Background to “Out of Africa 3”: Behavior and environmental change in the Middle Stone Age

Alison S. Brooks

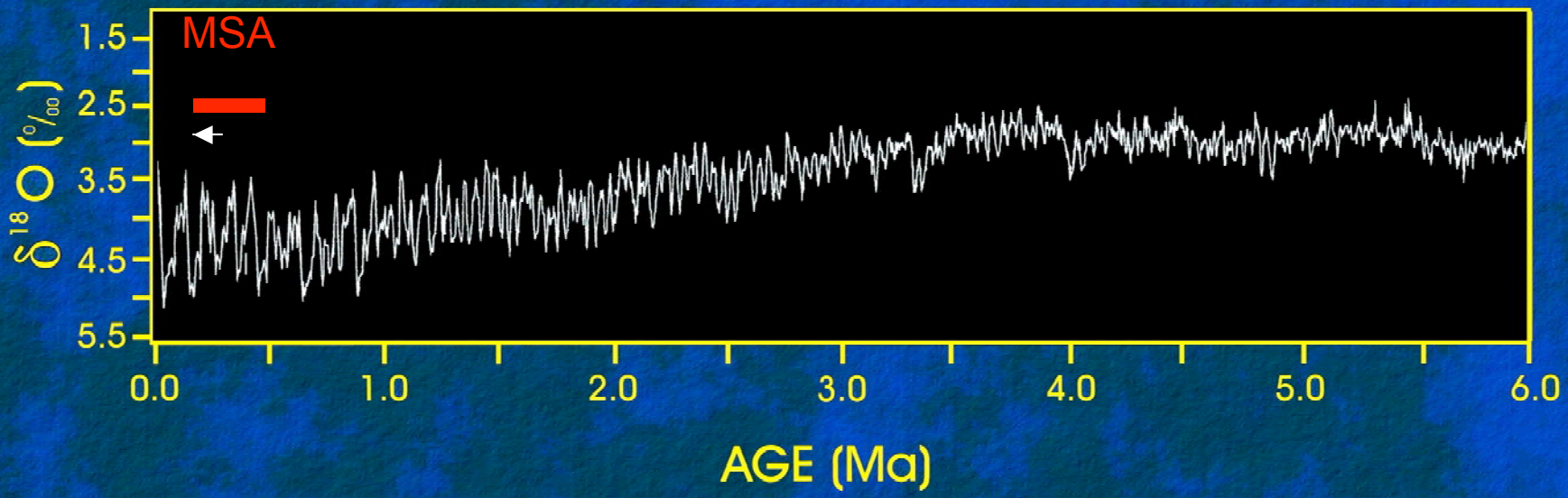
George Washington University/

Smithsonian Institution

What is the Middle Stone Age

- Before 1929 – two stages in African palaeolithic
  - Early Stone Age (handaxes, choppers – Modes 1,2)
  - Later Stone Age (microliths, tools similar to those still in use today – Mode 5)
- 1929, Goodwin and van Riet Lowe add “Middle Stone Age” for industries that lack both handaxes and microliths, but have formal tools on flakes and prepared cores (Mode 3)
- Reality – more complicated, both microliths and hand-axes within MSA sequences
- Behavioral context for the origins of our species

The Middle Stone Age occurs during a period of increased climate variability



Problem: Localized climate data very limited >40kyr

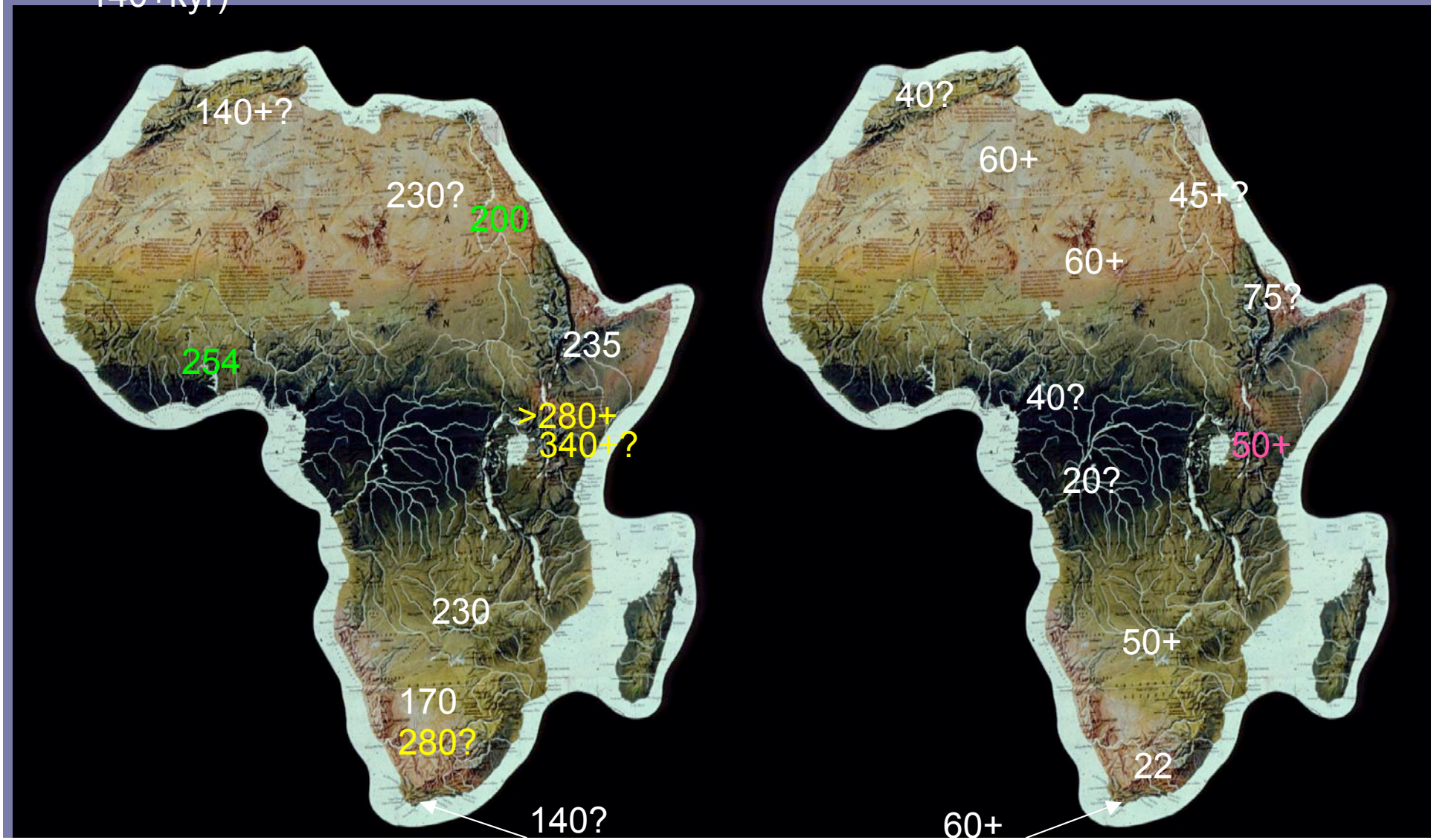
The MSA and Out of Africa 3- Modern Human Origins and Exodus: Ecological Questions

- Do changing behavior patterns within the MSA correlate to changing local climate; in particular do technological, economic and social intensification relate to deteriorating climate conditions or to more variable ones?
- Do such changes in behavior precede changes in morphology?
- Where was the AMH homeland within Africa?
- What were the climatic and ecological associations within Africa at time of expansion out-of-Africa? Is there a volcanic winter effect?
- What were the possible routes for migration within and out of Africa?

