



# Laboratorio di Palinologia e Paleobotanica

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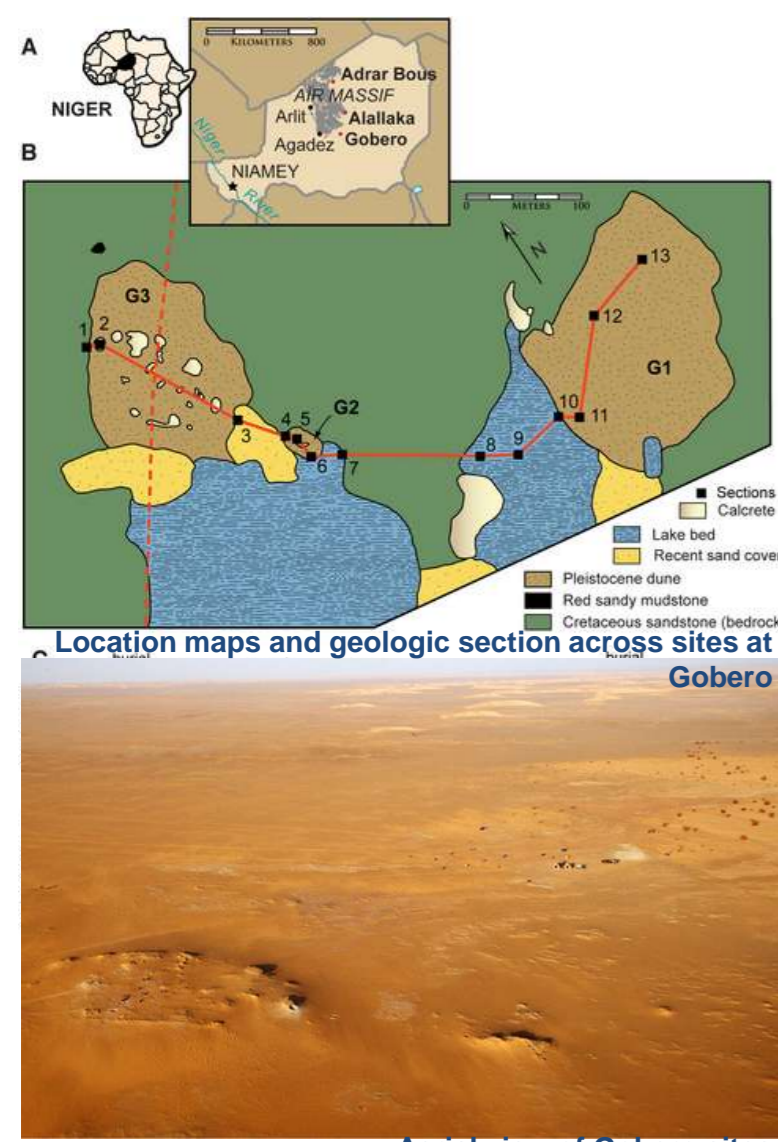
