

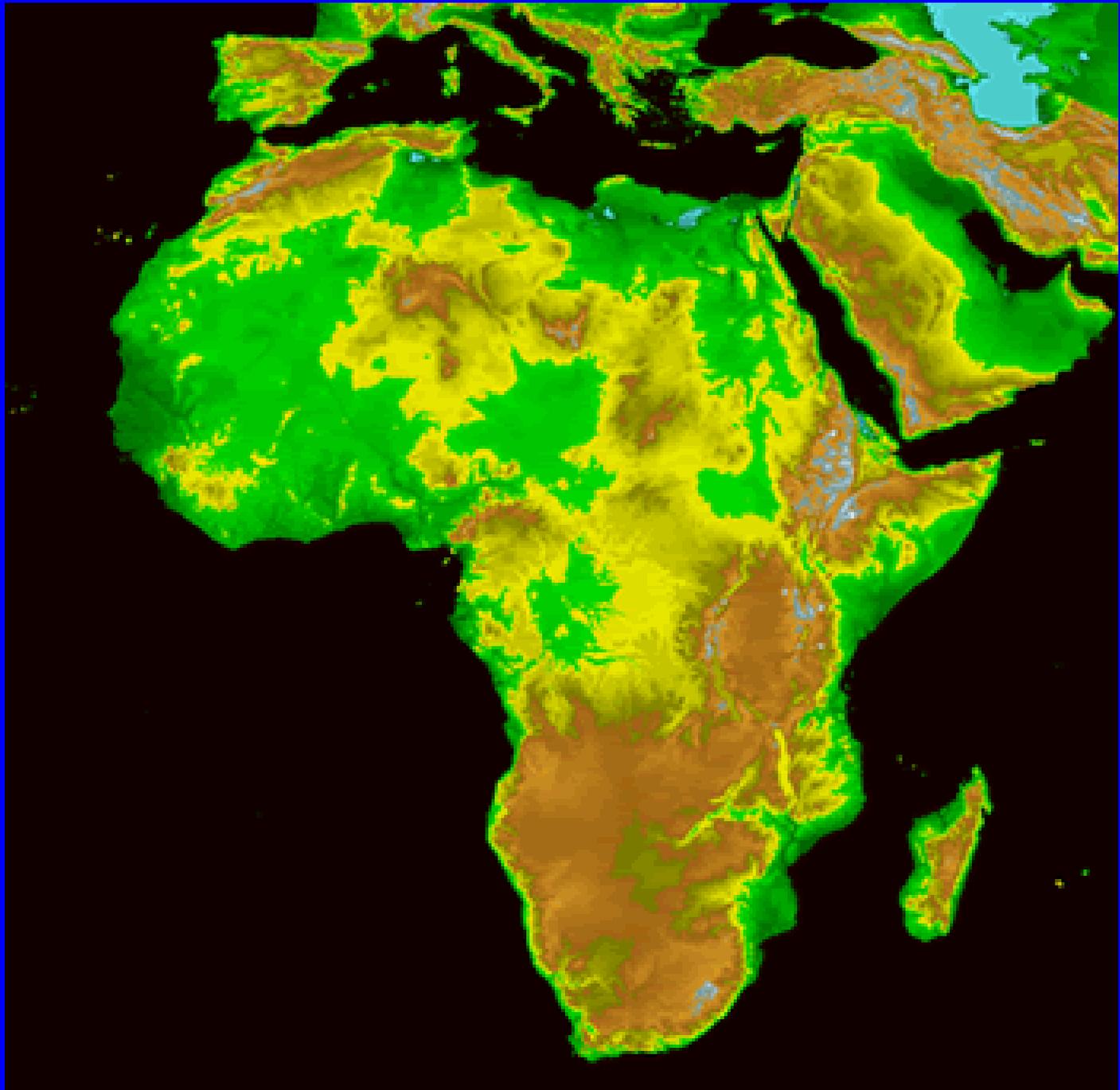
'Stone islands in a sand sea:  
recent work on the Messak Plateau and Erg Awbari in Fazzan, southern  
Libya'



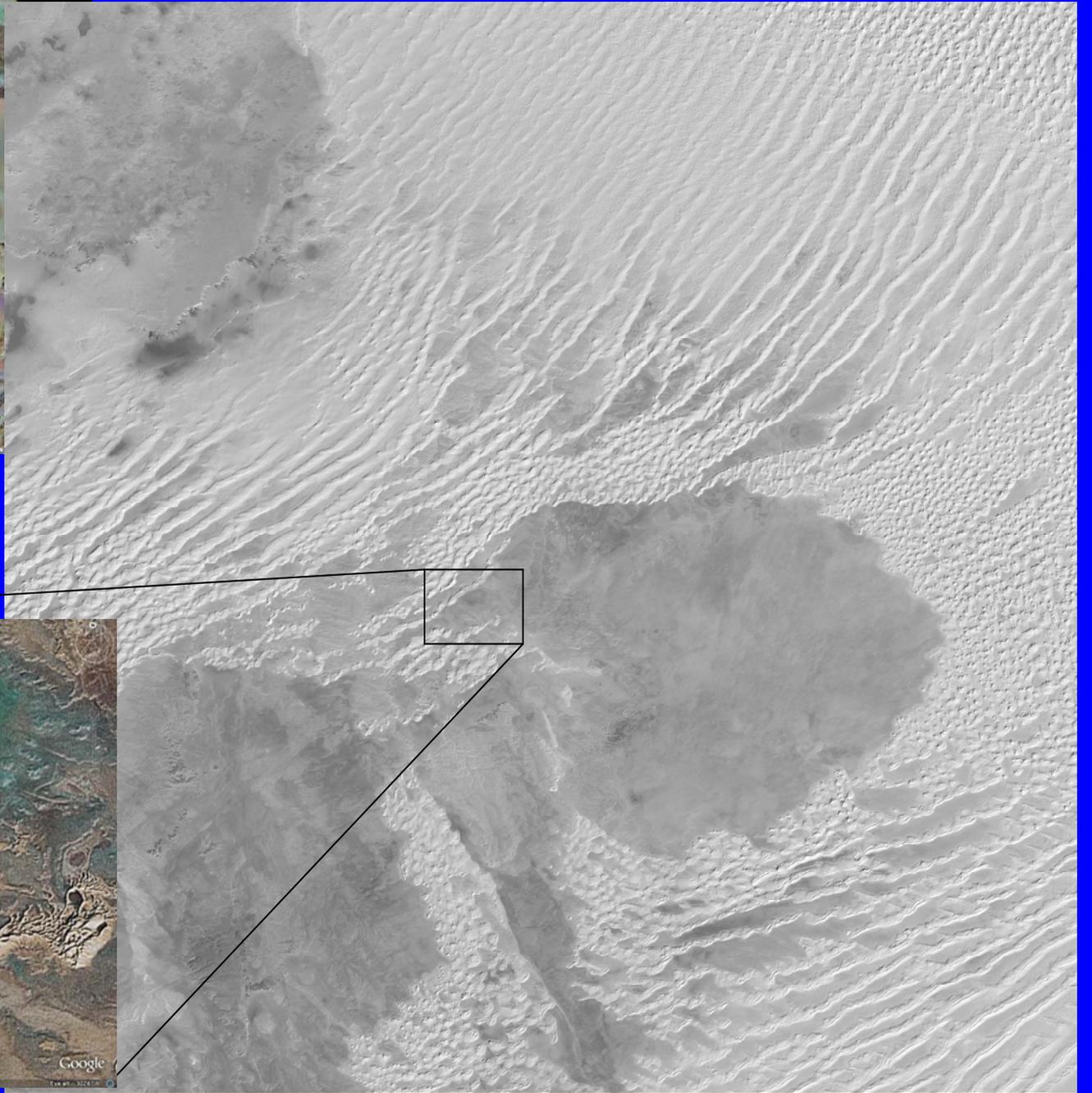
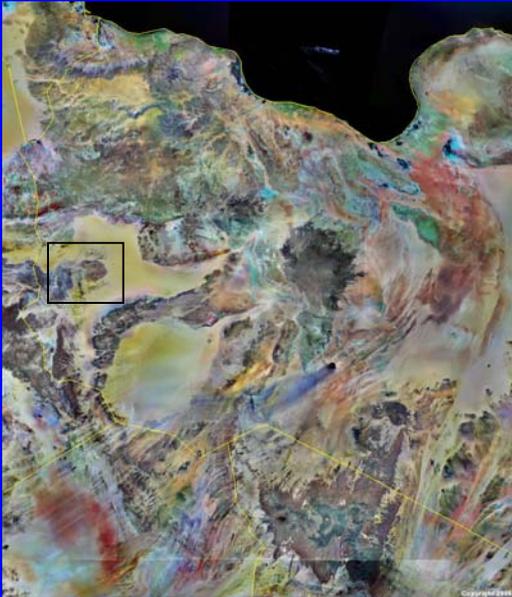
Marta Mirazon Lahr

Leverhulme Centre for Human Evolutionary Studies

Stony Brook, USA, University of Cambridge Seminar at the Department of  
September 2009 Anthropology, Stony Brook  
University