When is the Middle Stone Age?

Earlliest? 340+ to 140+kyr)

Latest? (kyr) 60+ to 22-20kyr



A possible AMH homeland in Eastern Africa?

- Largest contiguous area of woodlands, scrub and savannas, largest terrestrial mammal biomass and potential for terrestrial carnivores, largest potential human population
- Oldest evidence of *Homo sapiens*
- Oldest MSA and LSA

Herto

Omo

- New modern human genetic evidence suggests that E.Africa has high genetic diversity, old lineages, largest effective population sizes, possible root of human tree (Tishkoff *et al.* 2003)
- New linguistic evidence suggests Khoisan languaegs derive from E. Africa (Ehret 2005)

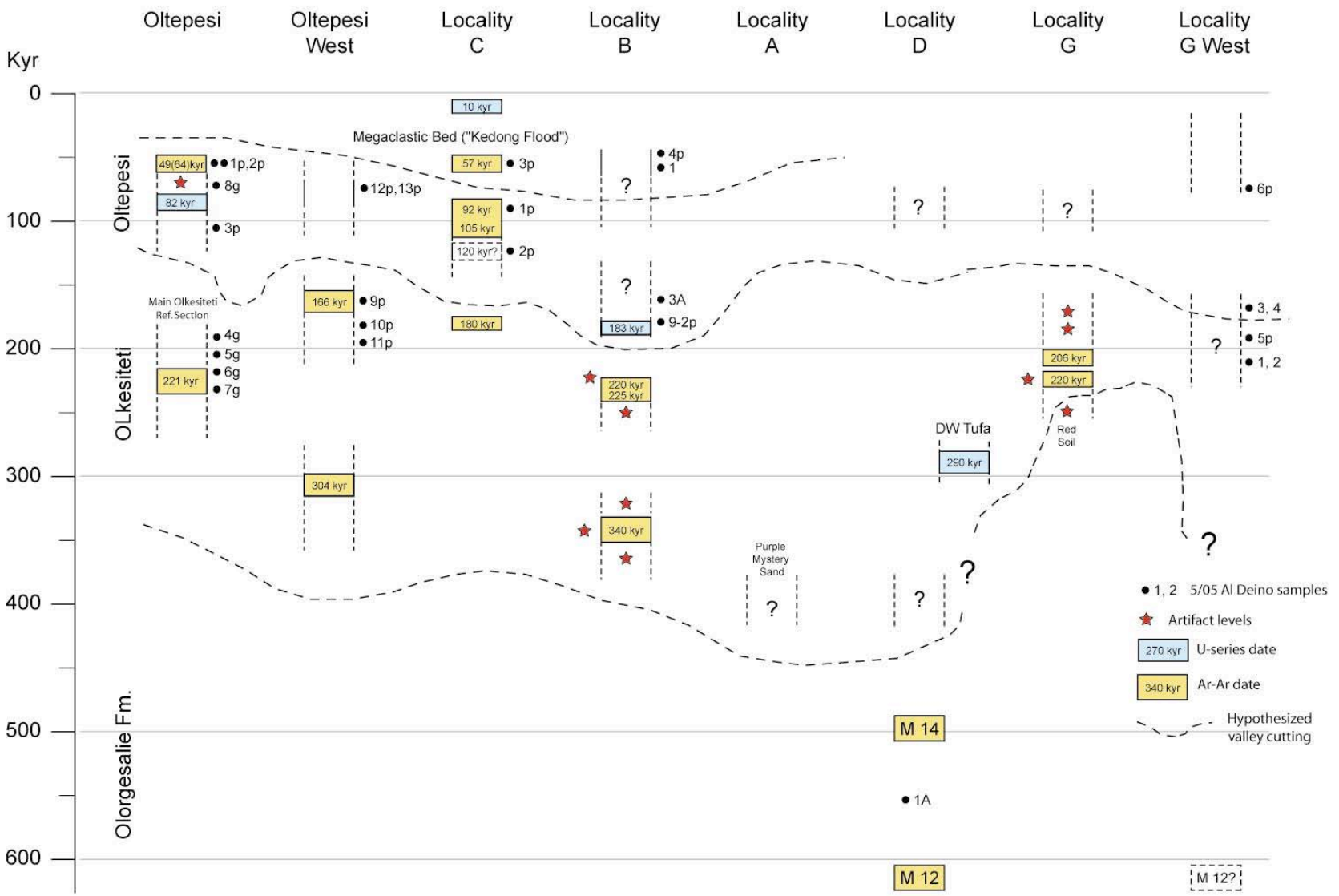
Earlier MSA (OIS 6-8+)

- Middle Awash, Ethiopia ~160+
- Omo, Ethiopia 195+
- Gademotta, Kukuleti, Ethiopia 235+
- Kapthurin, Kenya >280
- Malewa Gorge, Kenya 240
- Olorgesailie, Kenya 340, 220, <220
- Twin Rivers and Mumbwa, Zambia 230, 172

- (Also: Jebel Irhoud, Morocco, Florisbad, South Africa, Wonderwerk, South Africa and others)

Olorgesailie, Kenya: Preliminary Interpretation of Stratigraphic and Chronological Relationships - 500 ky to Holocene