Dipartimento Scienze della Vita - Università di Modena e Reggio Emilia



Research Day 2013 – 22 Marzo 2013

## Lessons from the Sahara desert: plants, human behaviour and cultural evolution in expanding droughts

Anna Maria Mercuri



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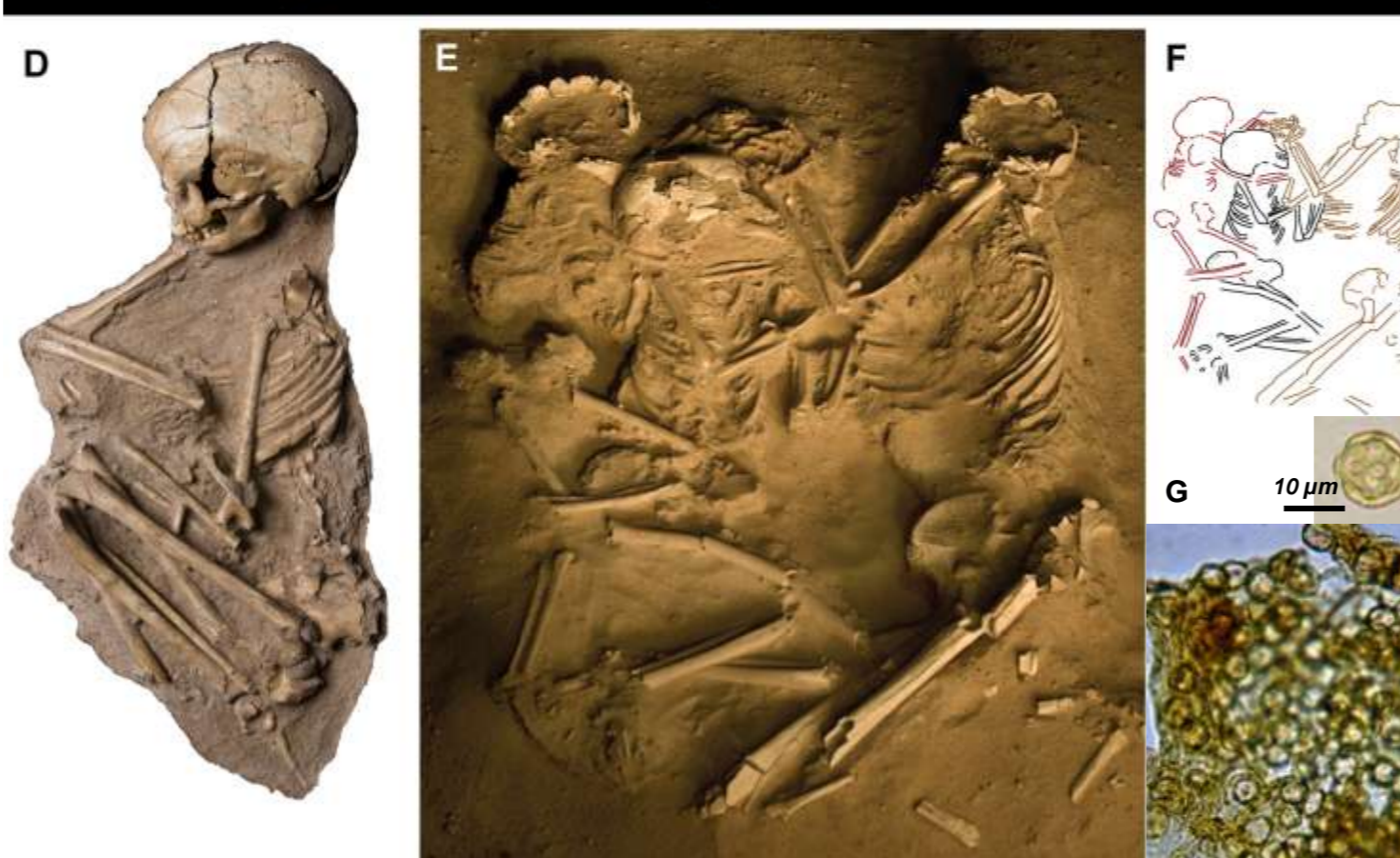
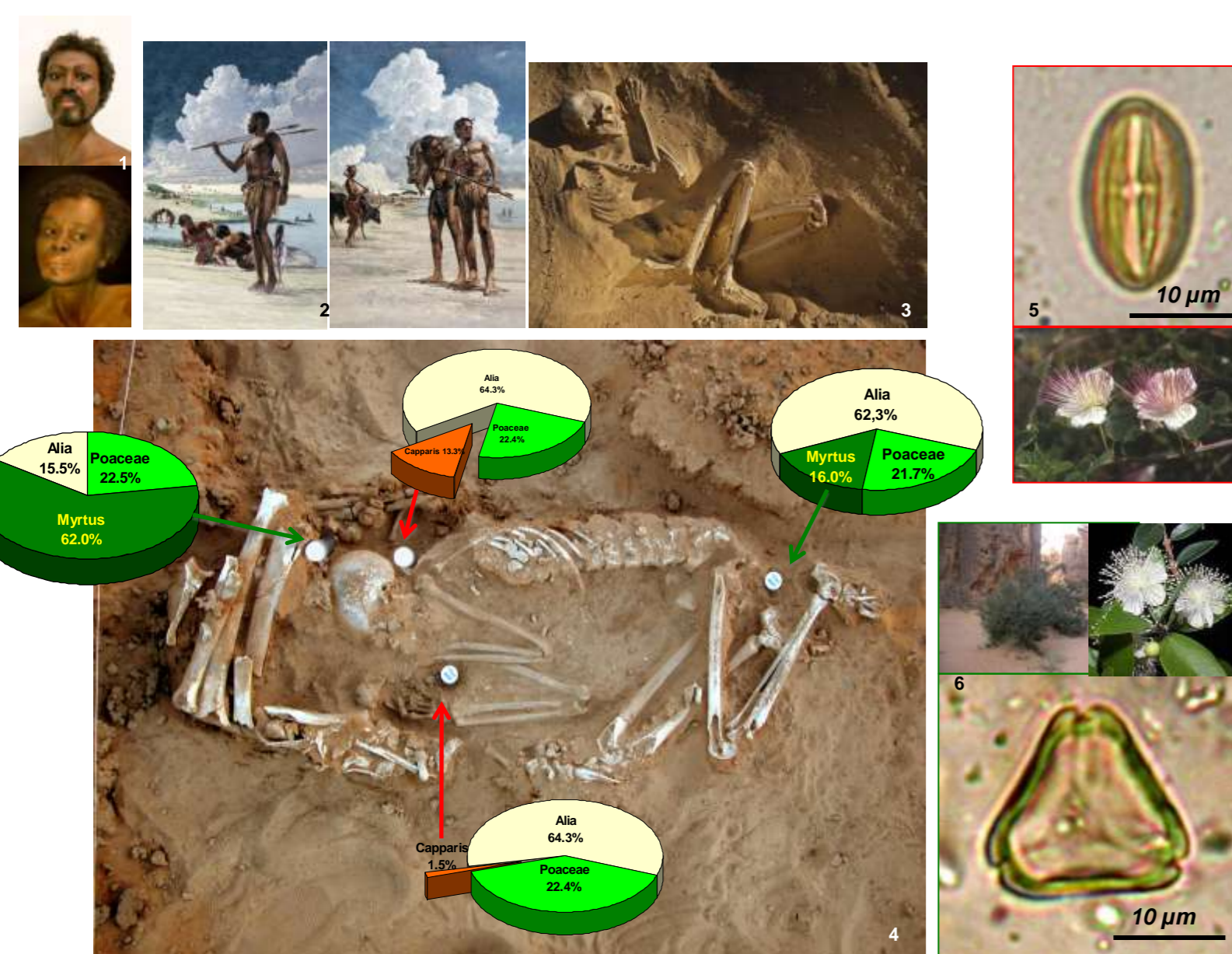