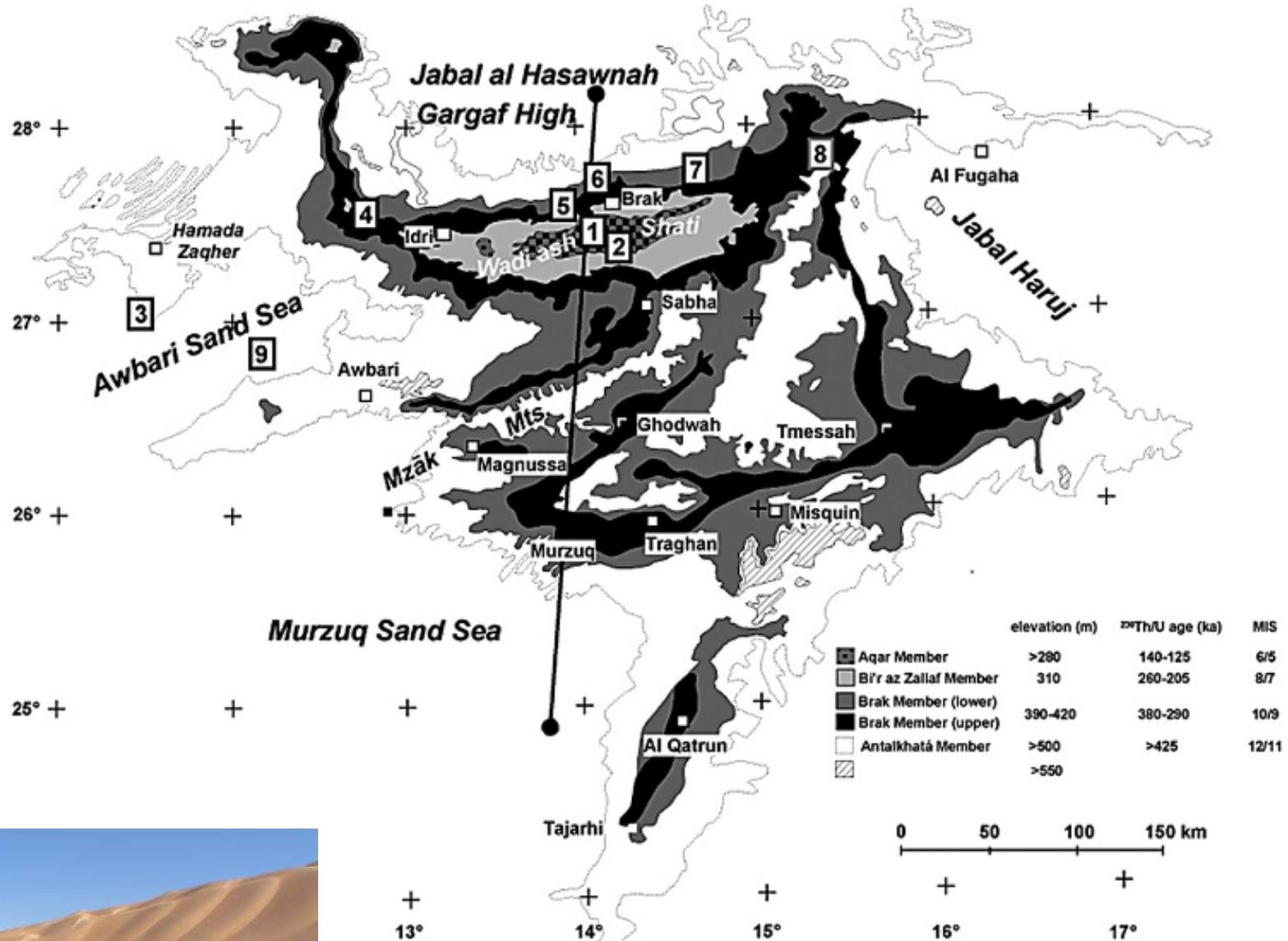










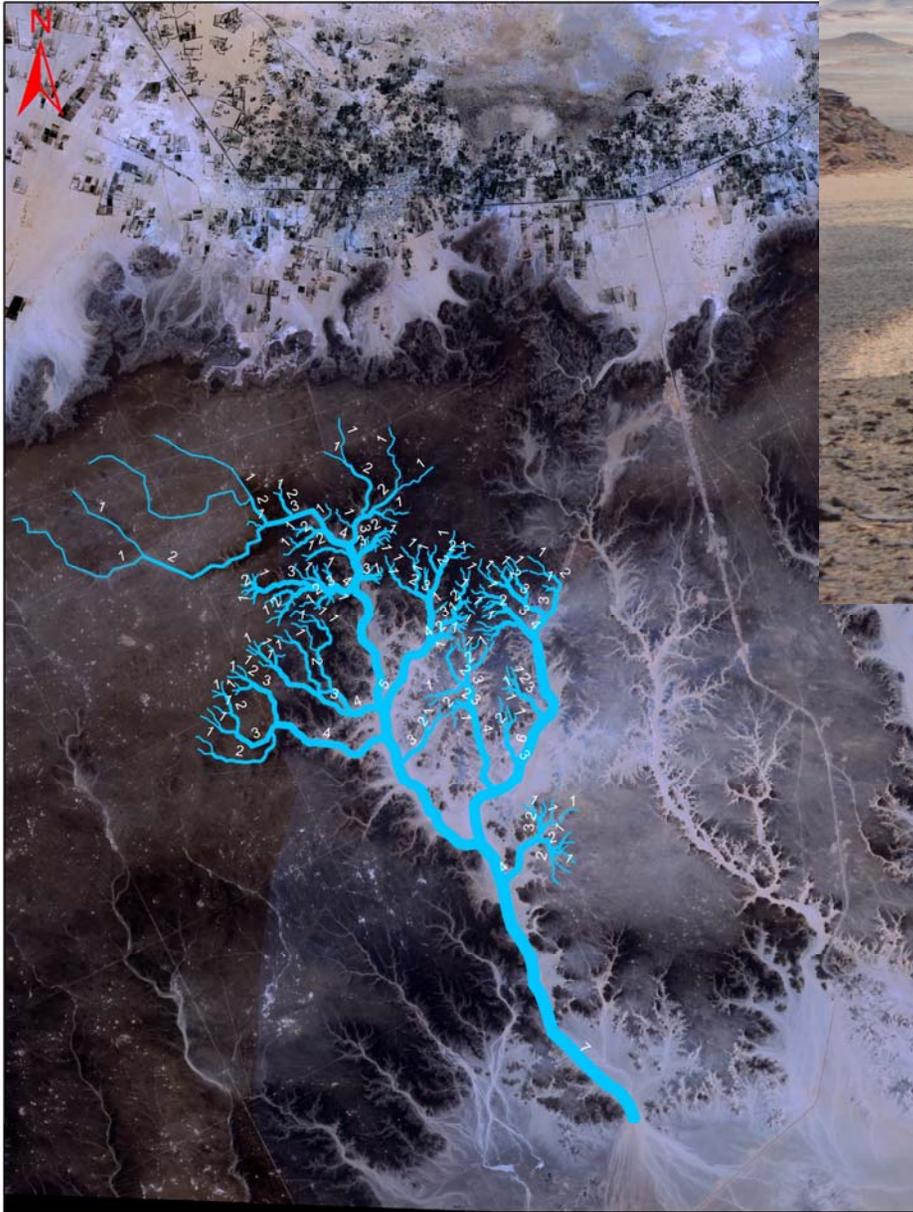


Geyh & Thiedig 2008 *Pal, Pal, Pal*

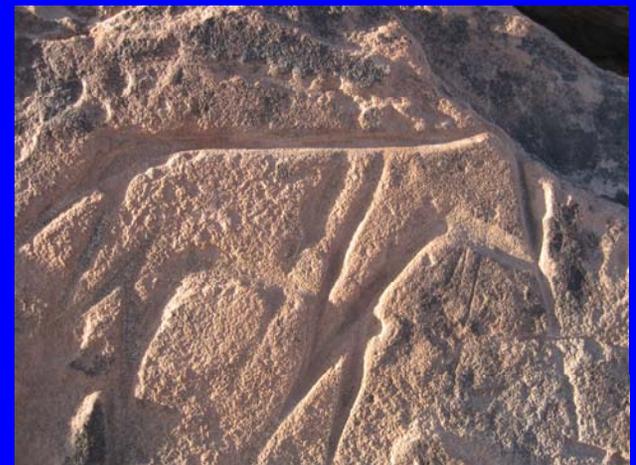




Mesaak Settafet  
(M'zak Settafet)

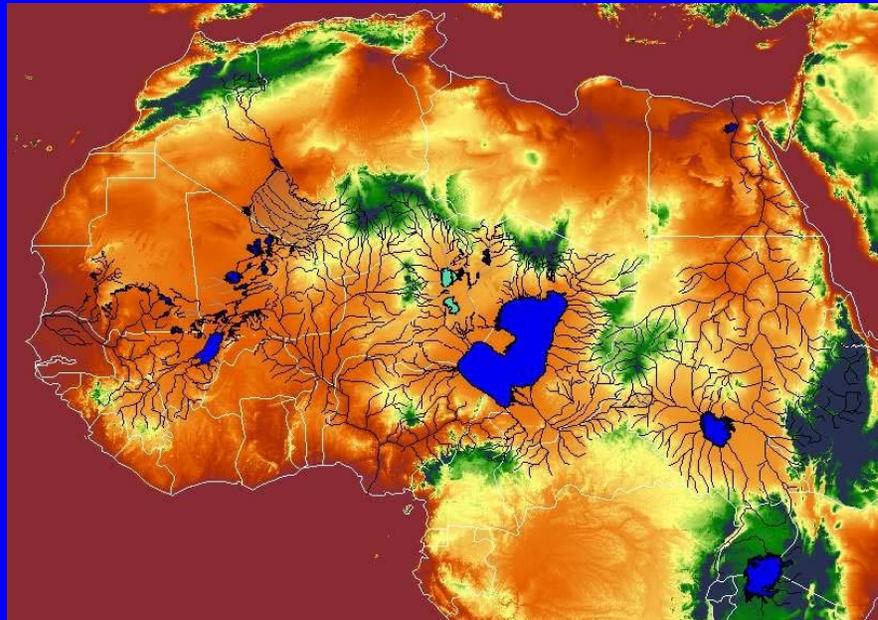
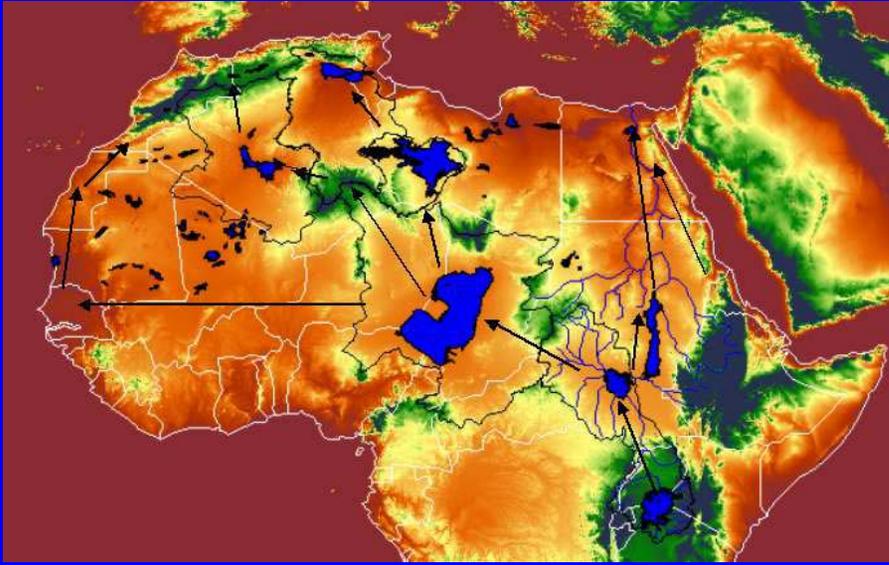


2,700 1,350 0 2,700 Meters

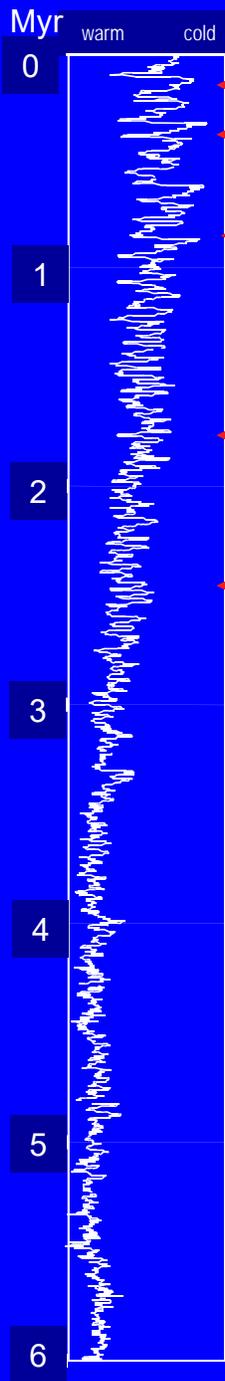








Drake et al 2006



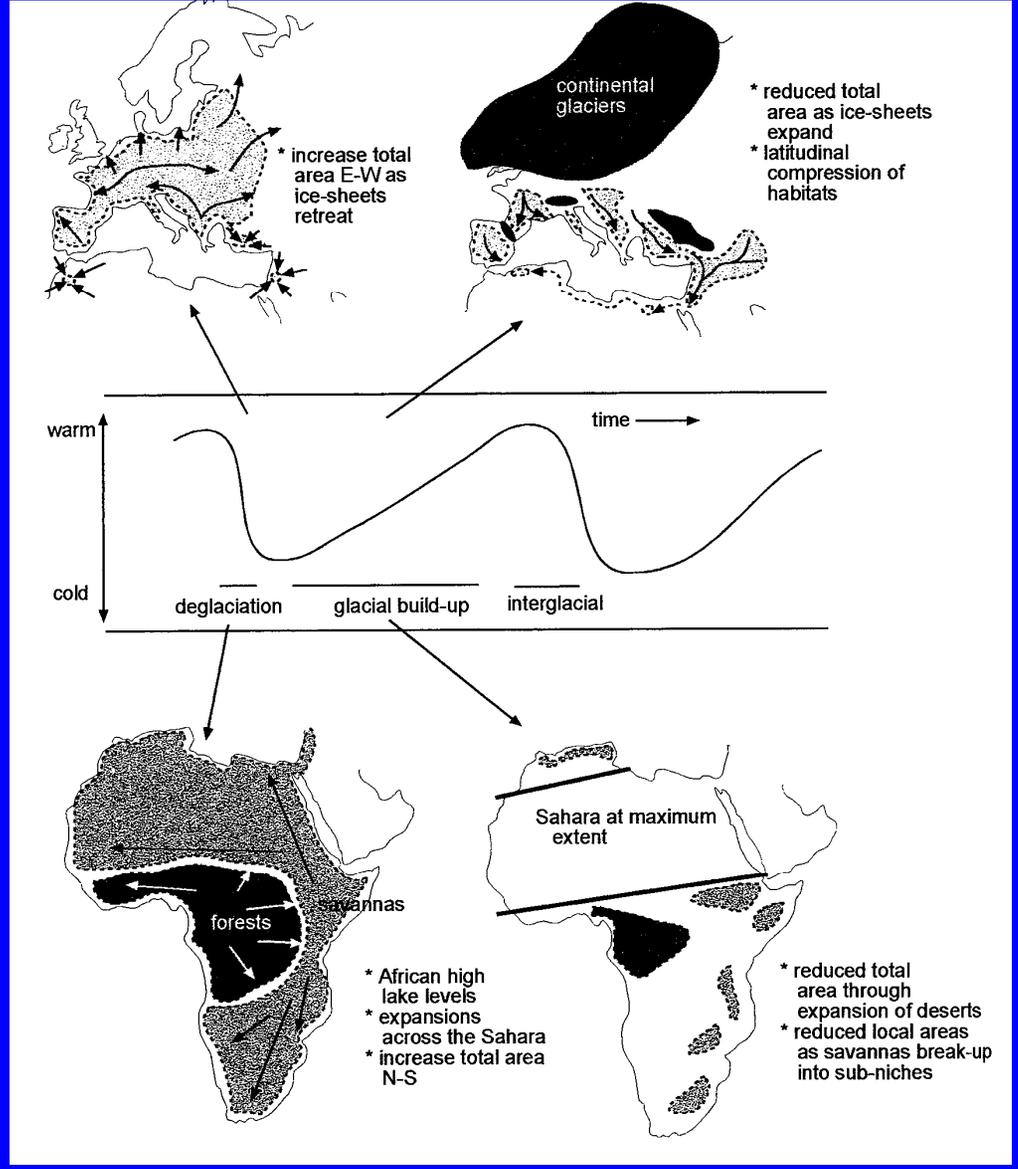
DISPERSAL

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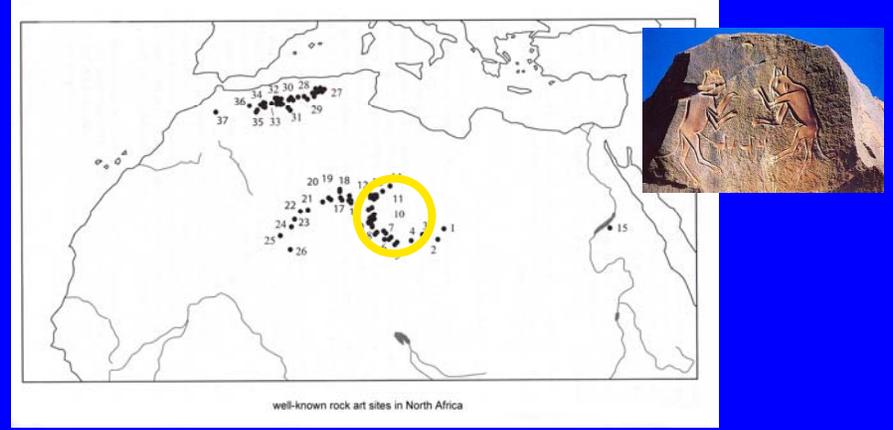
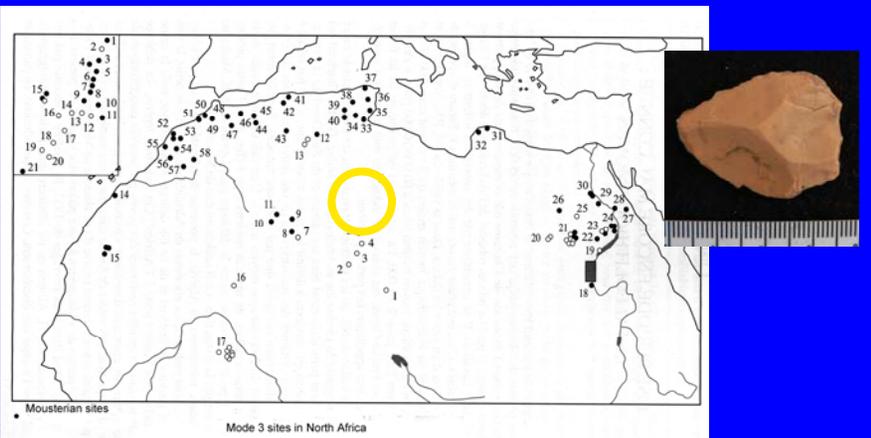
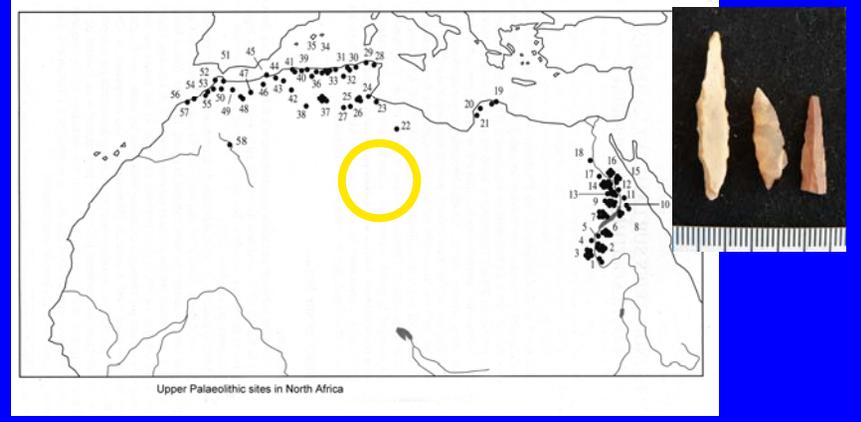
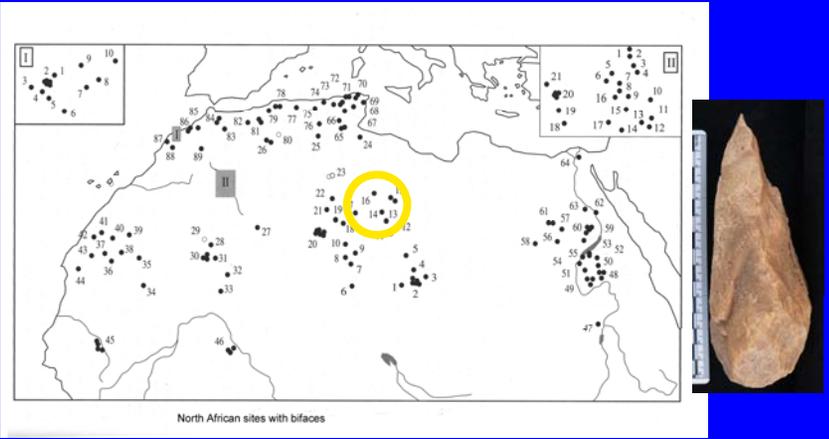
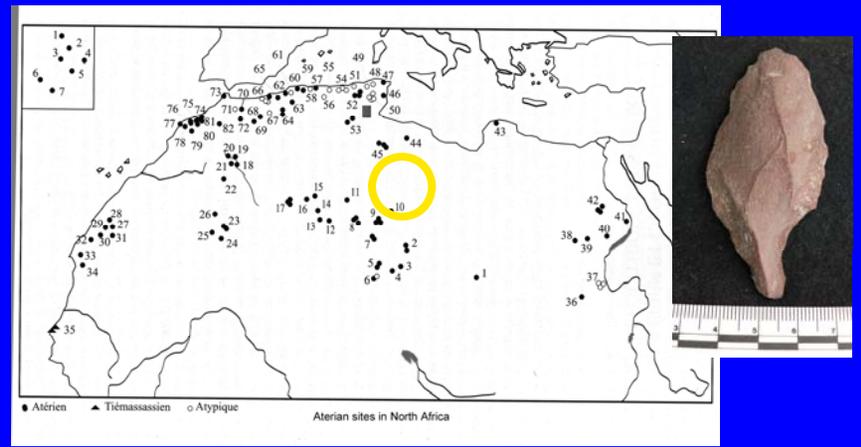
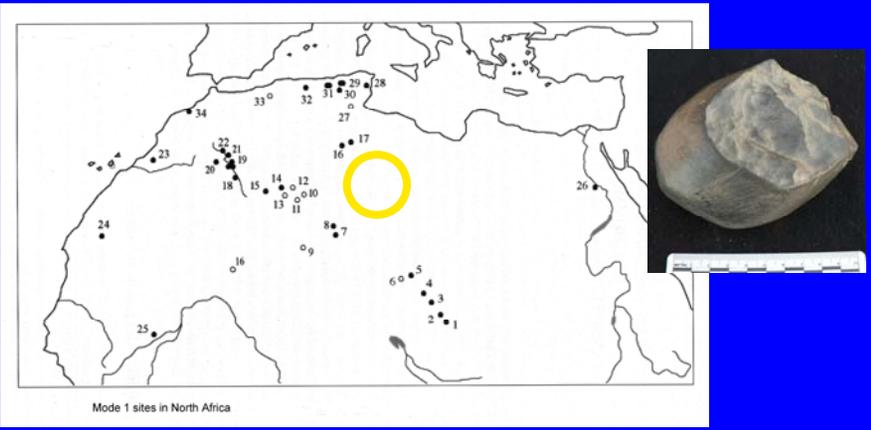
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Onset of global glaciation; evolution of East African grasslands