Anna K. Behrensmeyer, Al Deino, Warren Sharp, Ken Ludwig, Rick Potts

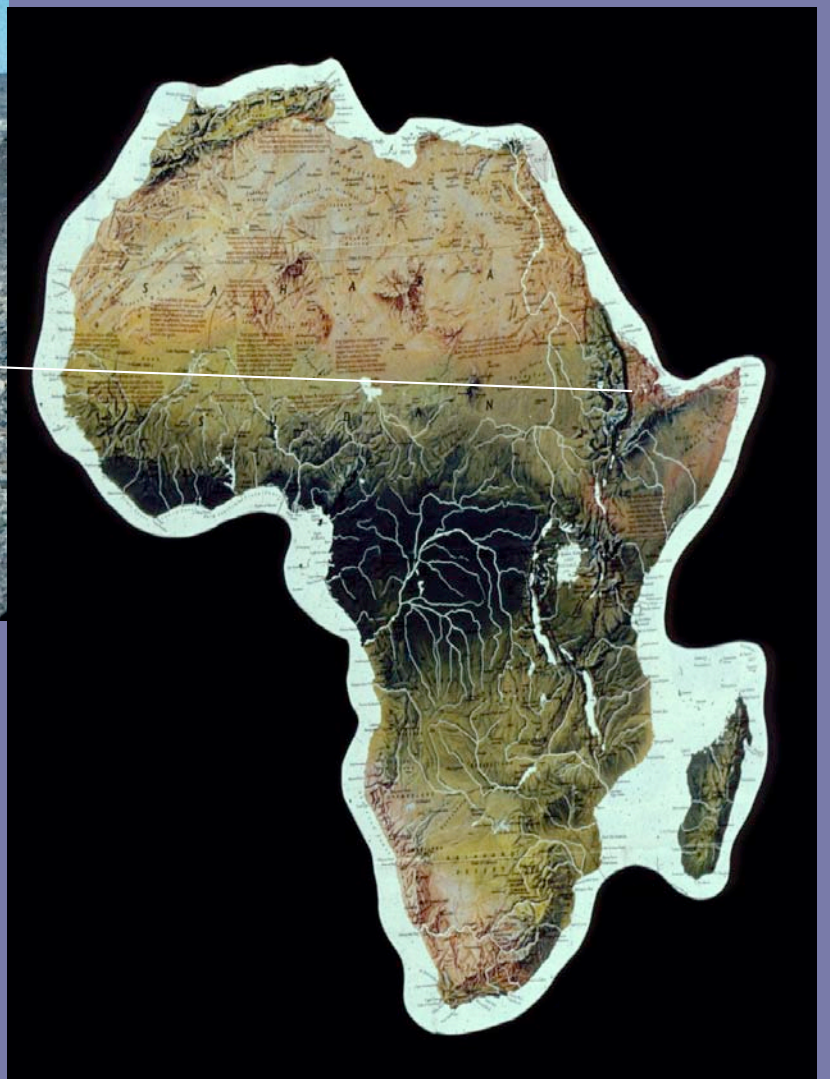


AKB 8/9/05

Area B: Ostrich Eggshell Site

340 kyr

Aduma, Middle Awash, Ethiopia



Excavation and Study 1993-2001

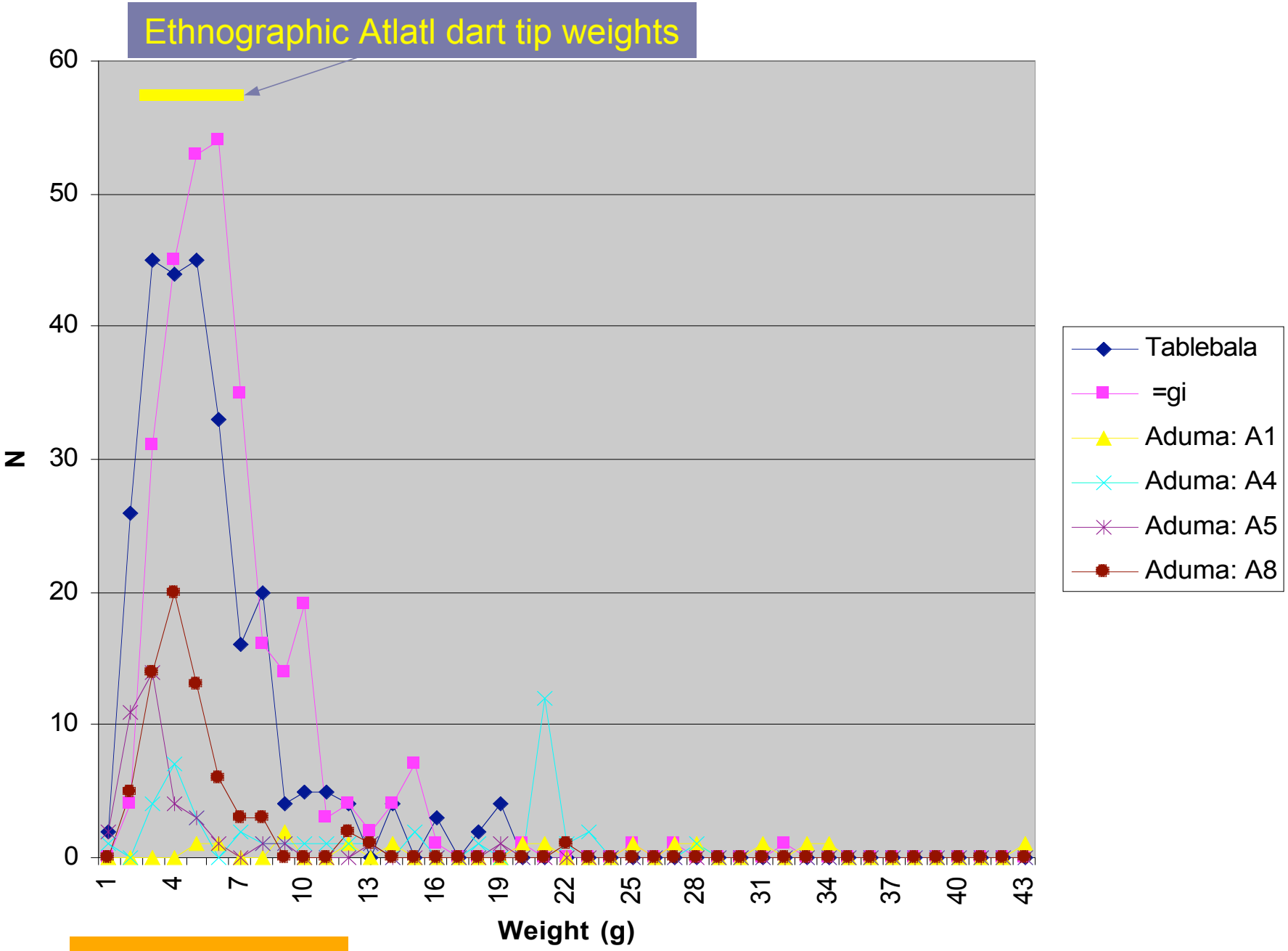
Cultural Innovation? ADUMA, ETHIOPIA

A-5 - <90 kyr (OIS 5a) small points -- ?arrowheads? Atlatl dart tips? Poison?

A-1 >100,000) big points, thrusting spears?

Olorgesailie OK industries 166->340 Kyr

- Sangoan picks and elongated narrow thick bifaces in horizons with Levallois technology
- Interstratified with small flake and scraper industries, small Levallois cores – MSA?
- Levallois blade cores, blades
- Up to 5% exotics (obsidian, chert)
- Dense occupation horizons
- Cf. to Middle Awash, Baringo, Naivasha-Narok
- Behavioral transition from Acheulean precedes appearance of AMH



Use of Poison?