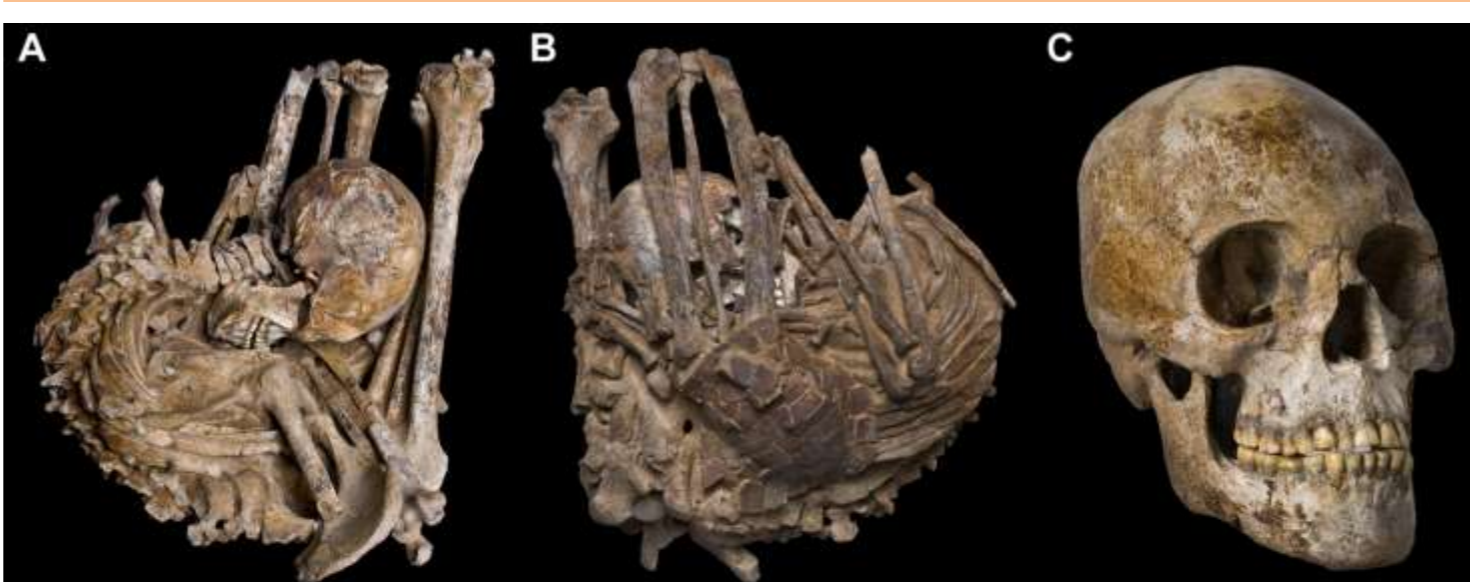
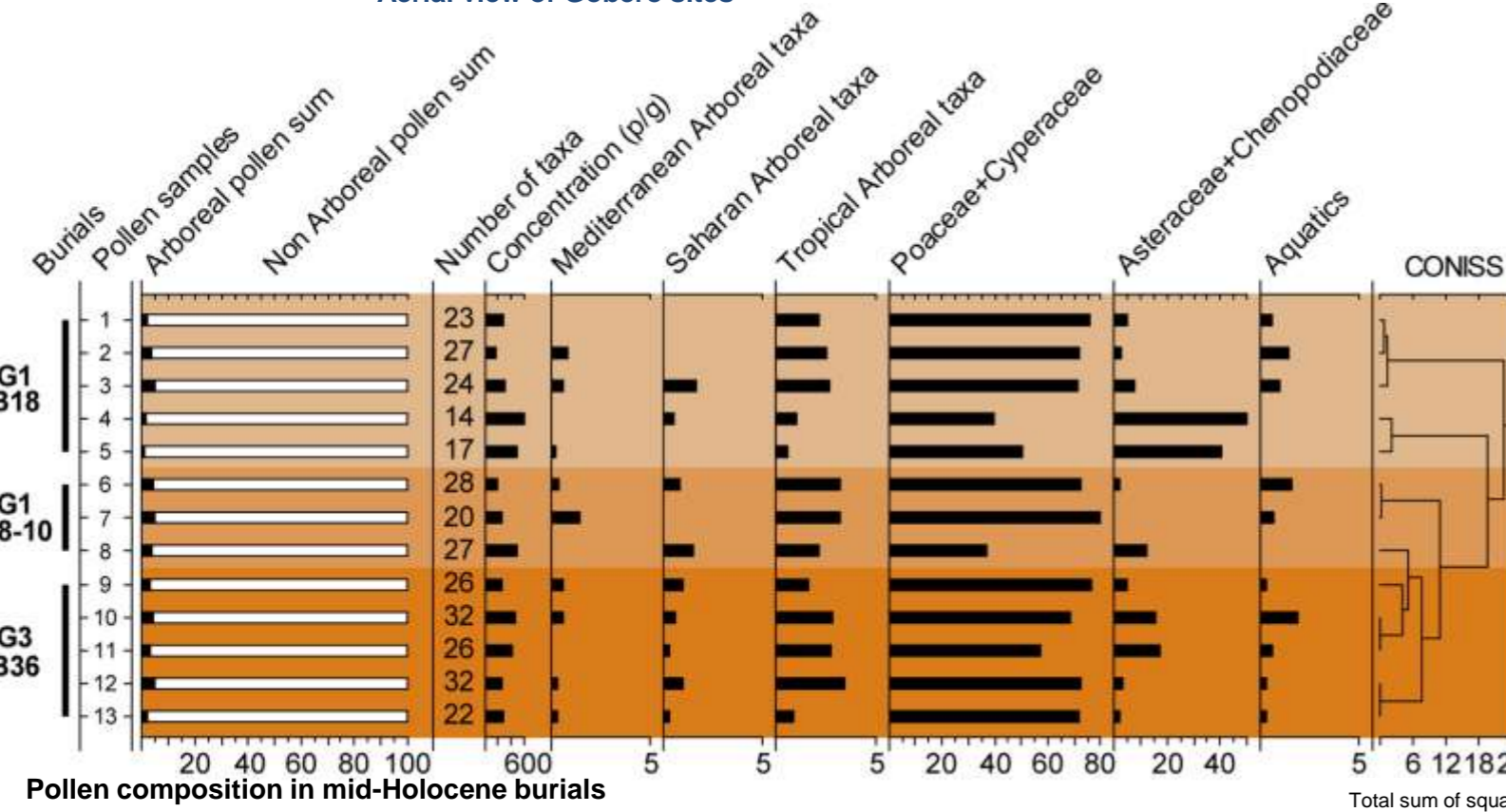


### Lakeside Cemeteries in the Sahara: 5000 Years