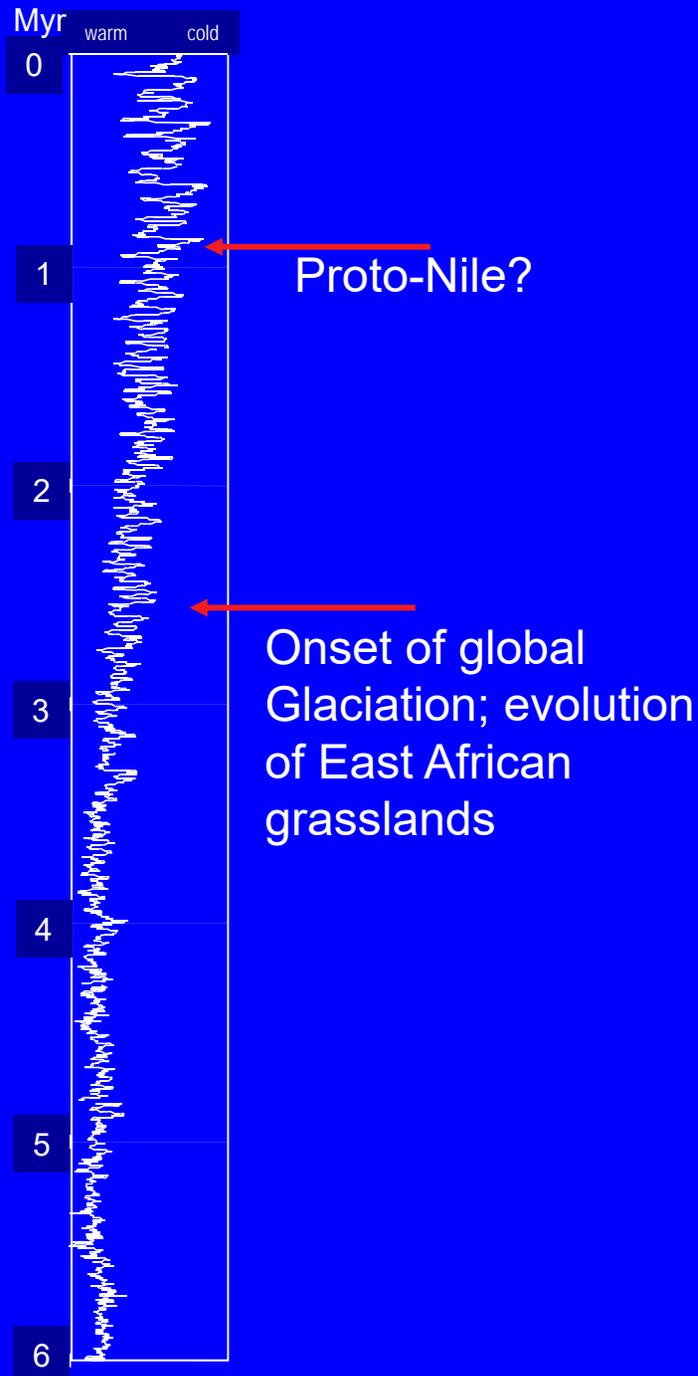
# The scale of climatic change in the last 2 Myr



The place of the Central Sahara in  
the prehistory of North Africa and  
hominin dispersals out of sub-  
Saharan Africa



## The first hominin dispersals to North Africa

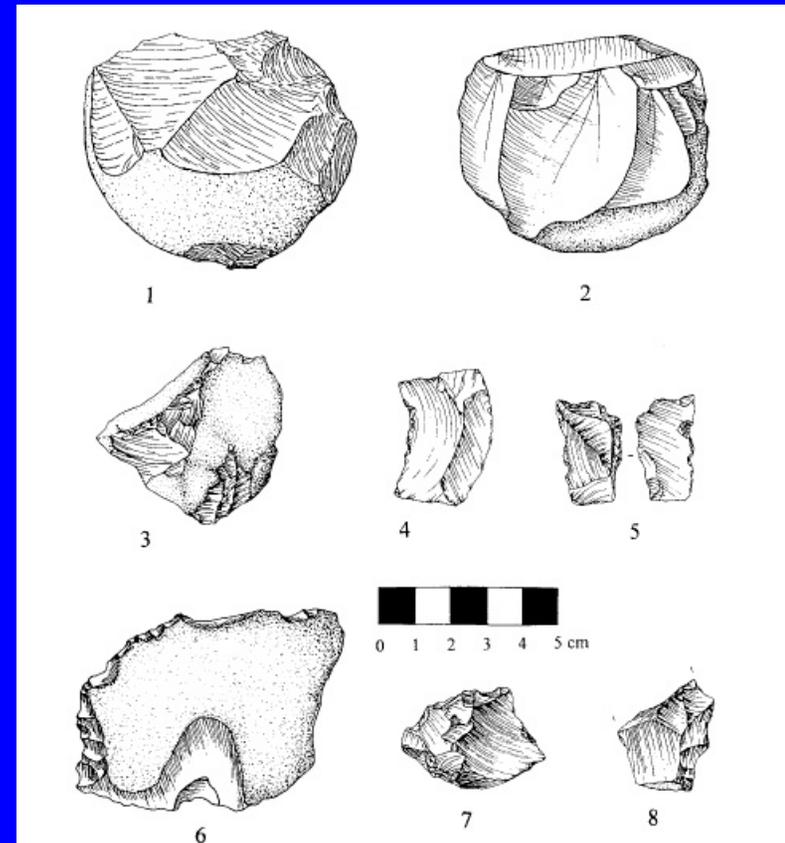


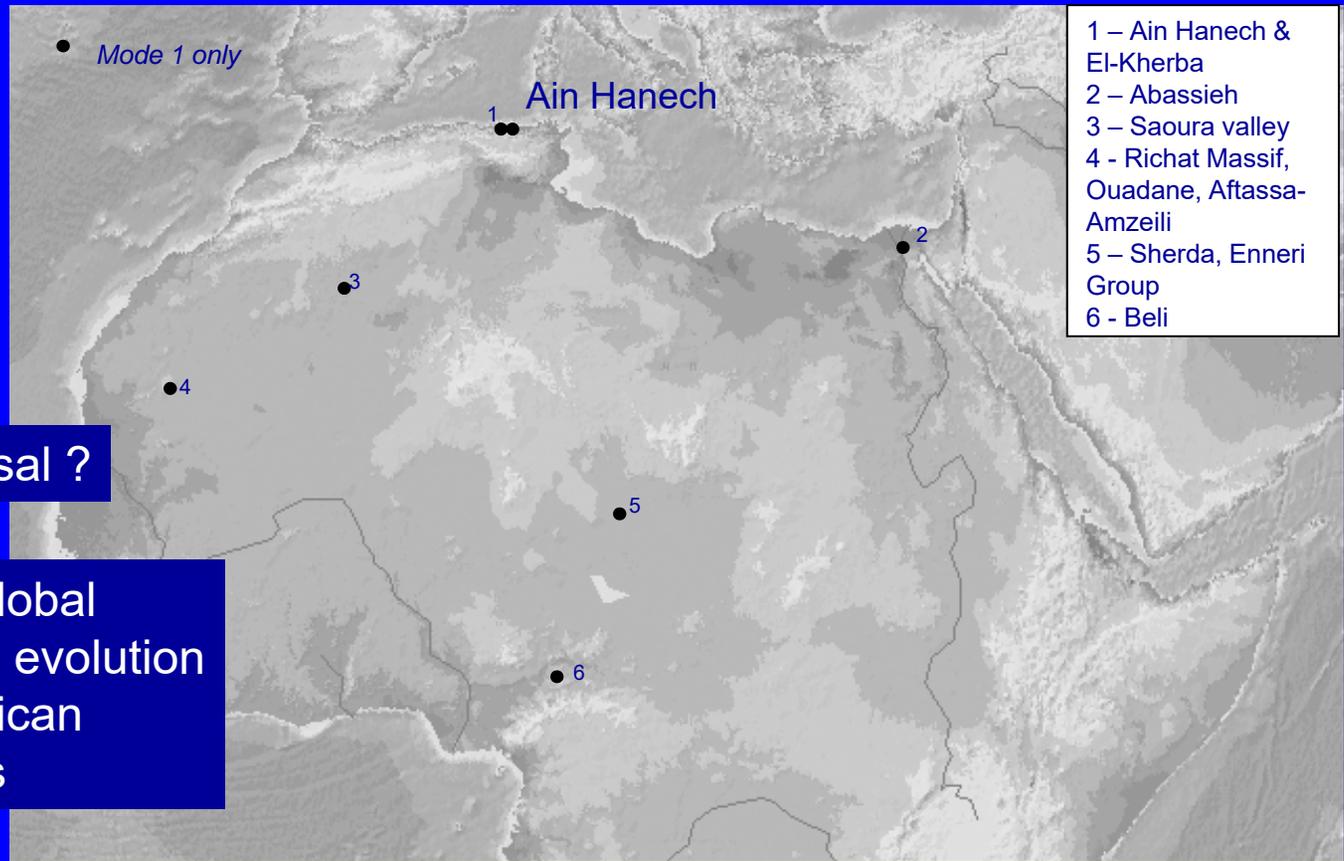
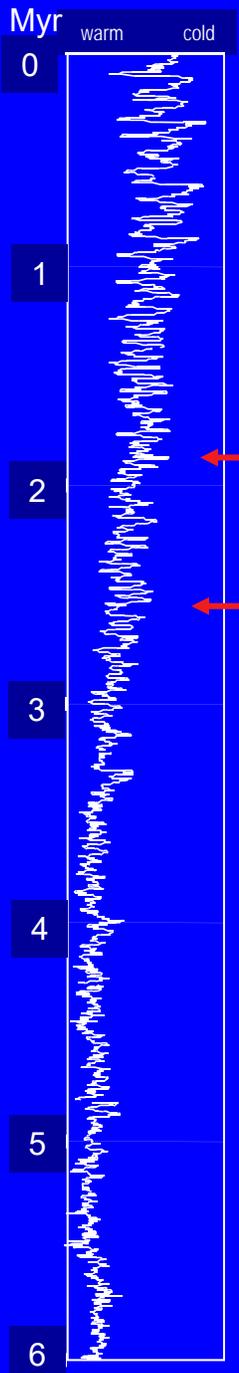
### *Late Pliocene - 2.5 Myr :*

- (1) establishment of the Saharo-Arabian desert belt ~ 2.5 Myr (DUST)
- (2) Significant African faunal turnover
- (3) Aïn Boucherit (~2.3 Myr) and Ahl al Oughlam (~2.4 Myr): rich palaeontological sites in the Maghreb – NO archaeology
- (4) Palaeo-Nile (late Pliocene): sources within Egypt (the mini Nile!)
- (5) Significant African faunal turnover ~1.8 Myr.