MSA Point Weights

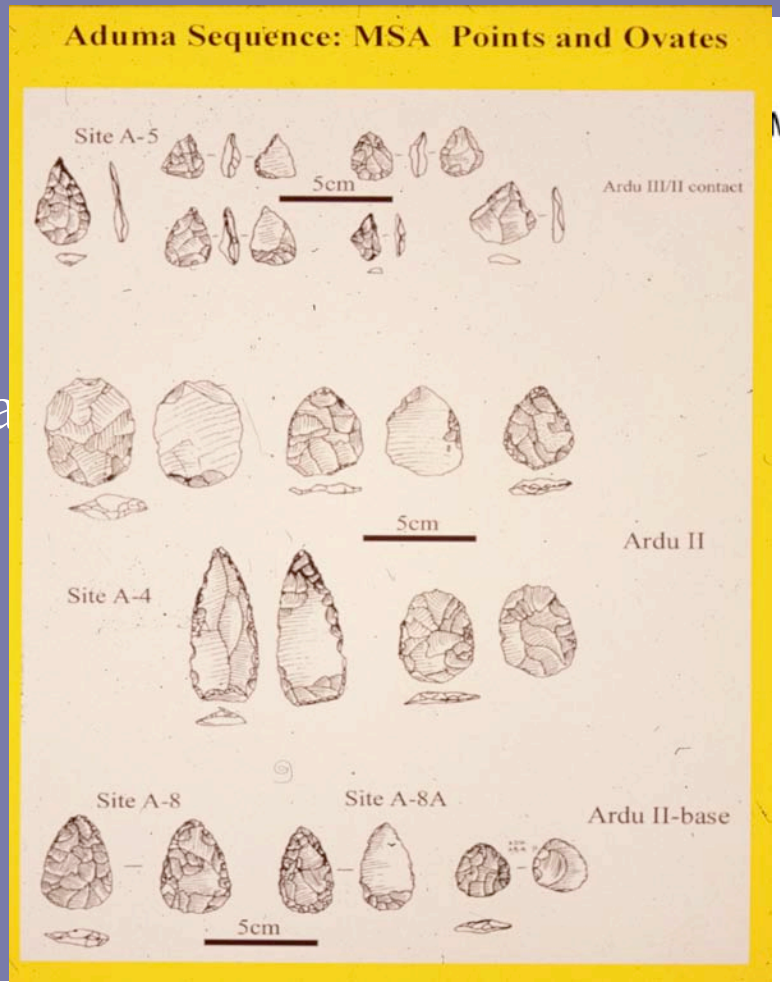
MSA Points OIS 5-4

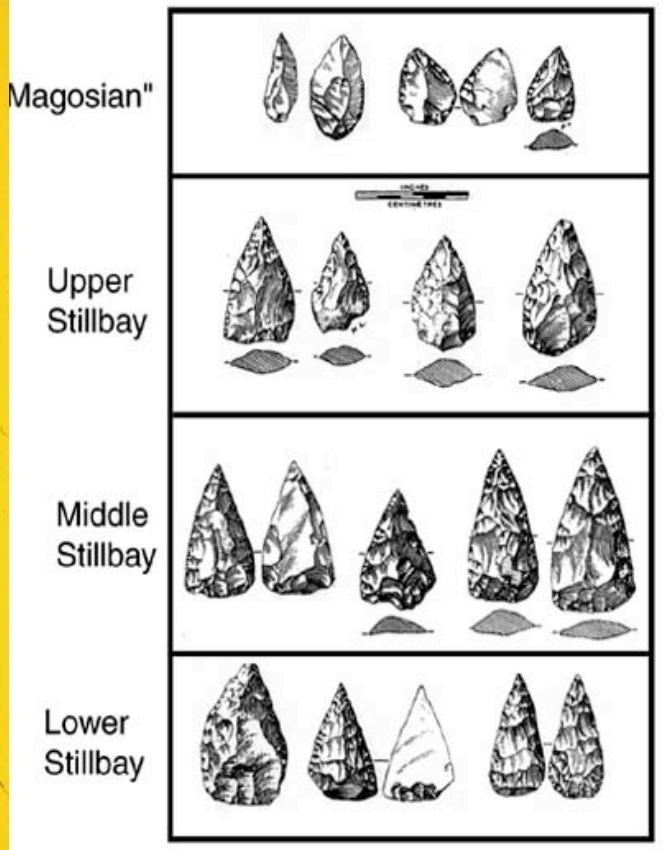
≠Gi Botswana 77 kyr

Tabelbala,Algeria

?60-130kyr?)

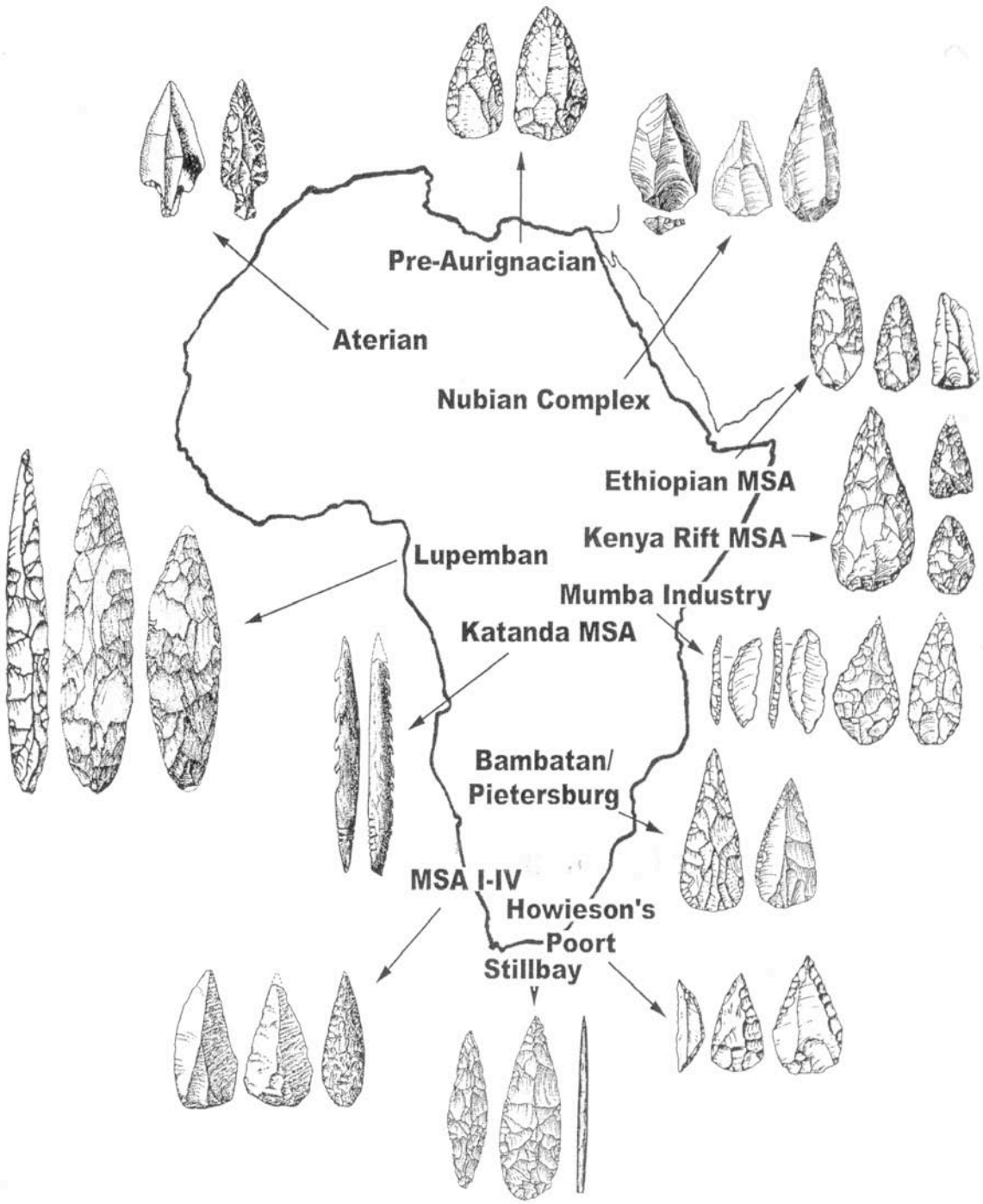
Ethiopia Middle Awash ~90kyr





All artifacts drawn by Mary Leakey.
From Leakey, 1943.

