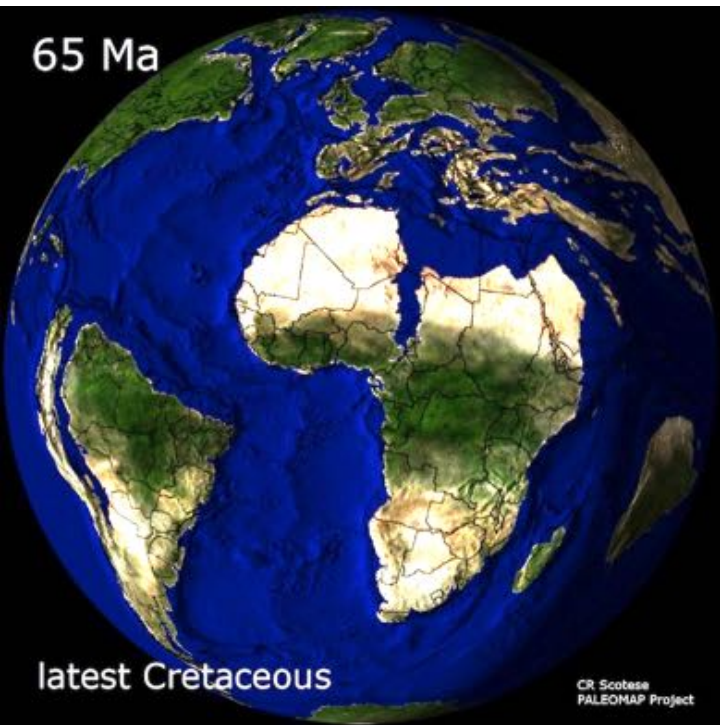
Titanosaurus sp.



ohfact.com



Cretaceous Lokitaung Gorge



scotese.com

Tiercelin et al., 2012



Lapurr Sandstone



Lokitaung Gorge

wikiwand.com

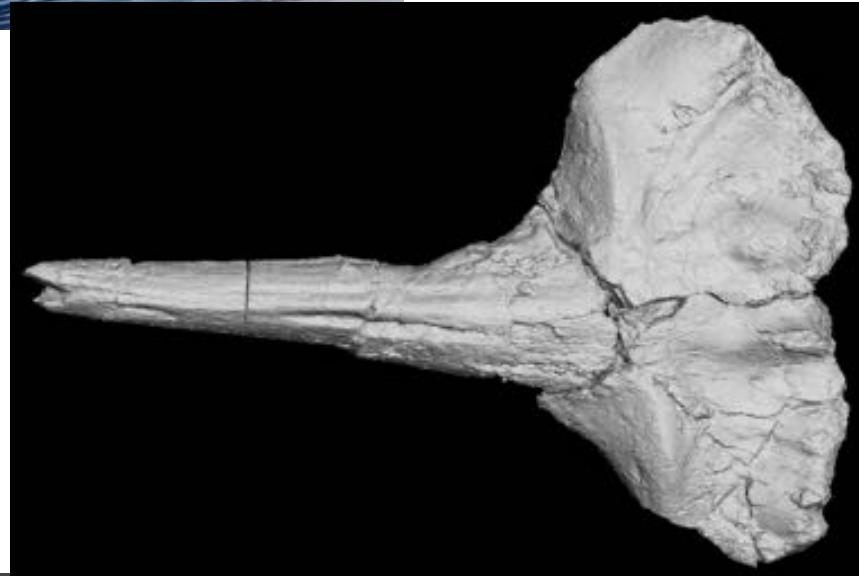


Desert Whale



phys.org

digimorph.org





A Whale in the Desert?

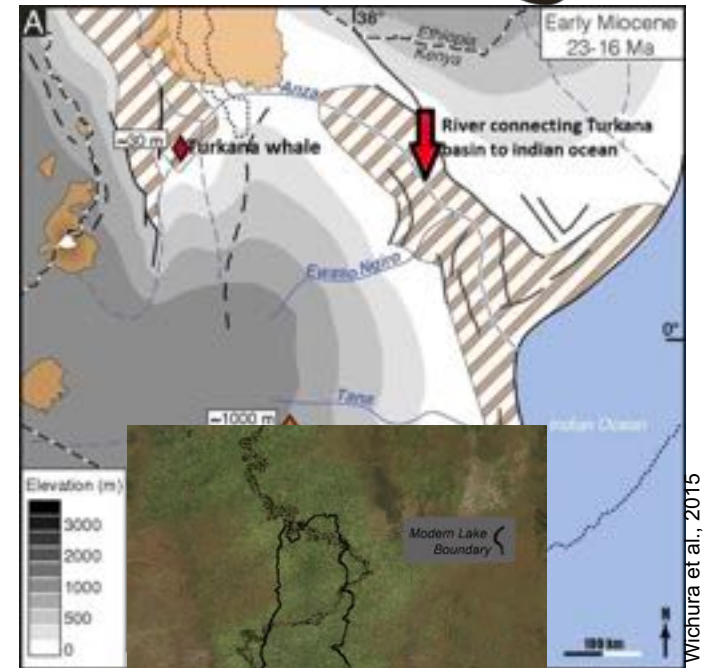


Liutkus-Pierce et al., 2019

Feibel, 1994

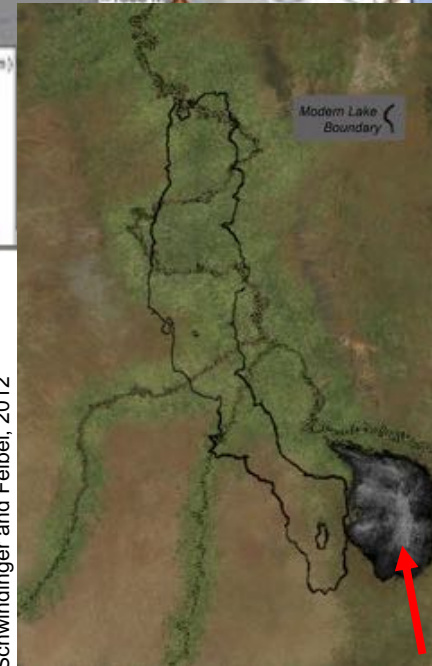


Turkana River: a fluvial corridor, connected the Turkana Basin with the Indian Ocean.



Wichura et al., 2015

Schwindinger and Feibel, 2012



Simbakubwa

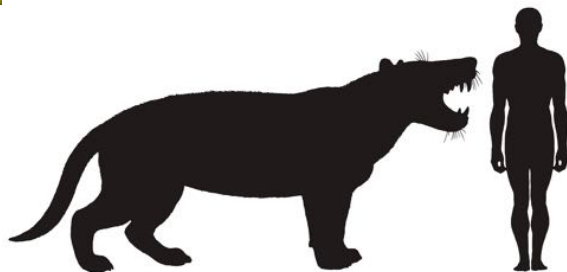


Anton, 2019



Africa's largest mammalian carnivore had canines 'the size of bananas'

Matt Borths, Duke University



nationalgeographic.com



Borths, 2019



Fun Links

[Interactive African fossils website](#) (some pages aren't working right now)

[Human Fossils](#)

[Dinosaurs of the Turkana Grits](#)

[3-D views of fossils and bones](#)

[West Turkana Paleo Project](#)

[West Turkana Archaeological Project](#)

[Nairobi National Museum](#)

[Turkana Basin Institute](#)

Question Time!