## Aïn Hanech and El-Kherba, near Sétif in northern Algeria

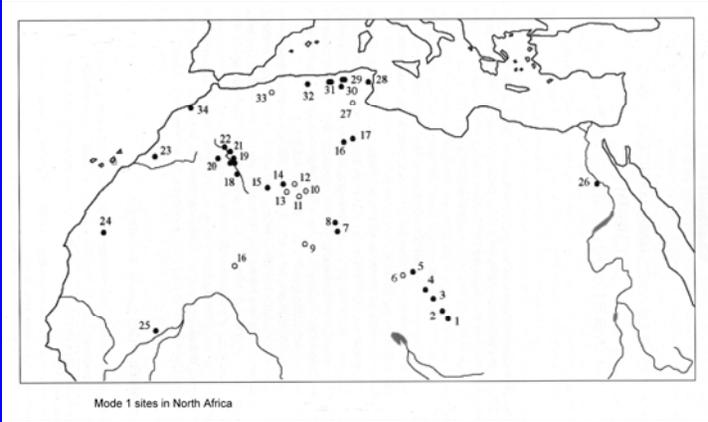
- discovered by Camille Arambourg in 1947, and the assemblage described as showing affinities to Olduvai Bed I/lower Bed II
- excavated more recently by Sahnouni and colleagues
- normal palaeomagnetism
- fauna includes *Mammuthus meridionalis*, *Equus tabeti*, *Sivatherium maurusium*, *Kolpochoerus phacochoeroides*, and lacks *Anancus* [present at Aïn Boucherit]
- proposed date for the site within the Olduvai subchron (1.95-1.78 Myr).
- This dating is strongly disputed by Raynal, Geraads and colleagues, who believe the site to be closer to 1.2 Myr.
- Whether the earlier or later Lower Pleistocene date of Aïn Hanech is confirmed, the site still represents the oldest stratigraphically contextualised hominin occupation of North Africa.





1<sup>st</sup> Dispersal ?

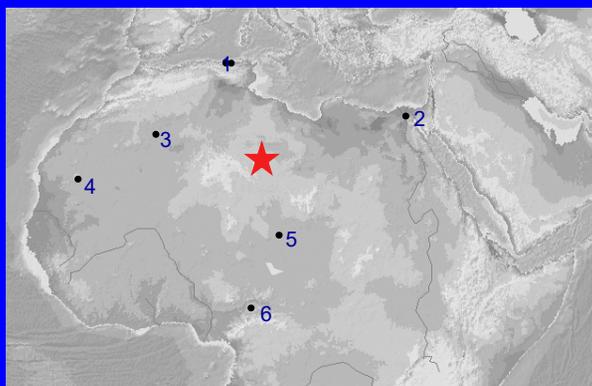
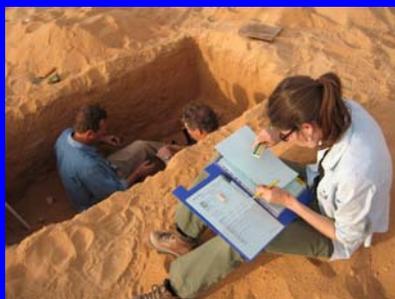
Onset of global  
Glaciation; evolution  
of East African  
grasslands



Aumassip, 2004

Mode 1 sites in North Africa

# Mode 1 / Oldowan sites in Fazzan, DMP



## The first hominin dispersals to North Africa

- North Africa was not occupied by hominins in the late Pliocene – Ahl al Oughla (~2.4 Myr) and Aïn Boucherit have rich faunas and no artefacts.
- Aïn Hanech, Algeria: Earliest evidence of occupation - Oldowan industry, ~1.8 Myr.
- No strong evidence that the Nile was used as a corridor by hominins during the Lower Pleistocene, consistent with palaeoenvironmental data

....was the first colonisation of North Africa by hominins a unique event or part of a more generalised trend of geographic expansion?

## The East African context

Site	Region, Country	Age
Bouri	Middle Awash, Ethiopia	~2.5 Myr
Gona – group of sites	Hadar, Ethiopia	2.6 - 2.5 Myr
Omo, Shungura Fm, Member E sites	Omo River, north of Lake Turkana, southern Ethiopia	2.48 - 2.34 Myr
Omo, Shungura Fm, Member F sites	Omo River, north of Lake Turkana, southern Ethiopia	2.34 – 2.32 Myr
Lokalalei sites, W Turkana	West side of Lake Turkana, Kenya	2.35 Myr
Fejej	Ethiopia	~2.3 Myr
Koobi Fora sites, E Turkana	East side of Lake Turkana, Kenya	KBS tuff: ~ 1.88 Myr
Okote Mmb sites, E Turkana	East side of Lake Turkana, Kenya	Okote tuff: 1.6 – 1.4 Myr
Olduvai Gorge, Bed I sites + DK site, + FLK-Zinj site	Northern Tanzania	~ 1.9 – 1.7 Myr



# The global context



●▲ Artefacts ○□△ Hominins

Distribution of key Mode 1 or early *Homo* sites – Plio-Pleistocene (2.0 – 1.6 Myr)

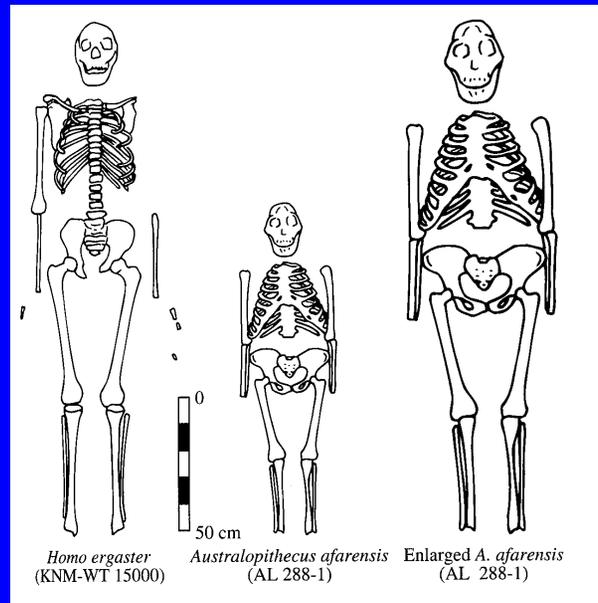
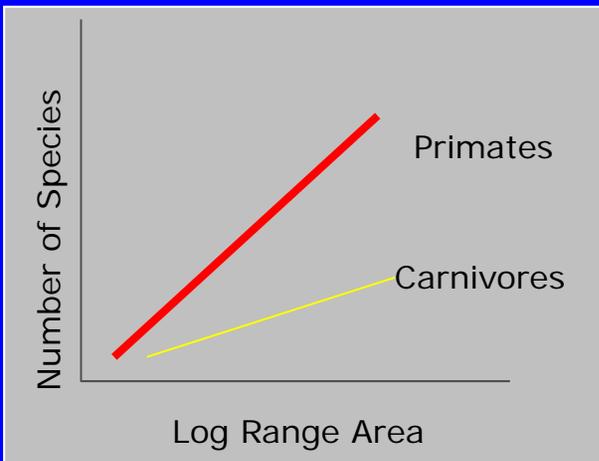


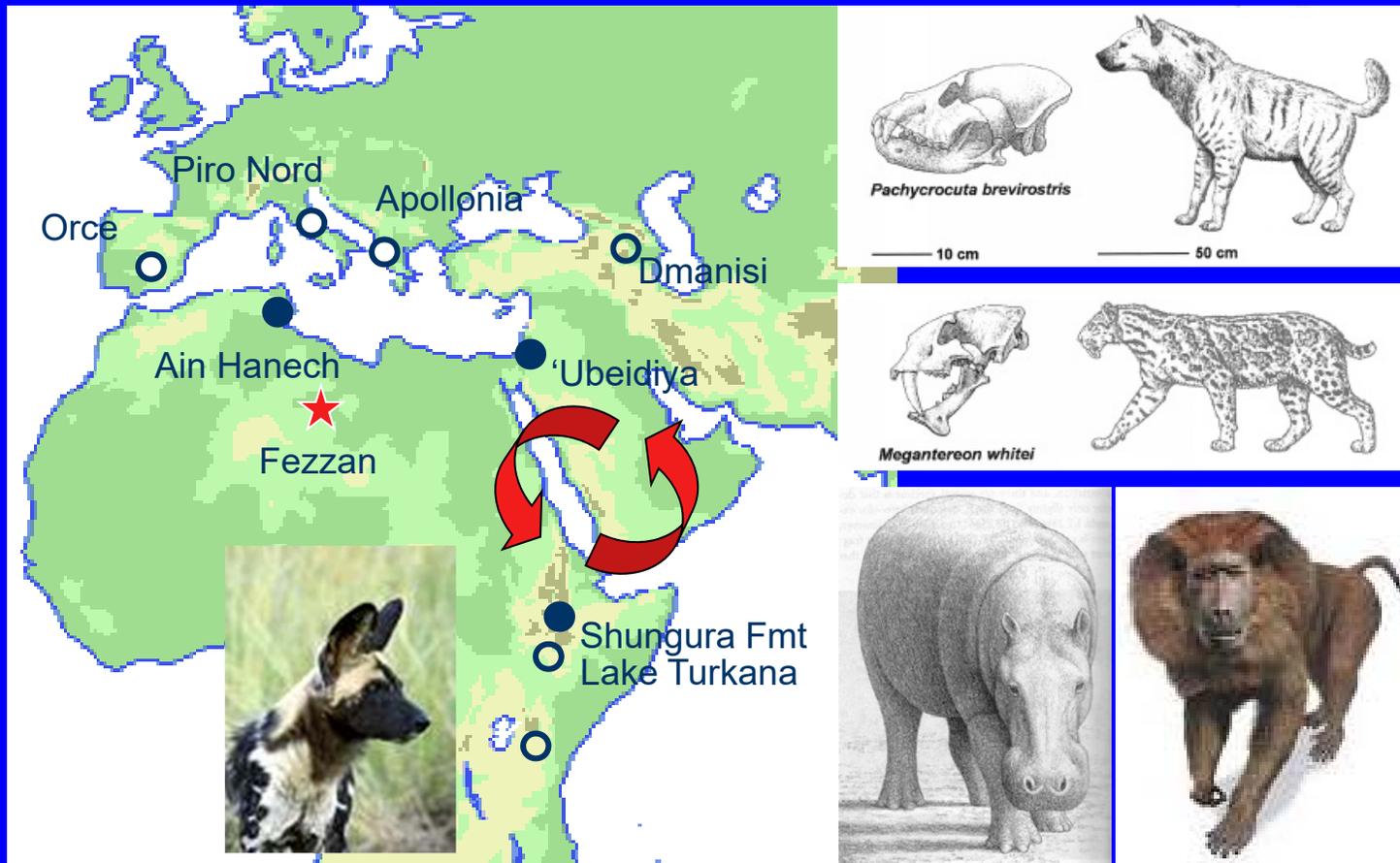
Stone tools and animal bones with cut-marks found in deposits close to and of similar age to *A. garhi*

Helene Roche, holding a Mode 1 (Oldowan) core with all its flakes (from Lokalalei, West Turkana, Kenya, dated to 2.34 Myr



## The adaptive context





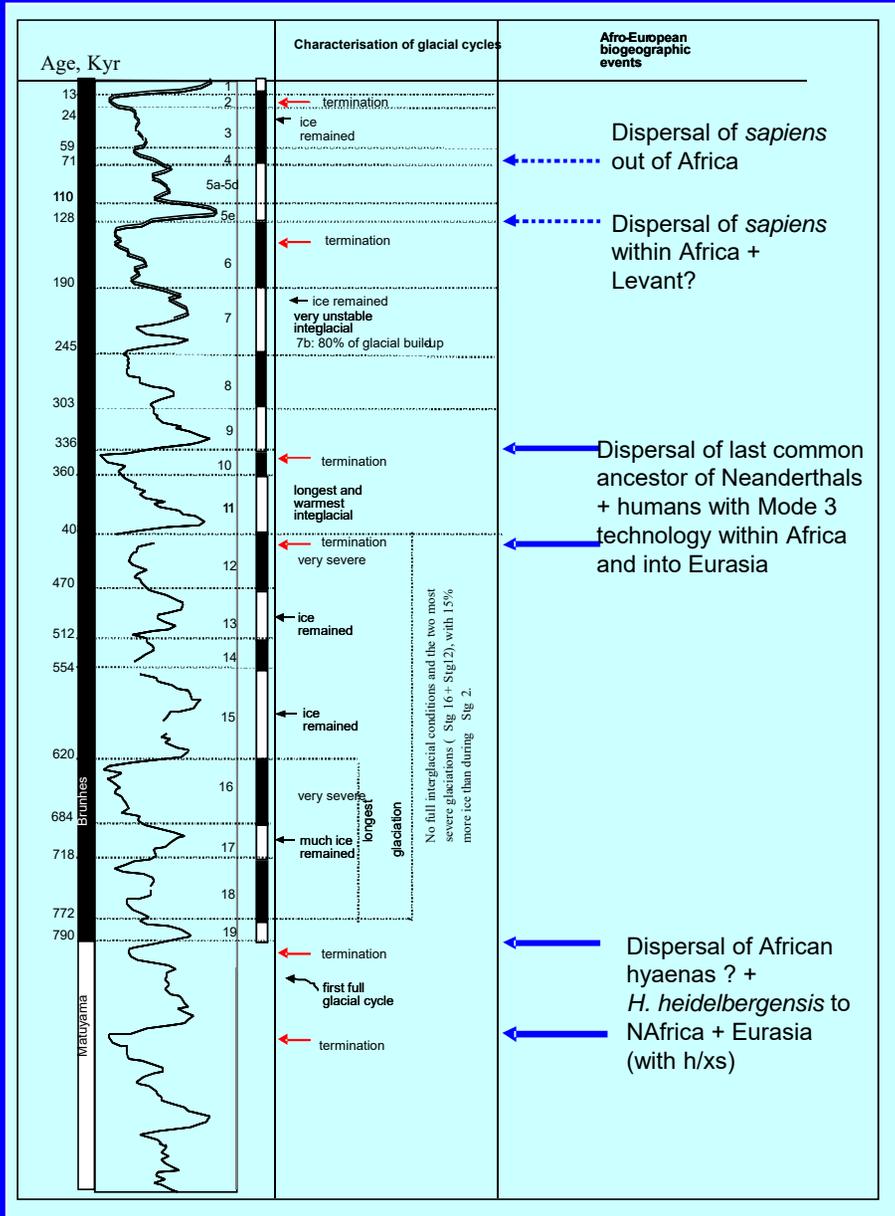
IMPORTANT AFRO-EURASIAN FAUNAL EXCHANGE: 1.9-1.8 Myr

The evolutionary ecological context - dispersing hominins as part of the carnivore guild

Was the colonisation of North Africa by hominins a unique process or part of a more generalised trend of geographic expansion?

- not associated with the 1<sup>st</sup> appearance of lithic technology
- same chronological framework as the dispersal of hominins into Eurasia, in the context of intercontinental faunal exchange
- Most probably associated to a climatically-driven temporary increase in the foraging environment of more carnivorous hominins
- North African colonisation is as significant and distant as the Eurasia dispersals

.... How often did hominin populations expand into North Africa?