Ethiopia, Gorgora ?age?



Point Styles

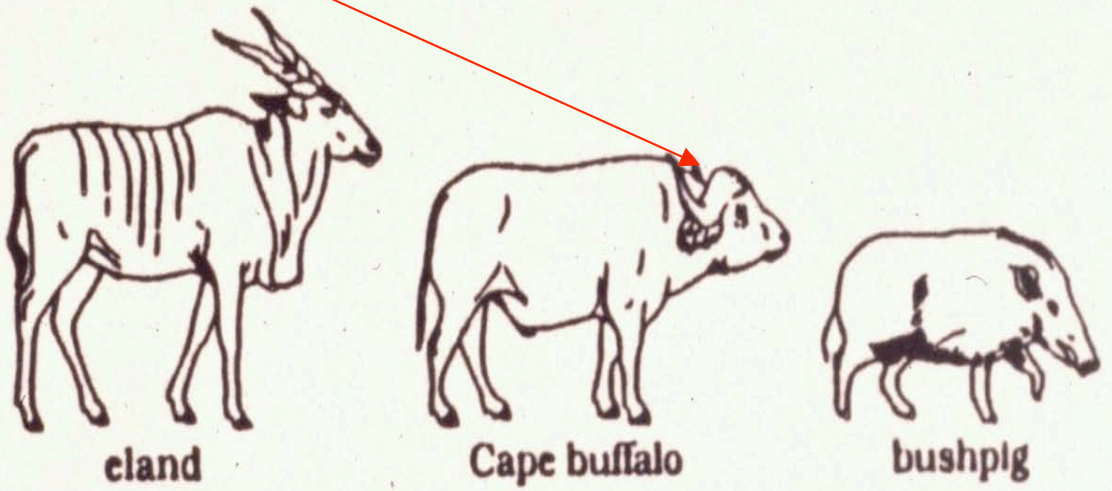
MSA 90-60 kyr

(Ethnicity?)
(Adaptive zones?)

Hunting: MSA vs. LSA

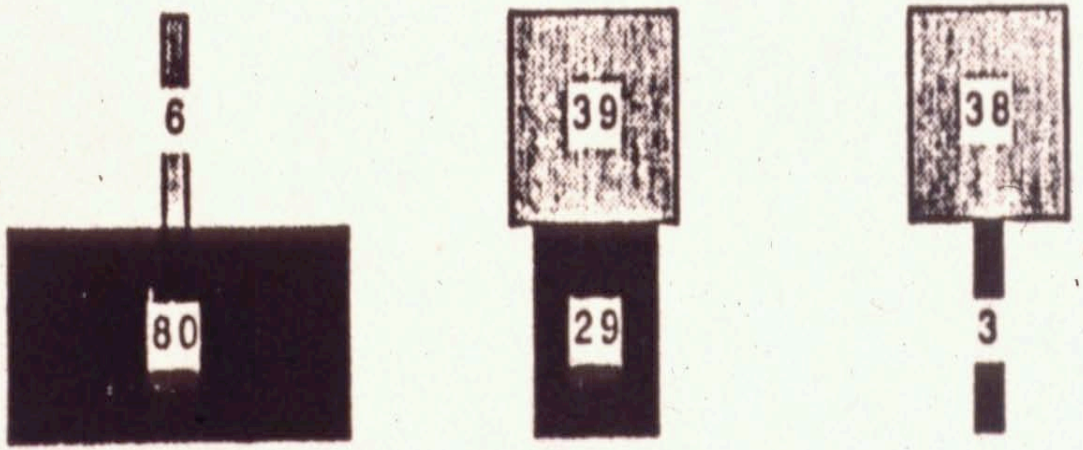
Were MSA hunters stupid or savvy?

Figure 17. Photograph of the right cranial aspect of a *Pelorovis* cervical vertebra with a stone artefact—almost certainly the tip of a stone point—embedded in the right cranioventral aspect. The cranial epiphysis of the centrum is at the upper right. It is possible that the force of the blow fractured the cortex, resulting in subsequent erosion of the bone lateral to the point.