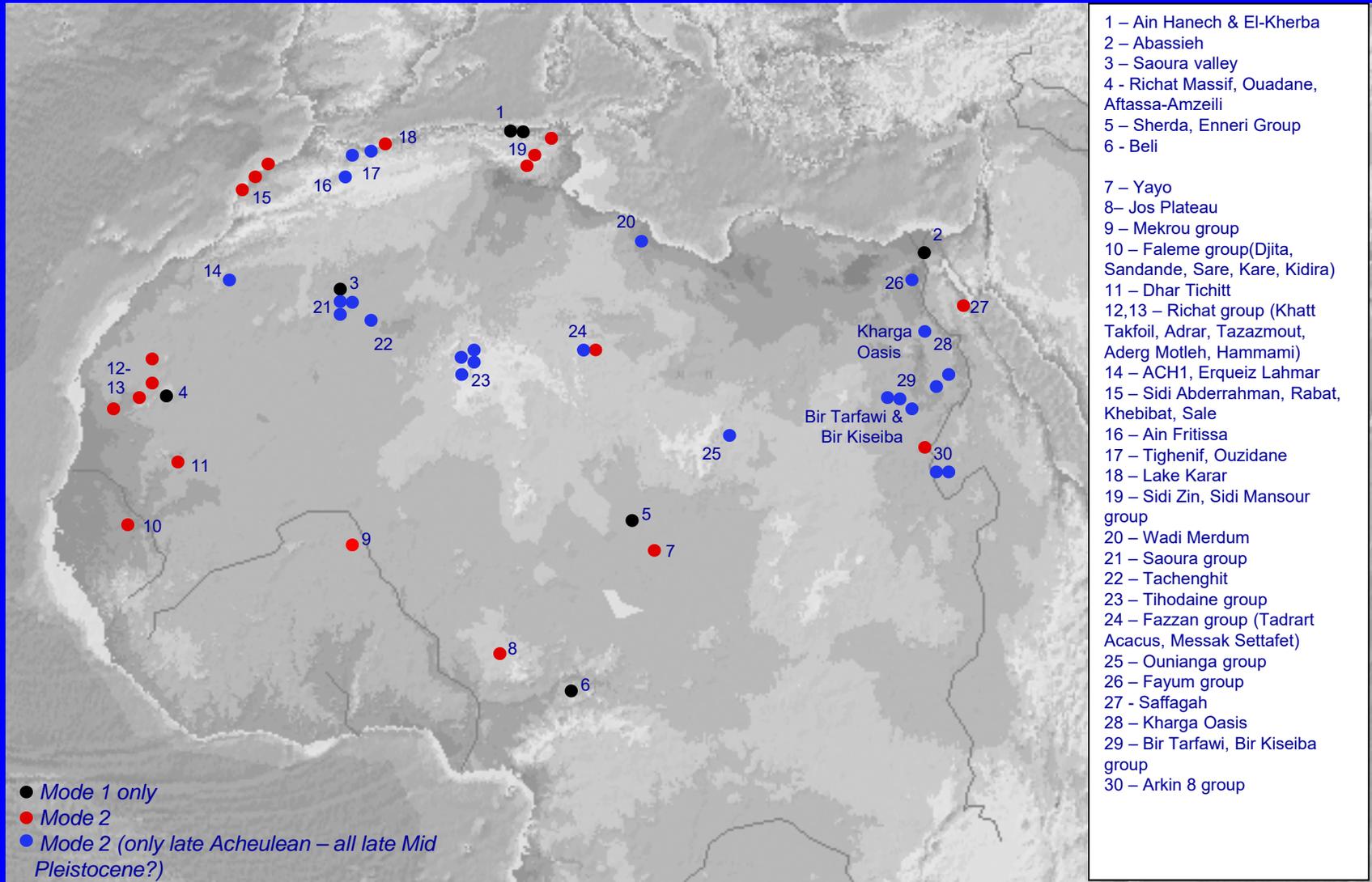


Lower Pleistocene – 1.8-0.8 Myr:  
 very dry conditions between 2 and  
 1 Myr, interrupted by two wet  
 episodes

Nile course interrupted ?

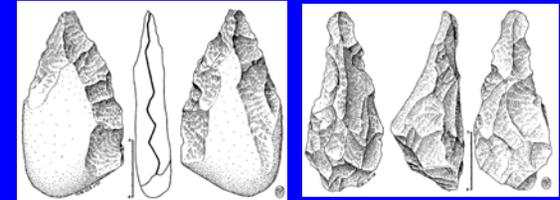
formation of Proto-Nile ~0.8 Myr?

# Acheulean sites in North Africa



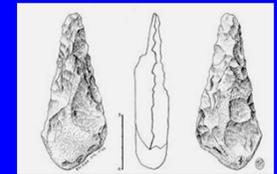
## Late Lower Pleistocene (1.5-0.8 Myr) – 1 site

- Casablanca, Morocco - Thomas Quarry 1, Unit L, ~1 Myr. Mode 2 (chopping-tools, polyhedrons, some cleavers, trihedrons and rough bifaces)



## Early-Mid Middle Pleistocene (0.8-03 Myr) – multiple sites

- Casablanca: Oulad Hamida 1 Quarry, the Grotte de Rhinoceros at Thomas Quarry 1 (OH1-GDR), Hominid Cave, ~ 0.7-0.6 Myr. Mode 2 (cleavers rare, large bifaces) + *H. erectus* mandible and teeth.
- Tighenif (~0.7 Myr) and Lake Karar (a small spring), Oran Province, N Algeria. Mode 2 (from simple quartzite forms to lanceolate bifaces, ~ to Olduvai Bed III, Kombewa technique)
- Sidi Zin (palaeo-spring), E foothills of Atlas, N Tunisia: four stratigraphic units, w 3 Acheulean levels (with narrow lanceolate handaxes, flakes and heavy duty tools)
- Arkin 8, West Nile, Sudanese-Egyptian border (undated) – but similar industry to Maghrebian sites + GBY
- Sidi Abderrahman - Cap Chatelier, Grotte d'Ours, and Grotte des Littorines (locality of the Sidi Abderrahman *Homo erectus* mandible).
- Tihodaïne, edge of Tassili Massif, S Algeria. Late Acheulean industry and fauna ~Olduvai Bed IV.
- Bir Kiseiba, Egypt, Acheulean (with Kombewa technique), ~Olduvai Bed IV.
- Bir Tarfawi, Bir Sahara East, Kharga Depression, Fayum depression (40m lake): Acheulean, dated to minimum 350 Kyr (BT + BSE) and ~300 Kyr (Kharga)



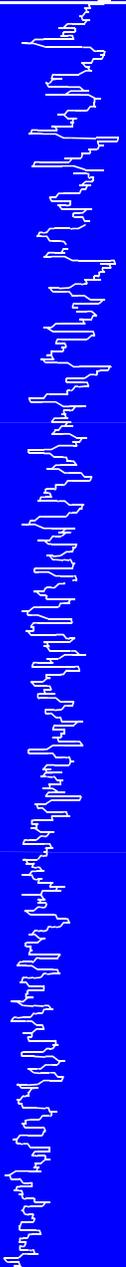
# Mode 2 / Acheulean sites in Fazzan, DMP



Myr

warm cold

0



DISPERSAL

DISPERSAL

1

DISPERSAL

2

DISPERSAL

3

Onset of global  
Glaciation; evolution  
of East African  
grasslands

- (1) North Africa was not occupied by hominins in the late Pliocene – Ahl al Oughla (~2.4 Myr) and Aïn Boucherit.
- (2) Aïn Hanech Algeria: Earliest evidence of occupation - Oldowan industry, ~1.8 Myr. The colonisation of North Africa is synchronous with that of Eurasia.
- (3) The pre-Acheulean occupation of the region was minimal, and most probably extremely ephemeral.
- (4) The early Acheulean (of Lower Pleistocene age) occupation was also sparse, and currently only documented with chronological certainty in the Casablanca sequence (Thomas Quarry 1 Unit L).
- (6) A later Acheulean tradition, early-mid Middle Pleistocene (800-400 Kyr ?), is more widespread. Technological affinities with eastern African industries, also pointing towards possible links with the Levant (Gesher Benot Ya'aqov).
- (7) A somewhat later group of ?Acheulean sites (400-300 Kyr?) is found west of the Nile (Fayum, Kharga, Bir Tarfawi, Bir Sahara East).

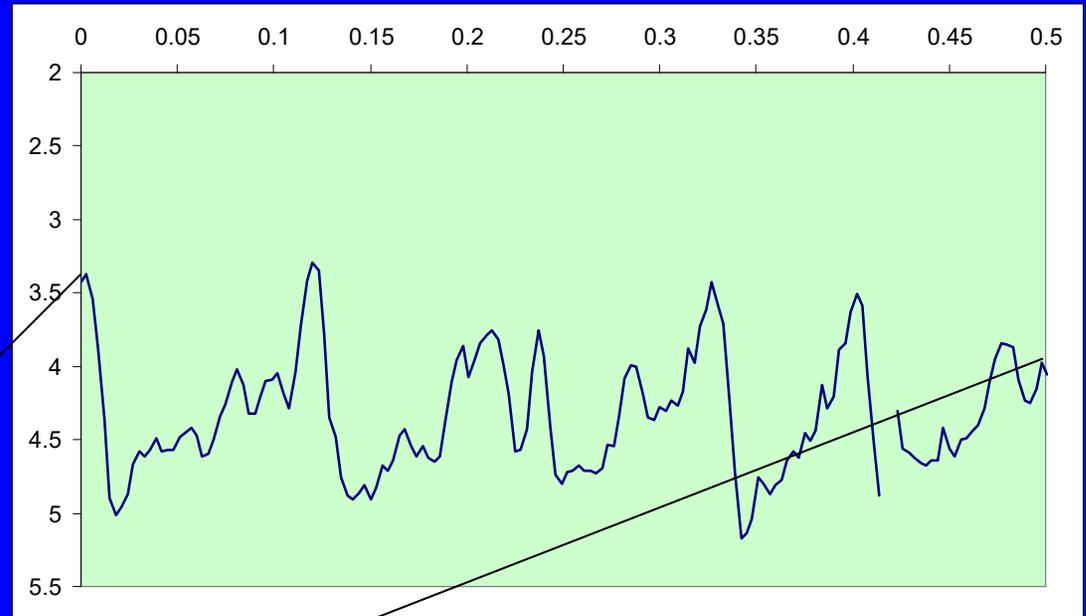


Possible number of Mode 3 dispersals to North Africa:

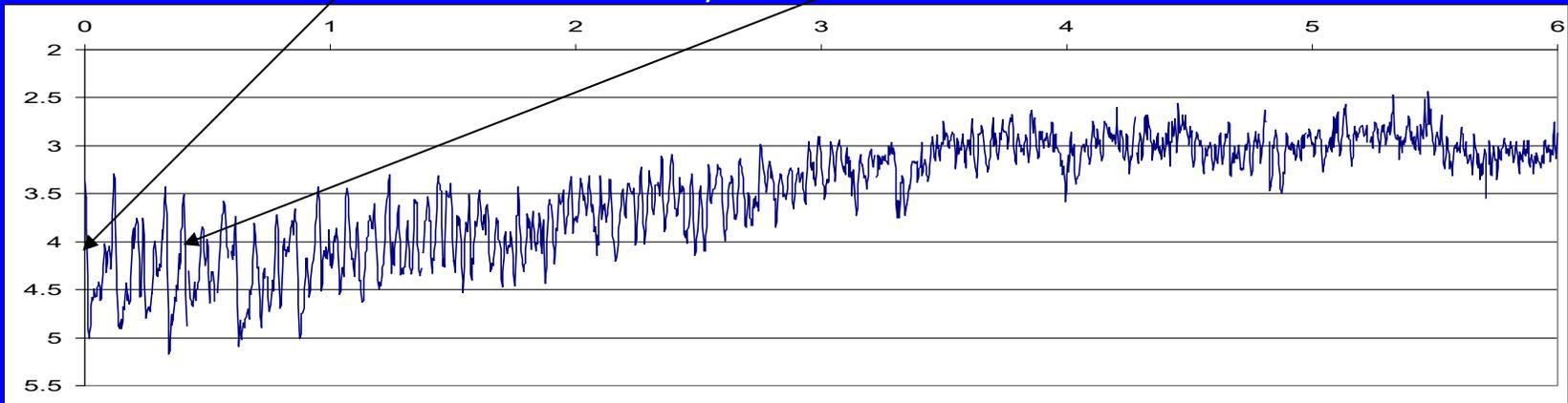
- 1. MIS11 (?) ~400 Kyr
- 2. MIS9 ~340 Kyr
- 3. MIS7 (?) ~240/220 Kyr
- 4. MIS5e ~130 Kyr

Aterian: unclear spatio-temporal pattern

0 – 500,000 years

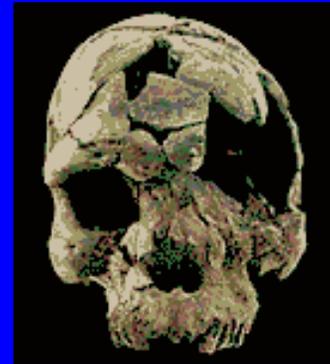


0 – 6 million years





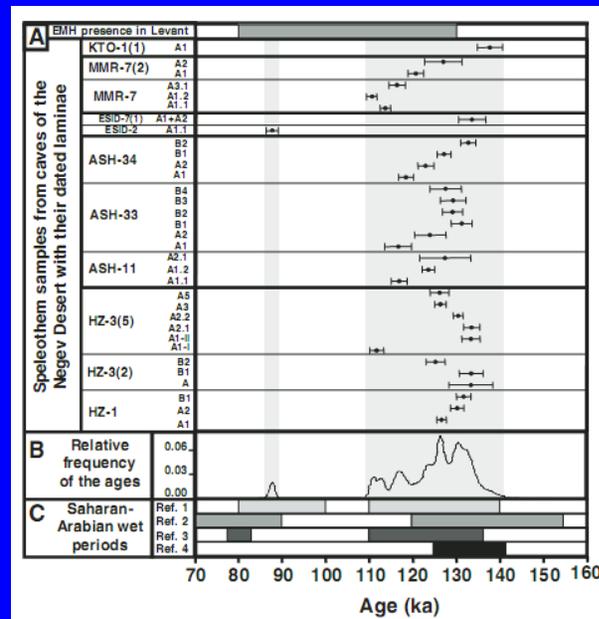
Modern humans dispersed from East Africa to the Levant during MIS5 (~130-120 Kyr)



Herto: ~160,000 yrs



Omo Kibish: ~ 200,000 yrs



Vaks et al (2007) Geology



Qafzeh: ~ 100,000 yrs

# Mode 3 / MSA sites in Fazzan, DMP



## Djebel Irhoud

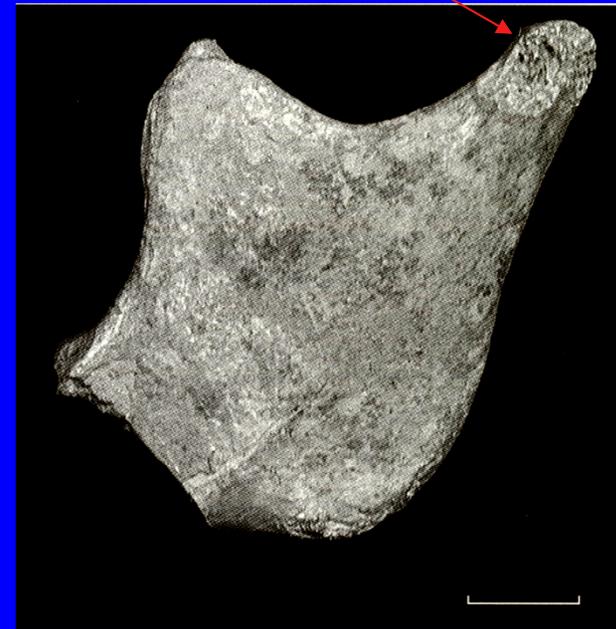
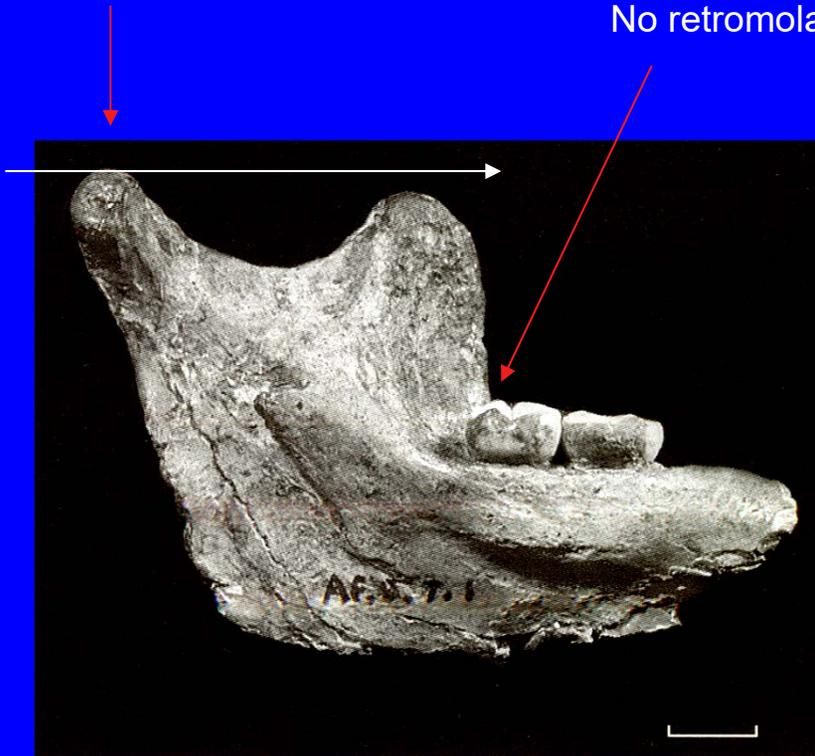


## The earliest *Homo sapiens* in North Africa: Hauer Fteah

Condyles taller than coronoid process

No retromolar space

Medial, rather than lateral condylar-coronoid groove



## North Africa during MIS5, MI4 and MIS3 ...

*Maghreb*: Expansion and extinction of Aterian ?

*Mediterranean coast*: refugium in Cyrenaica ? (Dabban, etc., of the Haua Fteah)

*Eastern Sahara*: intermittent occupation of the Nile Valley ? (Taramsa Hill, ~ 55 Kyr)



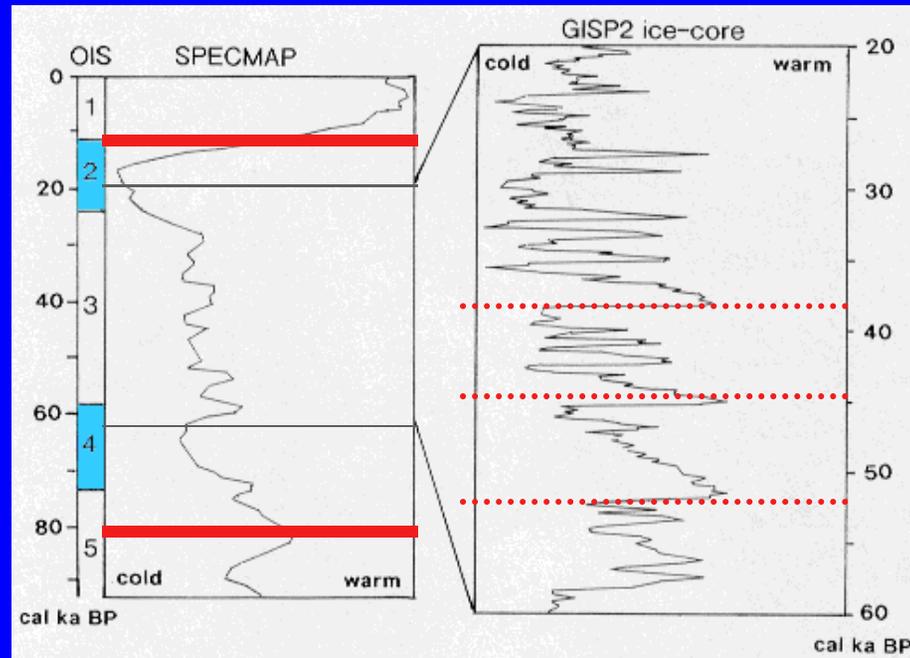
Aterian – dates ?



Taramsa Hill, Egypt



Dar es Soltan, Morocco



Aduma, Ethiopia



Hofmeyr, South Africa

Sub-Saharan Africa during OIS4 and OIS3 ...

*East Africa*: Aduma, ~ 70 Kyr; early LSA at Enkapune Ya Muto, Kenya (~ 50 Kyr)

*South Africa*: Hofmeyr, 36.7 Kyr

*Central & West Africa*: ?

# Aterian sites in Fazzan, DMP

Uan Afuda

Central Sahara is depopulated during MIS4 and MIS3

Sahara as a major barrier between sub-Saharan Africa and the southern Mediterranean

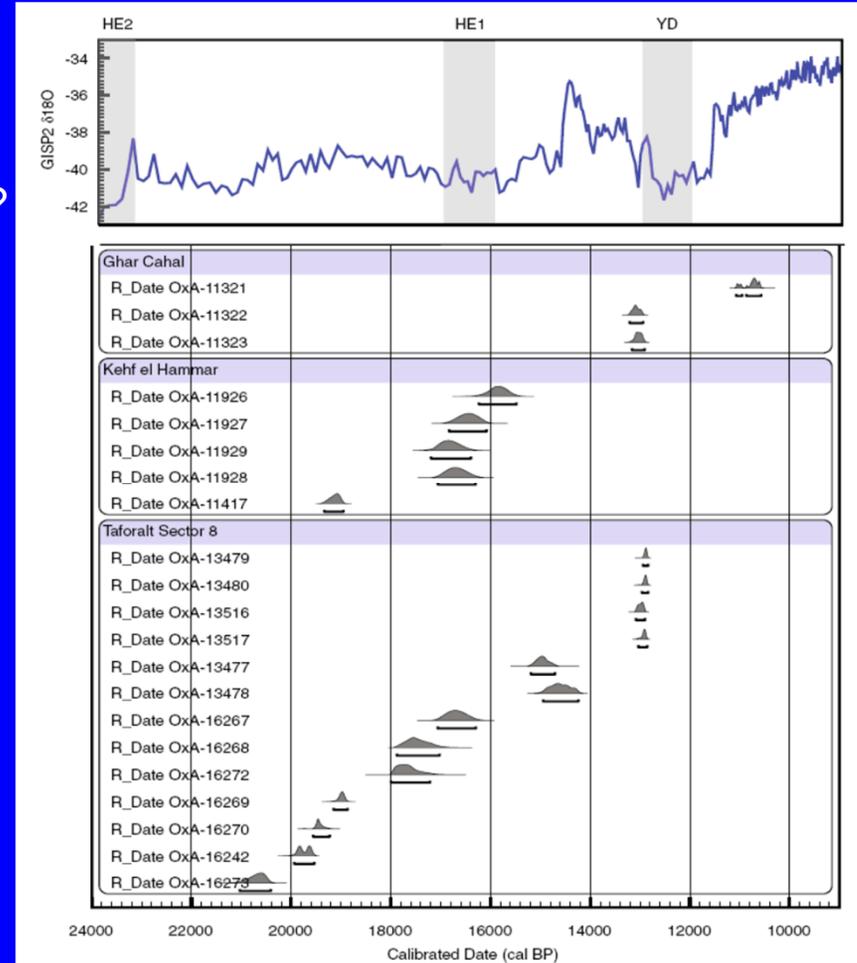
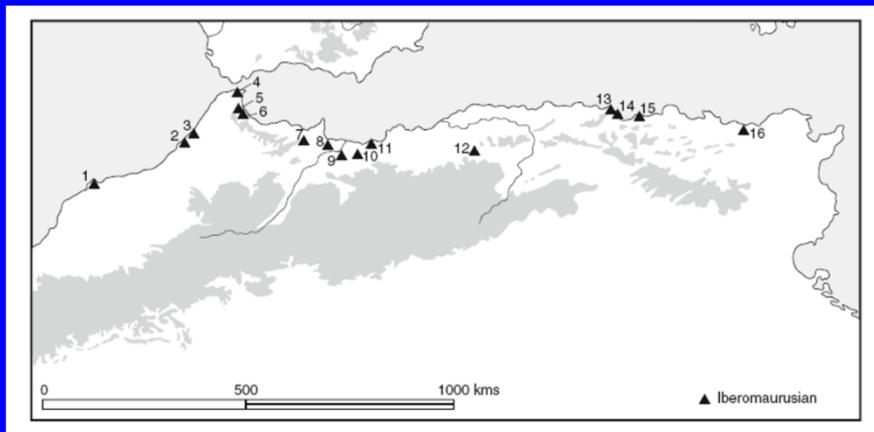


# North Africa during MIS2

*Maghreb:* the establishment of the Iberomaurusian population – mainly post-glacial?

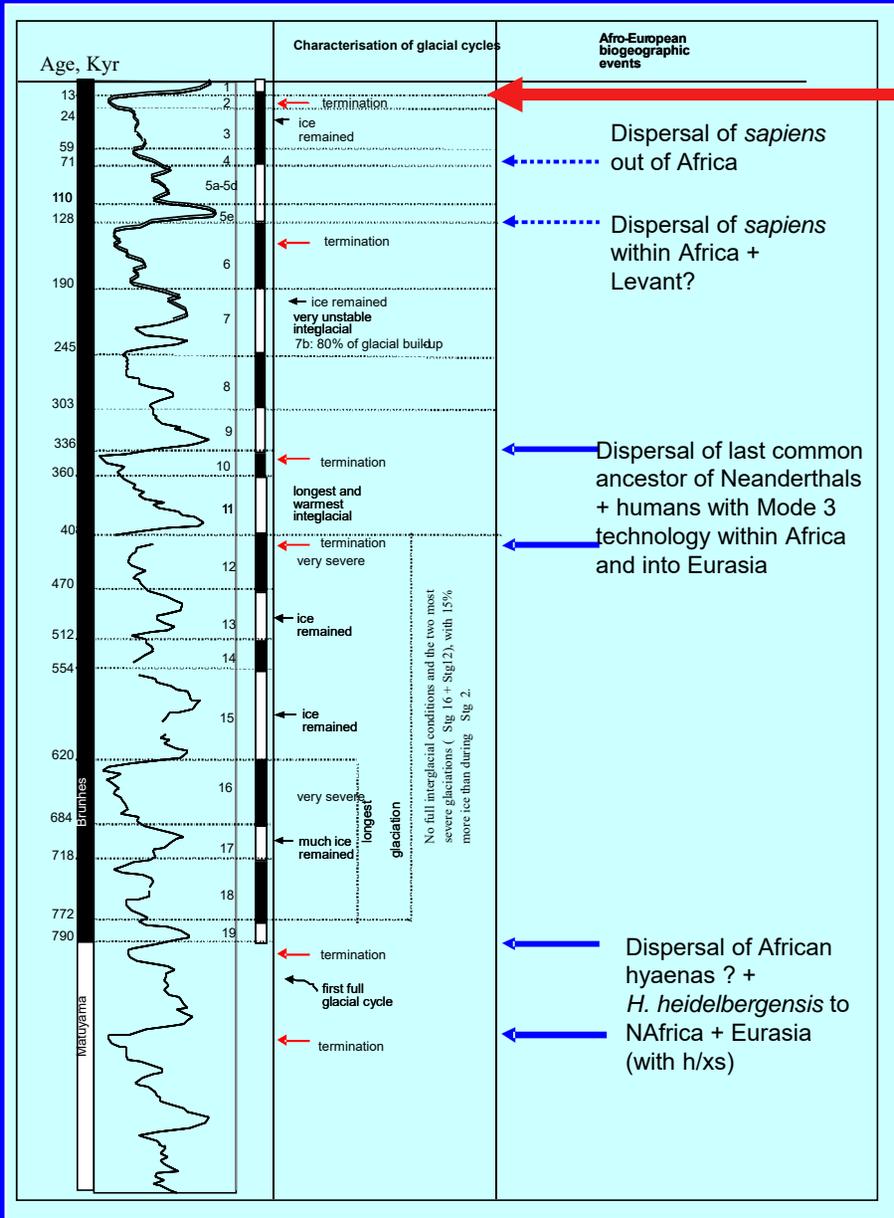
*Mediterranean coast:* ?

*Eastern Sahara:* hyper-arid  
*Central Sahara:* hyper-arid



Bouzouggar et al 2008

NW Africa as a refugium during the LGM ?