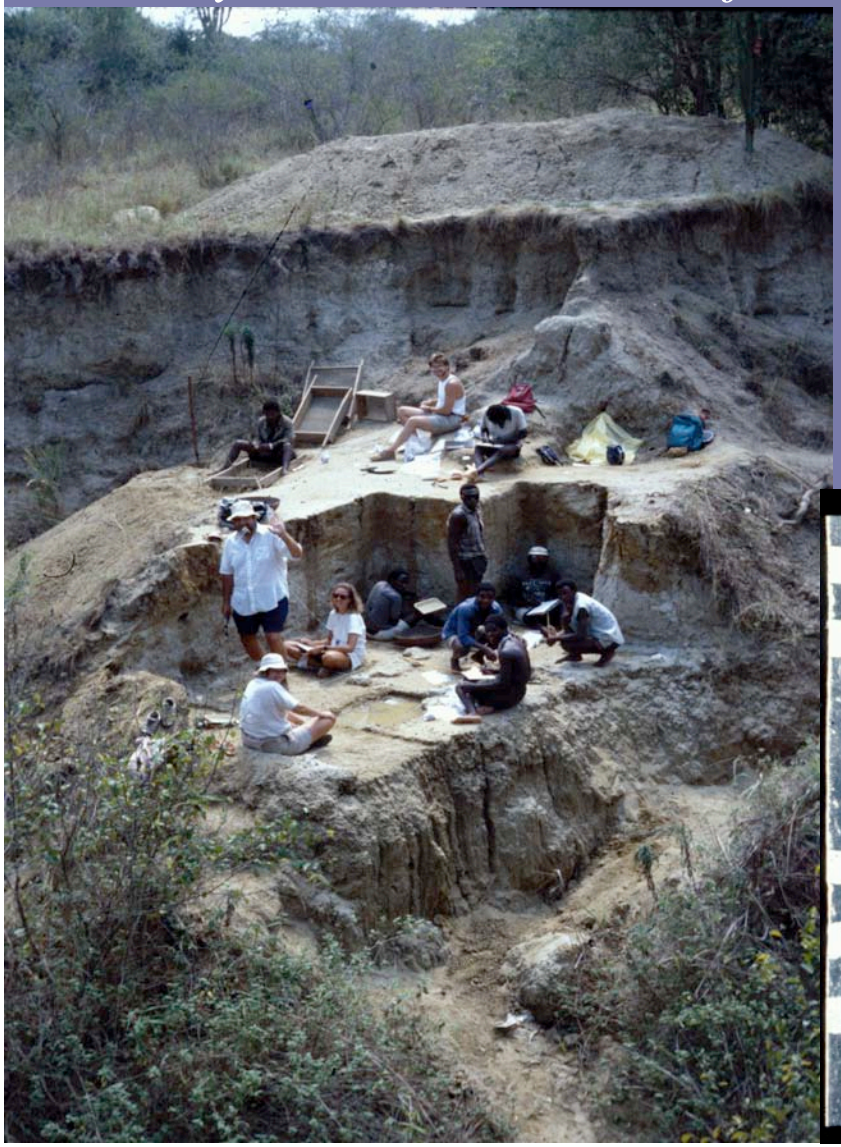


Nelson Bay Cave LSA (Present Interglacial Deposits)

Klasies River Mouth Cave 1 MSA (Last Interglacial Deposits)



Katanda 2, 9, 16 (D.R. Congo):
fishing for giant catfish
(*Clarias sp.*)
70-82 kyr Economic Intensification



Mumba Shelter, Tanzania

MSA ca. 130-45 kyr

Social Networks + Risk Reduction – Long distance transport ca.300 km

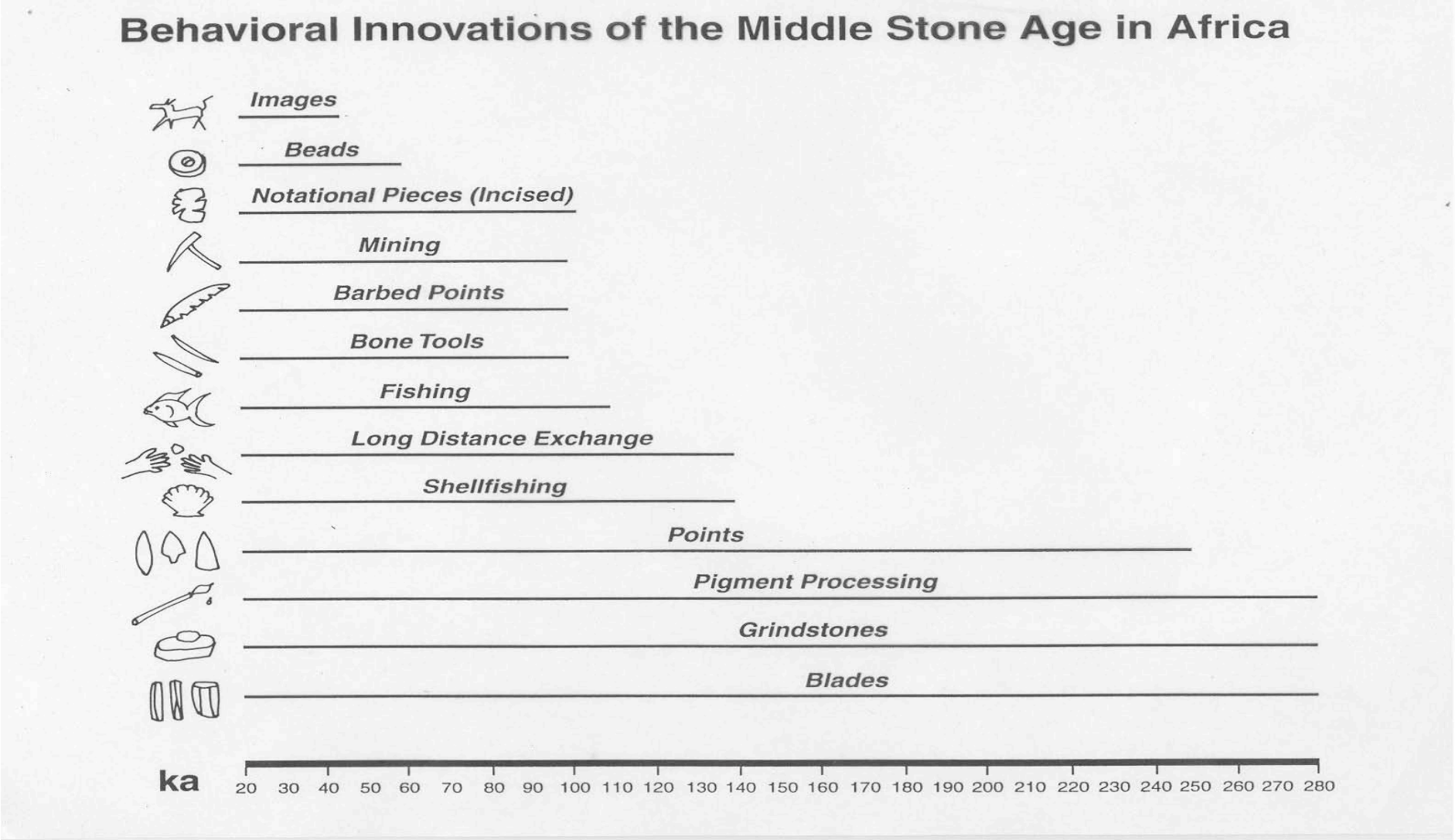
Symbolic behavior, social intensification (ca. 76 kyr)

Clothing ?

Perforators from ADUMA <90 KYR

String wear in holes

Blombos 76kyr



Increasing innovation rates, no abrupt change

Change through time in MSA

- Early MSA (before 130 kyr) different from later MSA
- Later MSA – target blank of flake or blade production is small in many industries

  Development of projectile technology

  Intensified subsistence practices. fish, shellfish

  More cave, long-term occupations

  more diverse raw materials, long distance exchange

  Greater use of ocher and symbolic artifacts (incised pieces, beads)

Are increasing innovations a response to climate/population stress after 90 kyr?