- From ~14,000 BP: improved climatic conditions, with pollen at Uan Afuda cave
- no archaeology for a few thousand years



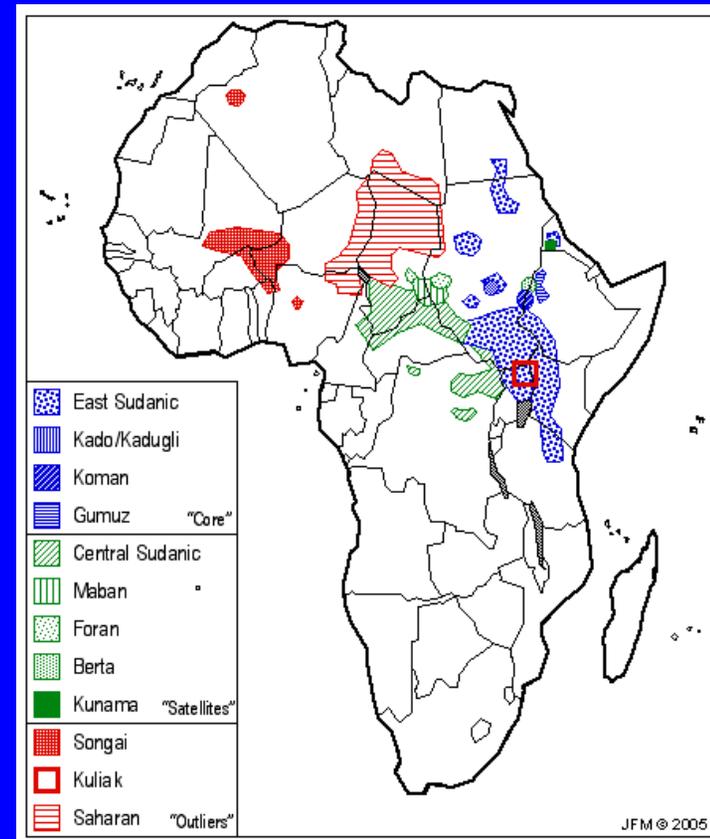
	Locality of occupation	Pottery/Grinding	Lithics	Economy
Early Acacus (9,800-8,900 yrs)	* base camps with stone structures in Acacus mts * use of interdune lakes * small occupation sites	* NO pottery * very very rare grinding tools * beads: very rare	* microliths, backed pcs, high blade/flake ratio * mainly quartz	* specialised hunting of Barbary sheep * very little plant processing
DRY				
Late Acacus (8,900-7,400 yrs)	* concentrated in highland sites * rare use of interdunes * larger sites	* Pottery: Dotted wavy-line, rocker decoration * Grinding tools: very frequent * beads: frequent * decorated ostrich eggshell	* high macro/microlith ratio * decreased % of blades and bladelets * increased % of geometric microliths * range of raw materials	* broader hunting range (small + large mammals, fish, birds) * significant exploitation of wild cereals * enclosures of Barbary sheep? * storage
DRY				

# The re-colonisation of the Central Sahara

- \* sub-Saharan African hunter-gatherers
- \* wavy-line pottery
- \* 'Acacus' phase



John Sutton's 'Aqualithic'



Distribution of Nilo-Saharan languages by Roger Blench

		Locality of occupation	Pottery/Grinding	Lithics	Economy
	Early Acacus (9,800-8,900 yrs)	<ul style="list-style-type: none"> <li>* base camps with stone structures in Acacus mts</li> <li>* use of interdune lakes</li> <li>* small occupation sites</li> </ul>	<ul style="list-style-type: none"> <li>* NO pottery</li> <li>* very very rare grinding tools</li> <li>* beads: very rare</li> </ul>	<ul style="list-style-type: none"> <li>* microliths, backed pcs, high blade/flake ratio</li> <li>* mainly quartz</li> </ul>	<ul style="list-style-type: none"> <li>* specialised hunting of Barbary sheep</li> <li>* very little plant processing</li> </ul>
	DRY				
	Late Acacus (8,900-7,400 yrs)	<ul style="list-style-type: none"> <li>* concentrated in highland (Acacus) sites</li> <li>* rare use of interdunes</li> <li>* larger sites</li> </ul>	<ul style="list-style-type: none"> <li>* Pottery: Dotted wavy-line, rocker decoration</li> <li>* Grinding tools: very frequent</li> <li>* beads: frequent</li> <li>* decorated ostrich eggshell</li> </ul>	<ul style="list-style-type: none"> <li>* high macro/microlith ratio</li> <li>* decreased % of blades and bladelets</li> <li>* increased % of geometric microliths</li> <li>* range of raw materials</li> </ul>	<ul style="list-style-type: none"> <li>* broader hunting range (small + large mammals, fish, birds)</li> <li>* significant exploitation of wild cereals</li> <li>* enclosures of Barbary sheep?</li> <li>* storage</li> </ul>
	DRY				
	Early Pastoral (7,400-6,400 yrs)	<ul style="list-style-type: none"> <li>* dense occupation of Acacus mts and Messak</li> <li>* dense occupation of interdunes</li> </ul>	<ul style="list-style-type: none"> <li>* Pottery: rocker decoration, but no wavy-line</li> </ul>	?	<ul style="list-style-type: none"> <li>* economy based on cattle, ovicaprids?, and exploitation of wild cereals</li> </ul>
	DRY: NO SITES (6,400-6,100 yrs)				
	Middle Pastoral (6,100-5,000 yrs)	<ul style="list-style-type: none"> <li>* occupation of Acacus mts, with smaller sites</li> <li>* quarries on Messak</li> <li>* intense use of interdunes – semi-sedentary camps</li> </ul>	<ul style="list-style-type: none"> <li>* Pottery: 'alternatively pivoting stamp' decoration</li> </ul>	<ul style="list-style-type: none"> <li>* crude lithics</li> <li>* wide range of arrowheads</li> <li>* polished tools (but rare)</li> </ul>	<ul style="list-style-type: none"> <li>* ?Nile influence</li> <li>* economy based on cattle, kept in IDs, with seasonal use of highlands</li> <li>* increased population</li> <li>* cattle burials</li> </ul>
	Late Pastoral (5,000-3,500 yrs)	<ul style="list-style-type: none"> <li>* discontinuous use of shelters in Acacus</li> <li>* wadis of Messak</li> <li>* no occupation of IDs</li> </ul>	<ul style="list-style-type: none"> <li>* Pottery: undecorated</li> </ul>	<ul style="list-style-type: none"> <li>* crudish tools, almost all quartzite</li> <li>* increase use of exotic raw materials</li> <li>* pre-dynastic tools</li> </ul>	<ul style="list-style-type: none"> <li>* economy based on ovicaprids – almost NO cattle</li> <li>* high mobility</li> <li>* human burials</li> </ul>

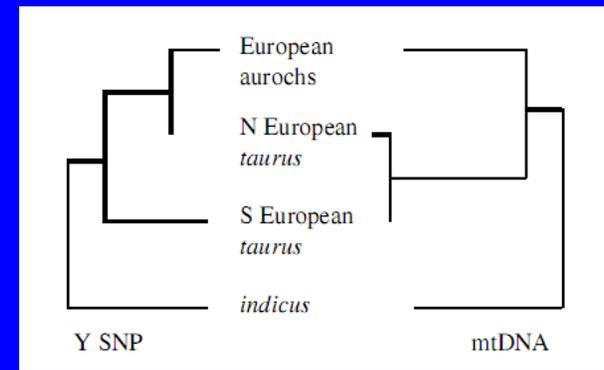
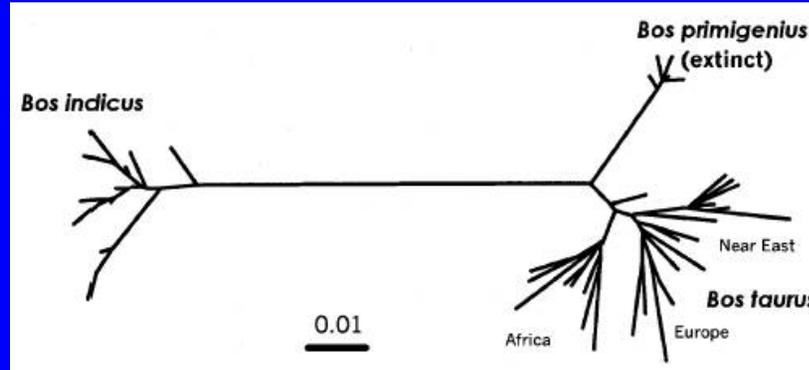
Adapted from di Lernia, Cremaschi and Garcea

# Pastoral sites in Fazzan, DMP

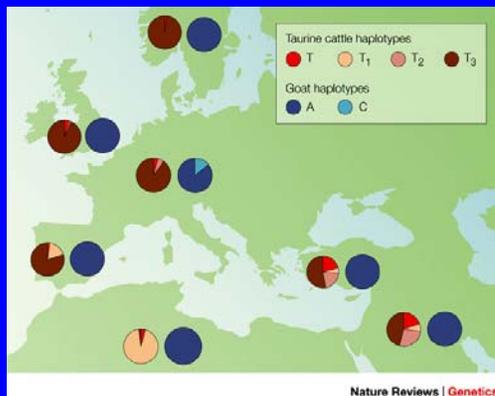






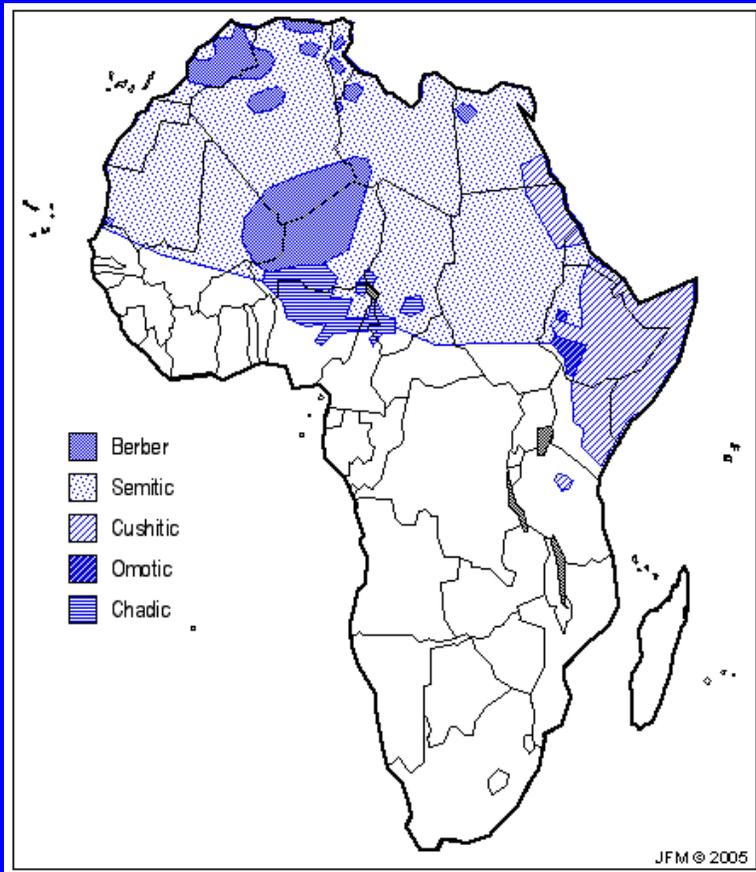


Introduction of domestic cattle to Africa –  
 local domestication of *Bos taurus* in North Africa during the Early Pastoral phase?



From MacHugh 1996 PhD thesis

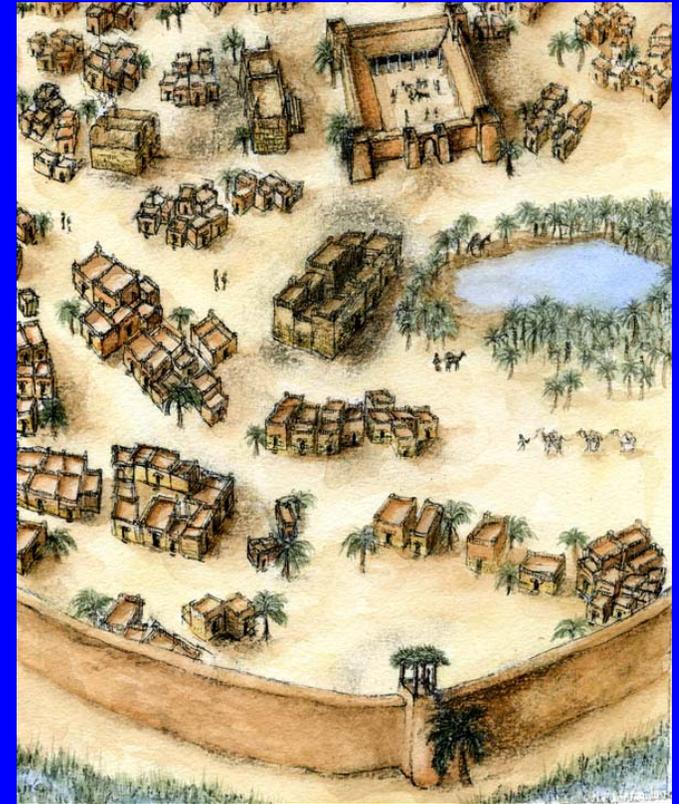
- Middle and Late Pastoral (~6,000 – 3,500 yrs)  
relations with the Nile Valley  
establishment of the Berber dialect chain?
- \* Sedentism and the rise of the Garamantes



Distribution of Afroasiatic languages by Roger Blench

# The Garamantes

- The first Libyan state;
- The first Libyan towns;
- The first Libyan writing
- The first Libyan agriculture;
- The first Libyan metallurgy
- The first trans-Saharan trade

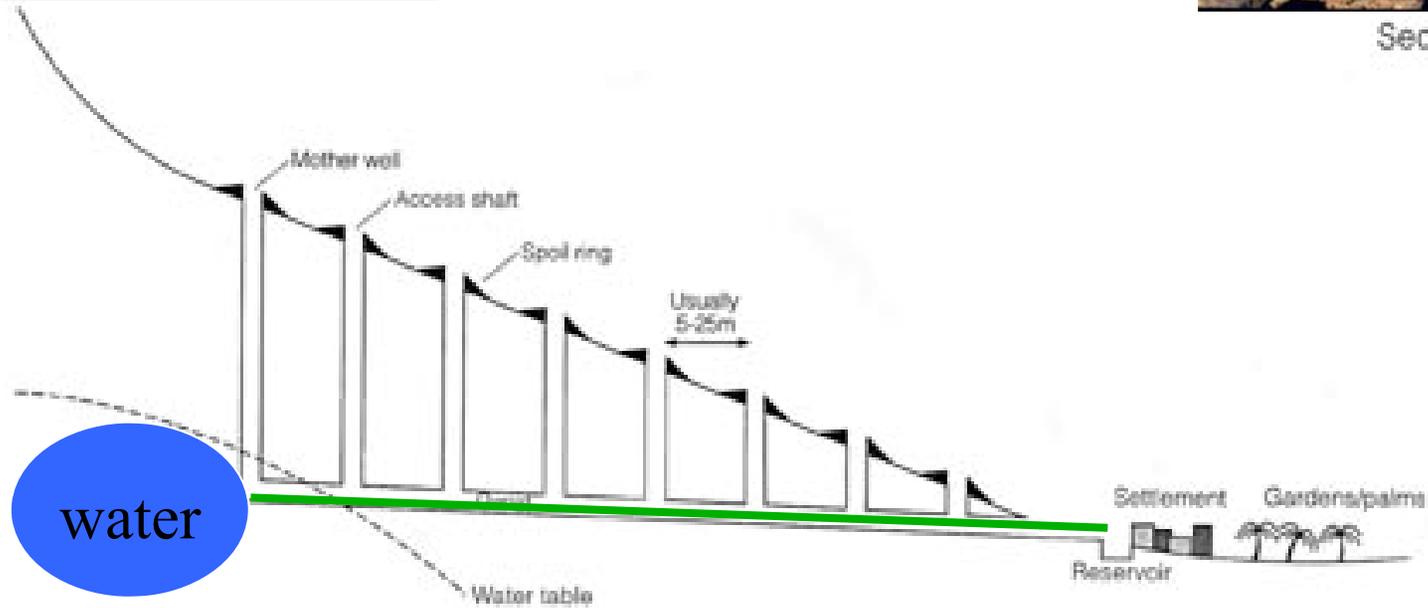




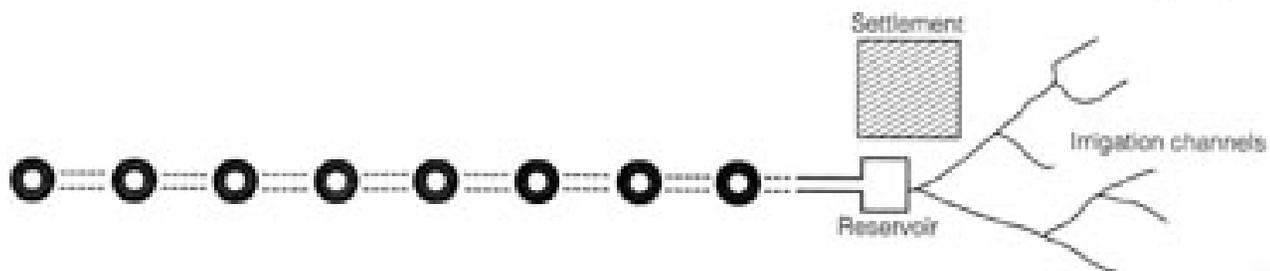
# Garamantian farming: the foggaras



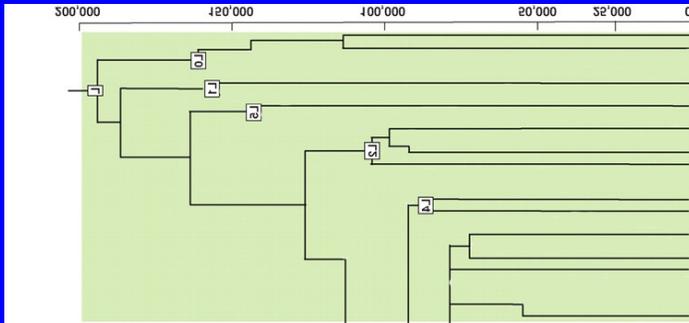
Section



Plan

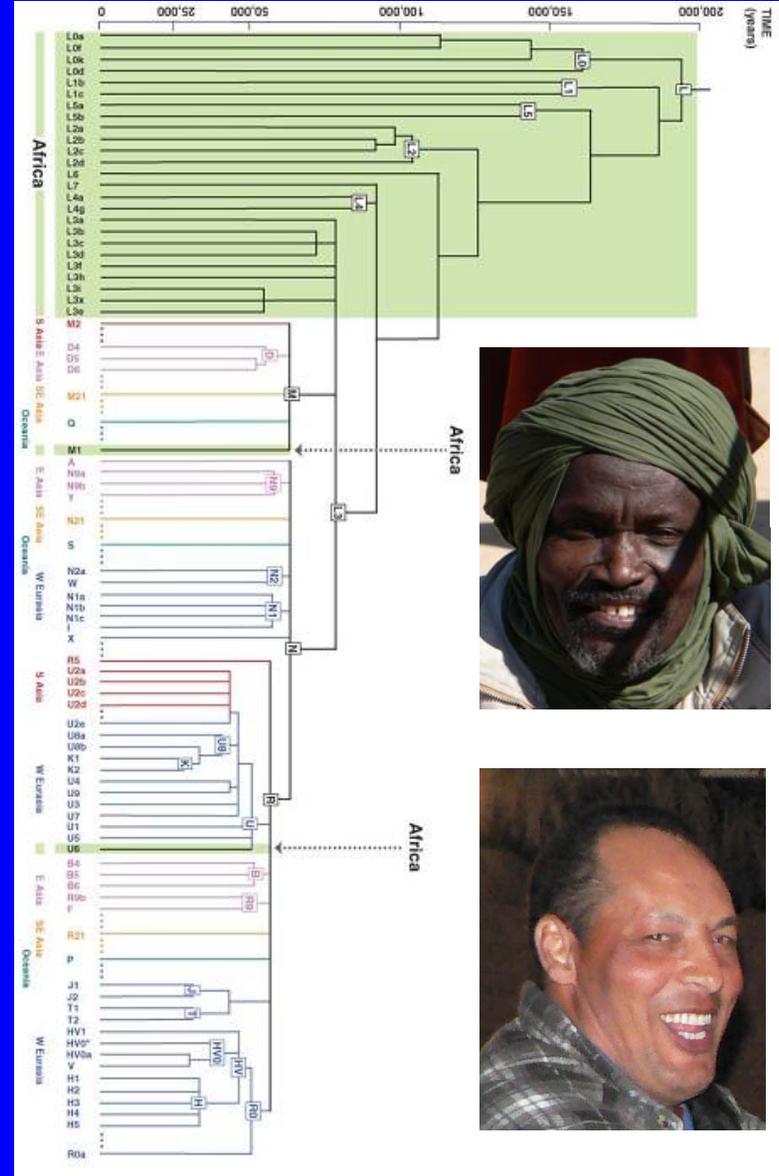


# The complex genetic landscape of the people of Libya



N=123

L0:	4	3.25%
L1 :	3	2.44%
L5:	1	0.81%
L2:	18	14.63%
L4:	4	3.25%
L3b-e:	5	20.32%
<b>L0-L5:</b>	<b>55</b>	<b>44.71%</b>
<b>M1:</b>	<b>6</b>	<b>4.88%</b>
W:	1	0.81%
N1:	4	3.25%
X:	4	3.25%
U*:	12	9.76%
<b>U6:</b>	<b>6</b>	<b>4.88%</b>
B4:	1	0.81%
J:	11	8.94%
T:	6	4.88%
R0*:	17	13.82%

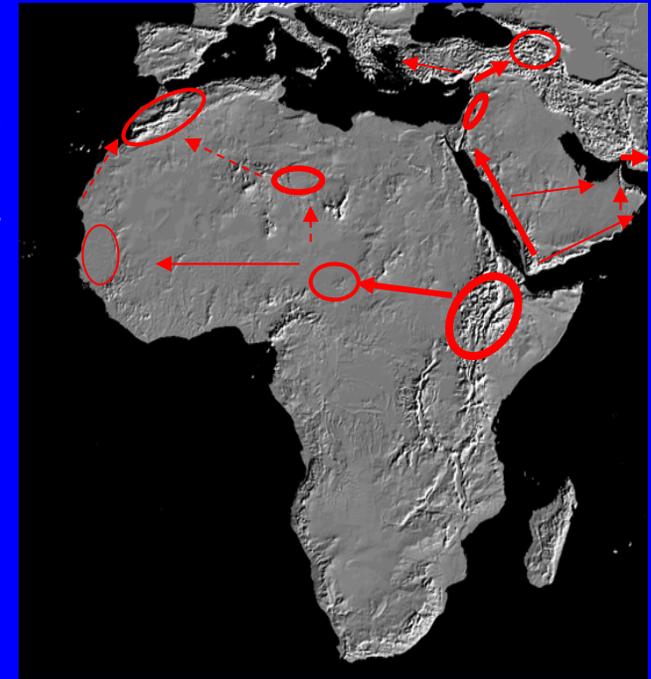


Betti, Kivisild & Lahr – mtDNA diversity of the Libyan population

## What we know and don't know...

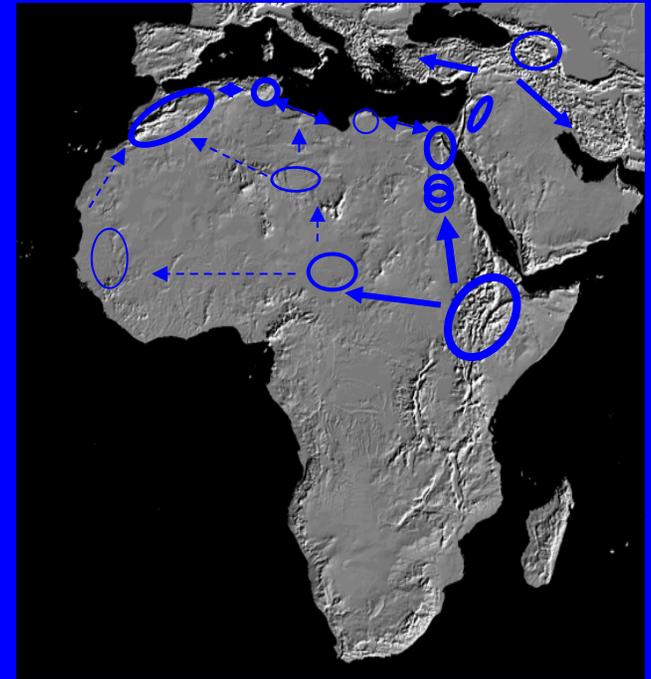
### Earliest occupations (1.8-0.8 Myr)

- (1) North Africa was first colonised in the Plio-Pleistocene from East Africa, probably ~1.8 Myr. This early occupation seems to have been sparse and ephemeral. These hominins most likely used the Central Saharan corridor, and the presence of Oldowan sites in Fazzan (DMP) supports this hypothesis.
- (2) North Africa was also colonised by hominins who manufactured Acheulean artefacts at least by ~1 Myr, probably another populations of *Homo ergaster/erectus*. This dispersal also seems to have used the Central Saharan corridor, and again similar early Acheulean assemblages have been found in Fazzan (DMP).



## Early Middle Pleistocene occupation (0.8-0.3 Myr)

- (1) The character of Acheulean industries in North Africa changes in the Middle Pleistocene. They become more widespread from West to East (including the Nile and western desert), and show strong affinities to derived Acheulean industries in East Africa (Olororgesailie) and the Middle East (GBY) [also India?]
- (2) The makers of North African Middle Pleistocene Acheulean industries probably represent a population of *Homo heidelbergensis*, who colonises Europe at a similar time.
- (3) This dispersal probably used the Nile corridor (re-established as a waterway linking the East African lakes and the Mediterranean at this time). Whether the Central African route was used or not remains unknown, but the great number of sites with this industry in Fazzan (DMP) and indeed elsewhere in the Central Sahara (Tihoidane), suggests that it was.



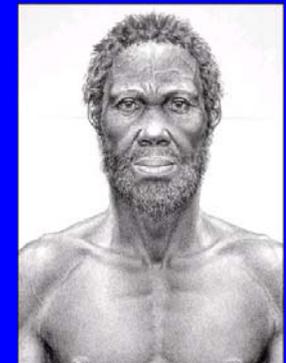
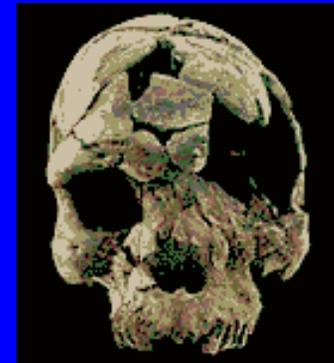
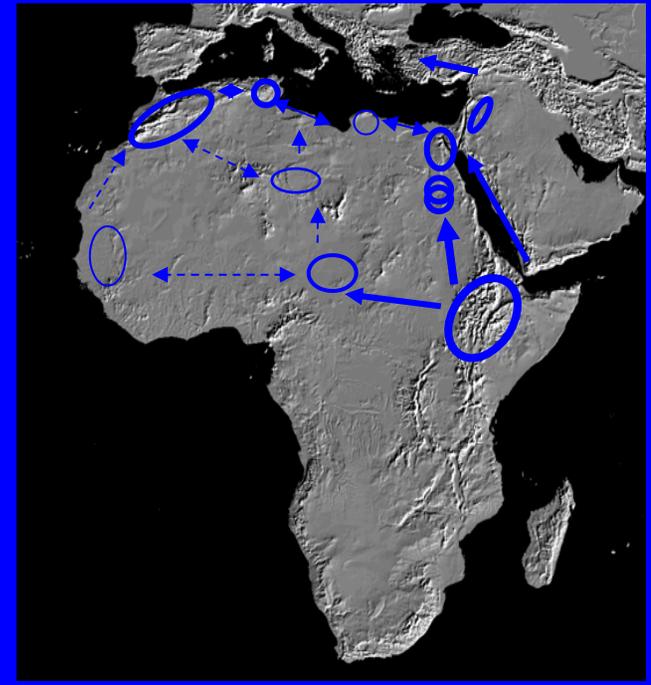
## Late Middle Pleistocene occupation (0.35-0.13 Myr)

- (1) This is a critical time in African and world prehistory, as it encompasses the origins of *Homo sapiens*, and as recent whole-genome results suggest, also the last common ancestor between humans and Neanderthals. Yet, little is known about the pattern and process of human evolution at this time.
- (2) Even less is known in North Africa – except that the Mode 3/MSA record is extremely rich, widespread, and variable. In particular, the relationship between the late Acheulean and the early MSA is poorly understood.
- (3) No chronological control virtually throughout the entire region – an ESR date of 190,000 for the fossil of Jebel Irhoud suggests a pre-modern Mode 3 population



## Early Upper Pleistocene occupation (0.13-0.06 Myr)

- (1) First colonisation of North Africa by *Homo sapiens*, part of a dispersal of modern humans from East Africa that reached the Levant ~120,000 years ago.
- (2) MIS5d-a (120-100 Kyr) : Possible period of contact along the southern Mediterranean coast and Levant?
- (3) Not clear which route was used, probably the Nile corridor or Red Sea coast. Possible presence en Fazzan at this time – Al Grayfah (DMP).
- (4) The Aterian industry has its heartland in the Maghreb, where it is dated from ~100,000 yrs ago (Taforalt) and associated with modern human fossils (Dar es-Soltan). However, its distribution is more widespread, being present in Fazzan (DMP, Acacus), western Egypt, and claimed in Arabia and India. Indeed, similar MSA-tanged points have been found in west Lake Turkana and Omo Kibish.



## Mid-late Upper Pleistocene and Holocene occupation (70-to the present Kyr)

- (1) During the last glacial period (MIS4 to MIS2), most of North Africa becomes depopulated.
- (2) Possible refugia: Cyrenaica ? (Dabban, etc.) and later the Maghreb (Iberomaurusian)
- (3) The origins of these late Pleistocene North African populations remain unknown – Mediterranean? But intermittent occupation of the Nile continues, and links between the Iberomaurusian and the Sahaba Sudanese fossils have been suggested.
- (4) The central Sahara remains uninhabited until the early Holocene, its re-colonisation lagging by a few thousand years the environmental amelioration.
- (5) The re-colonisation of the Central Sahara was by sub-Saharan African hunter-gatherers, with strong cultural links to populations in East Africa, Chad and Sudan.
- (6) The origins of the first Central Saharan pastoral economies remain disputed.
- (7) Strong links with the Nile, rather than sub-Saharan Africa, become established from the mid-Holocene.
- (8) The Garamantes re-establish the Central Saharan corridor through trade.



# Acknowledgements

David Mattingly  
Robert Foley



## DMP: Desert Migrations Project

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David Mattingly and his team – Burials & Identity among the Garamante  
Mustafa Salem, Nick Drake, Kevin White and Simon Armitage – the palaeo-lakes of Fazzan  
Marta Mirazon Lahr, Rob Foley and team – the prehistory of Fazzan and the role of the Central Sahara in hominin dispersals out of Africa