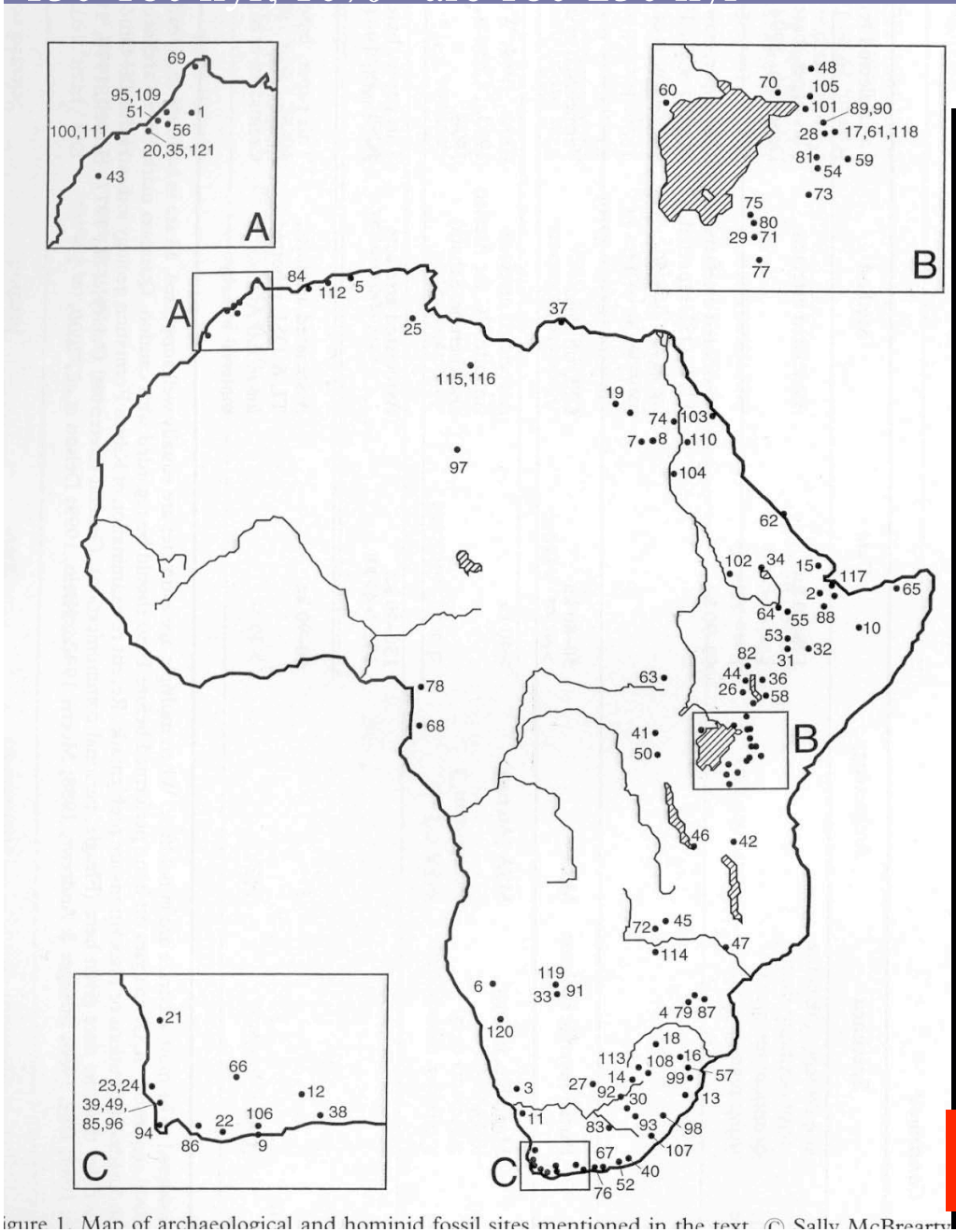
Use of term “Middle Stone Age” obscures behavioral variability through time and complexity in space

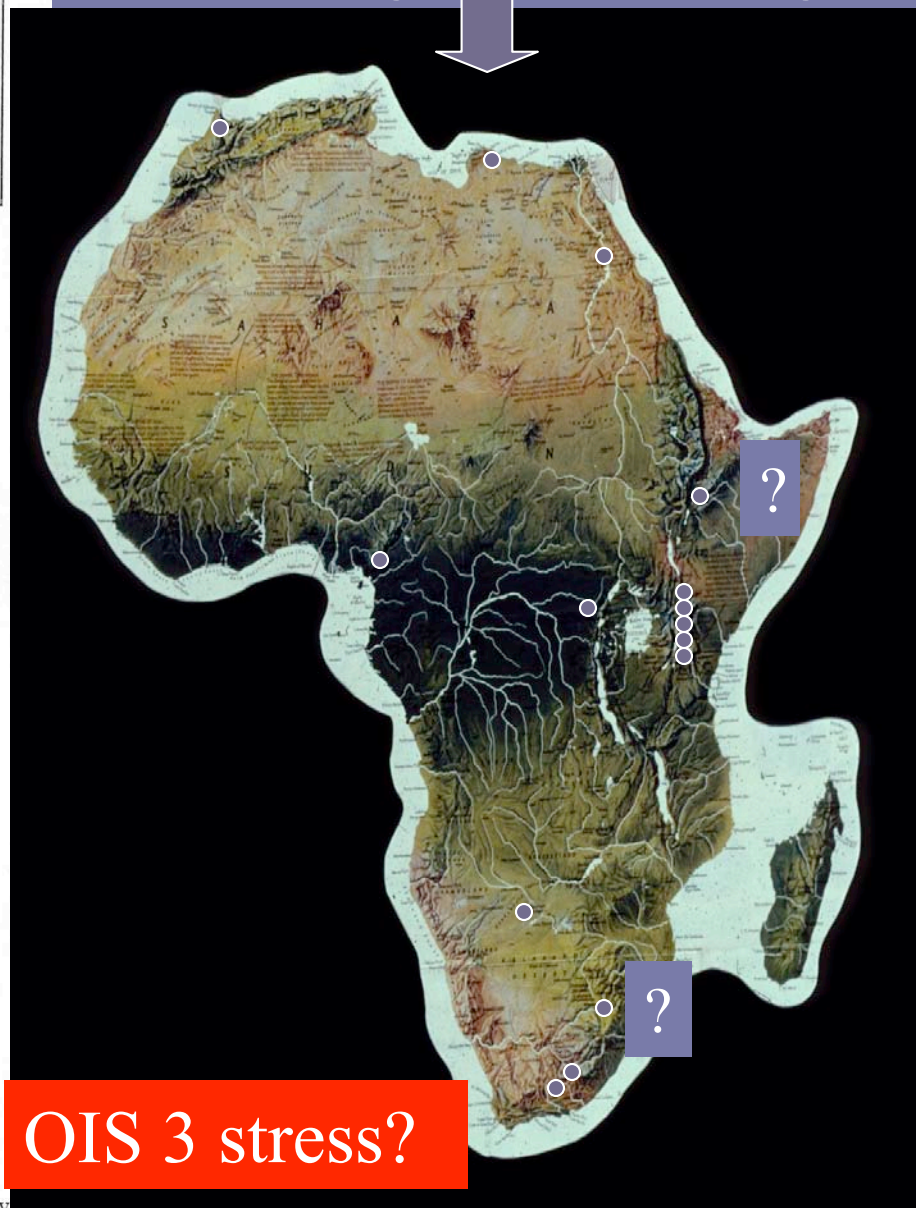
Ca 70% of sites are 60-130 kyr, 3% are 130-180 kyr, 10%+ are 180-230 kyr

BUT

Few African sites dated to 60-40 kyr

Most are in highlands, forest margins





OIS 3 stress?

igure 1. Map of archaeological and hominid fossil sites mentioned in the text. © Sally McBrearty

More MSA sites during warmer wetter climate phases -- BUT

- But also ca 30% of sample in OIS 4 (Howiesons Poort, Stilllbay, Mumba, etc)
- Increasing visibility of populations due to aggregation around scarce water resources until no such sources remain?
- Increasing social and economic intensification due to resource stress?
- Why is OIS 3 more site-rich in Europe than in Africa? (?sampling?)
- Need better dates, and both site-specific and regional climate data

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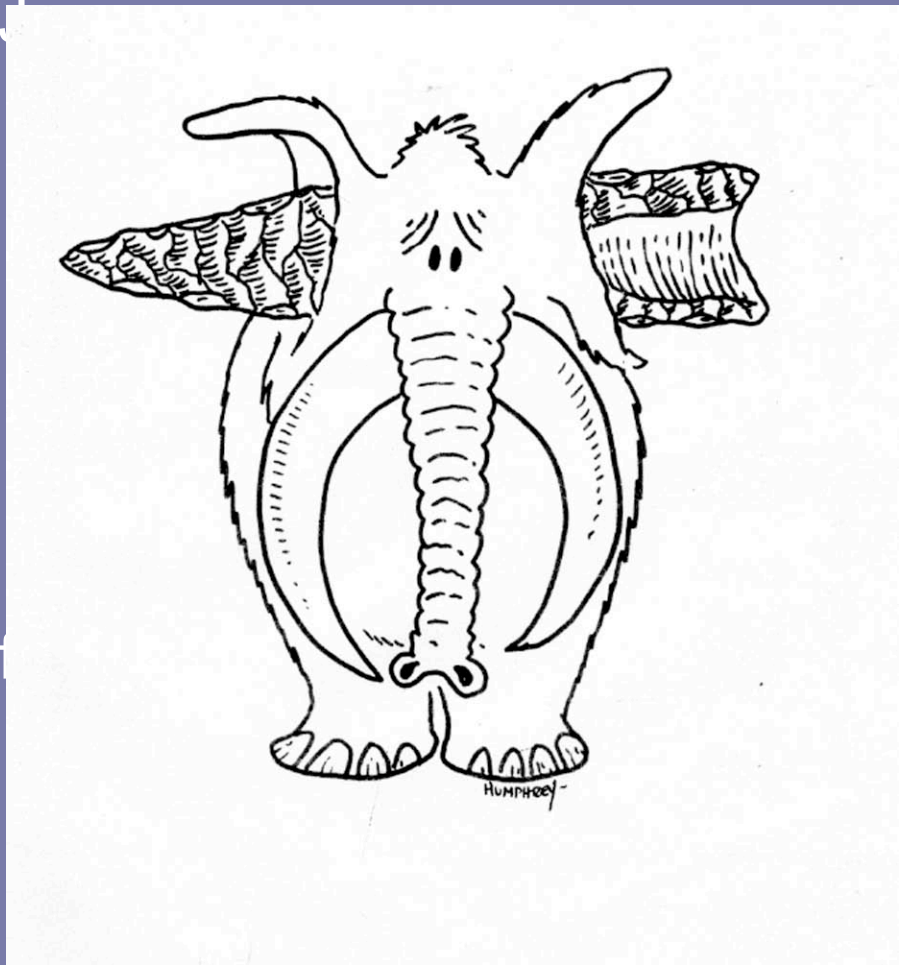
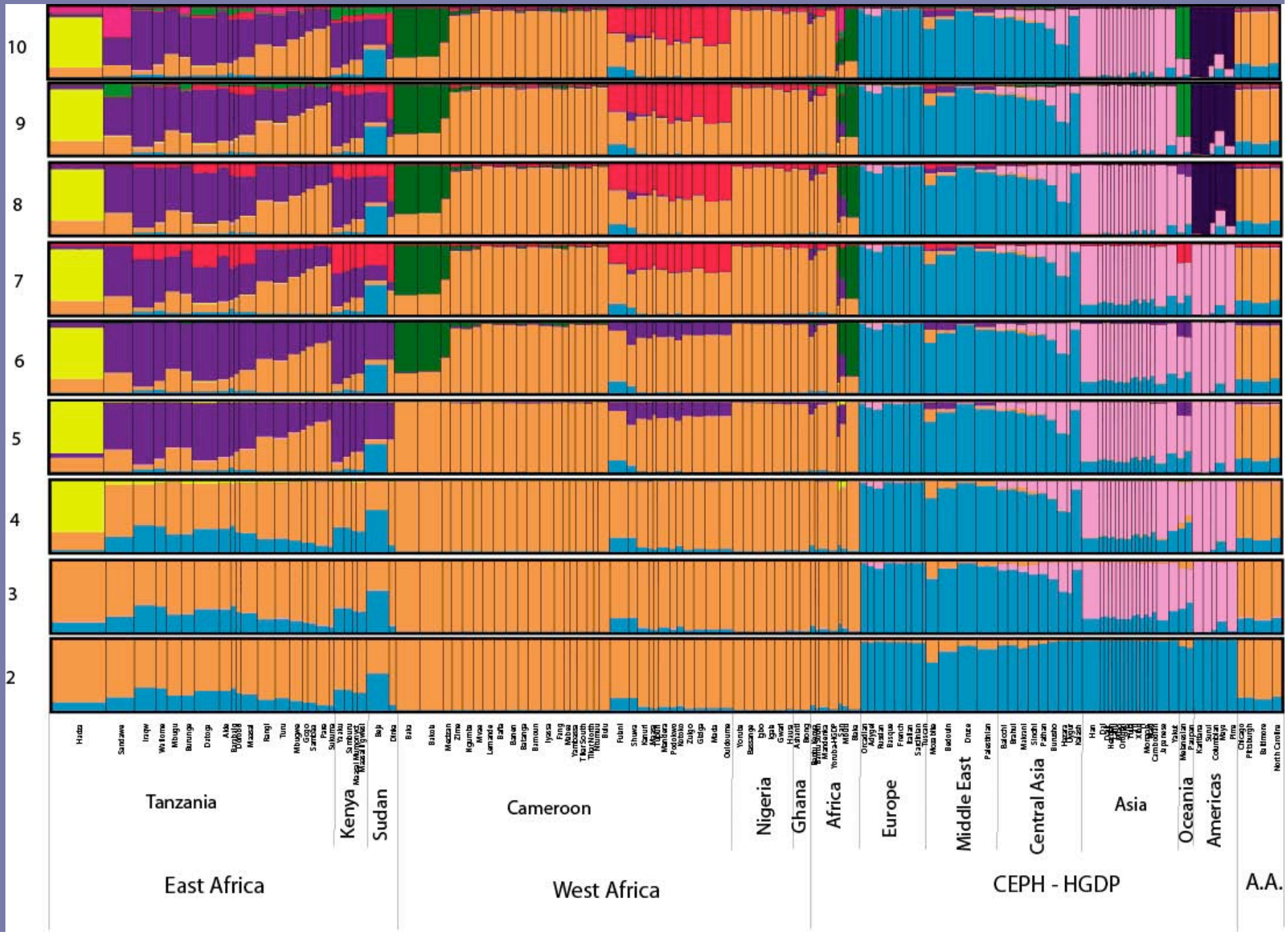


Global Genetic Substructure

Slide courtesy S. Tishkoff



African Genetic Substructure

Slide courtesy S. Tishkoff