of Holocene Population and Environmental Change

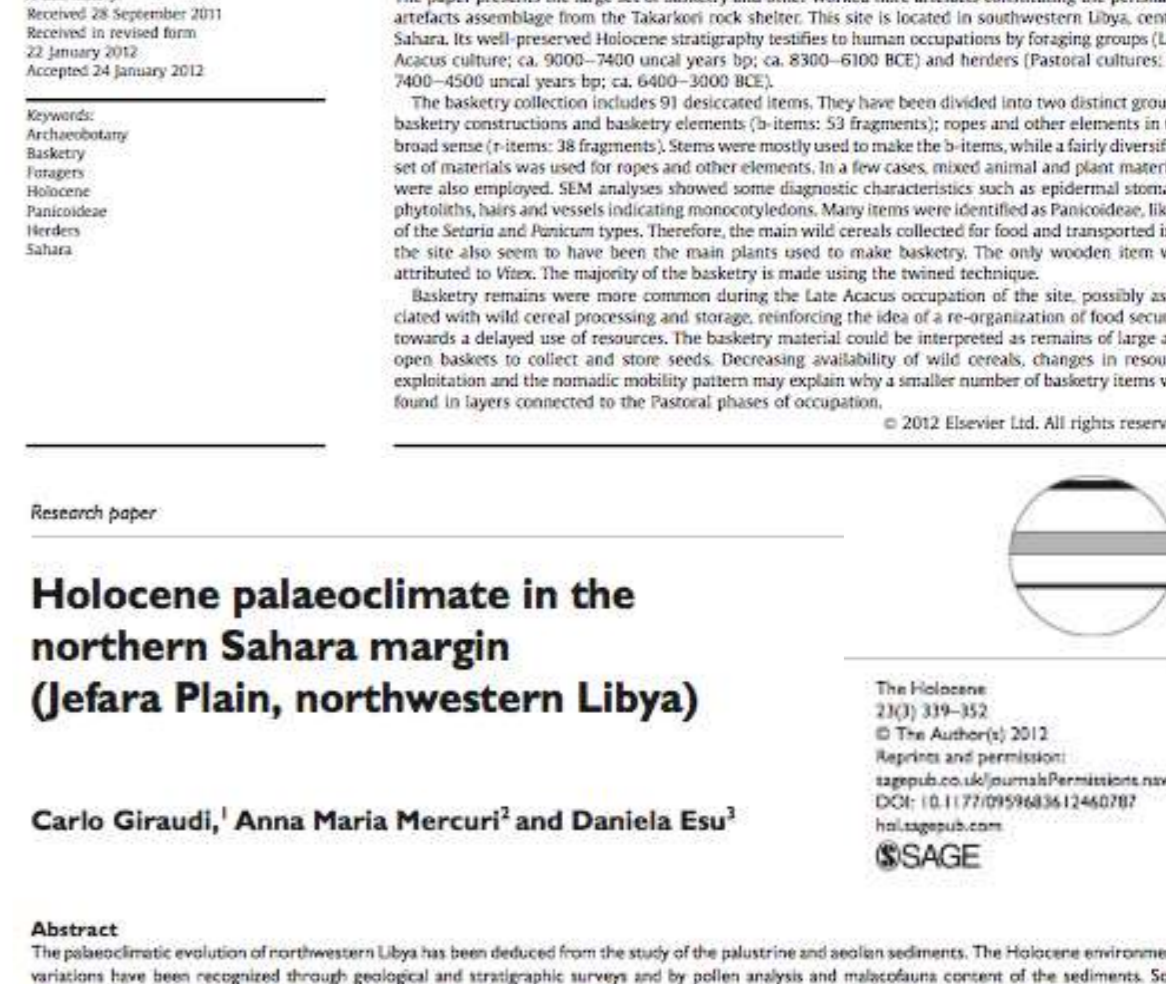
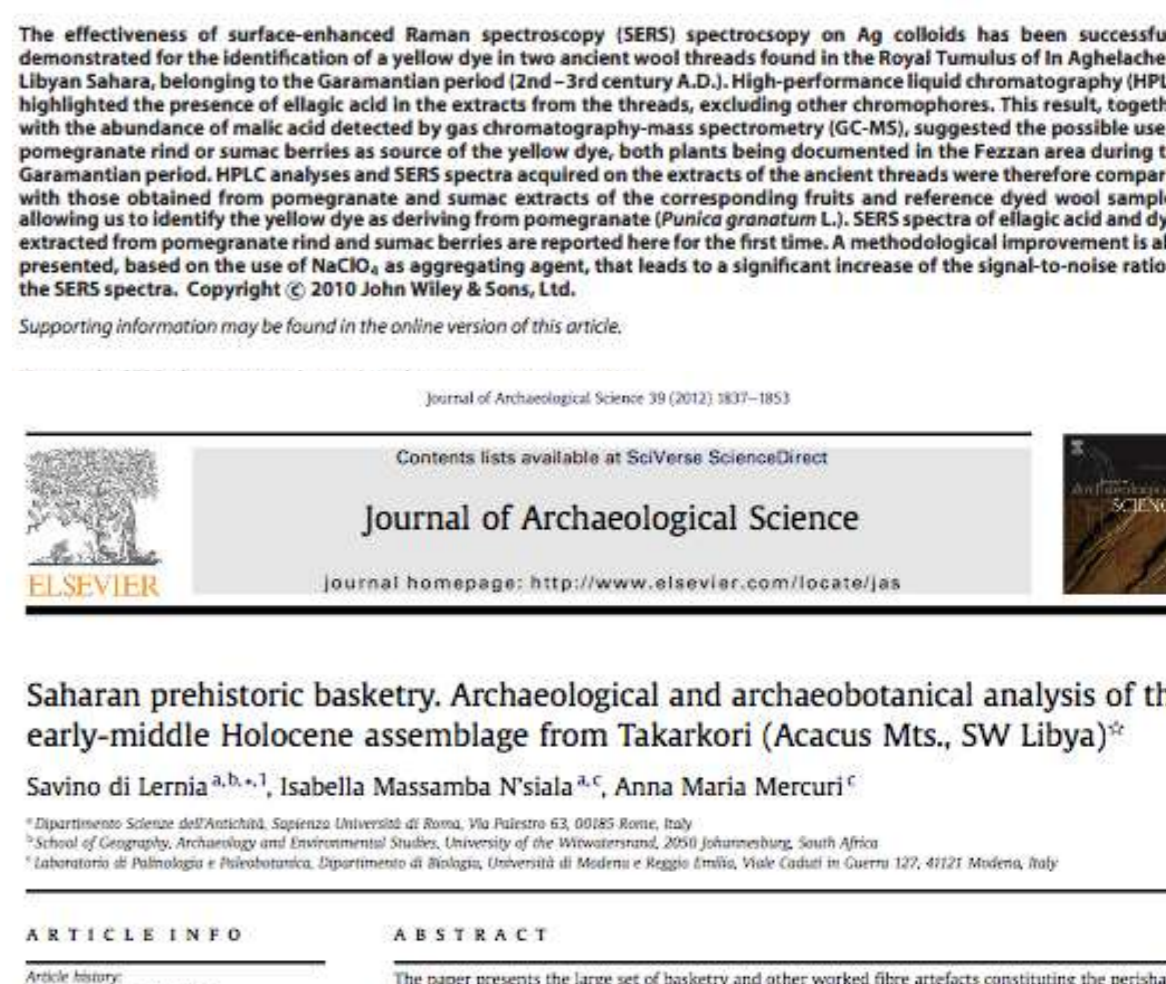
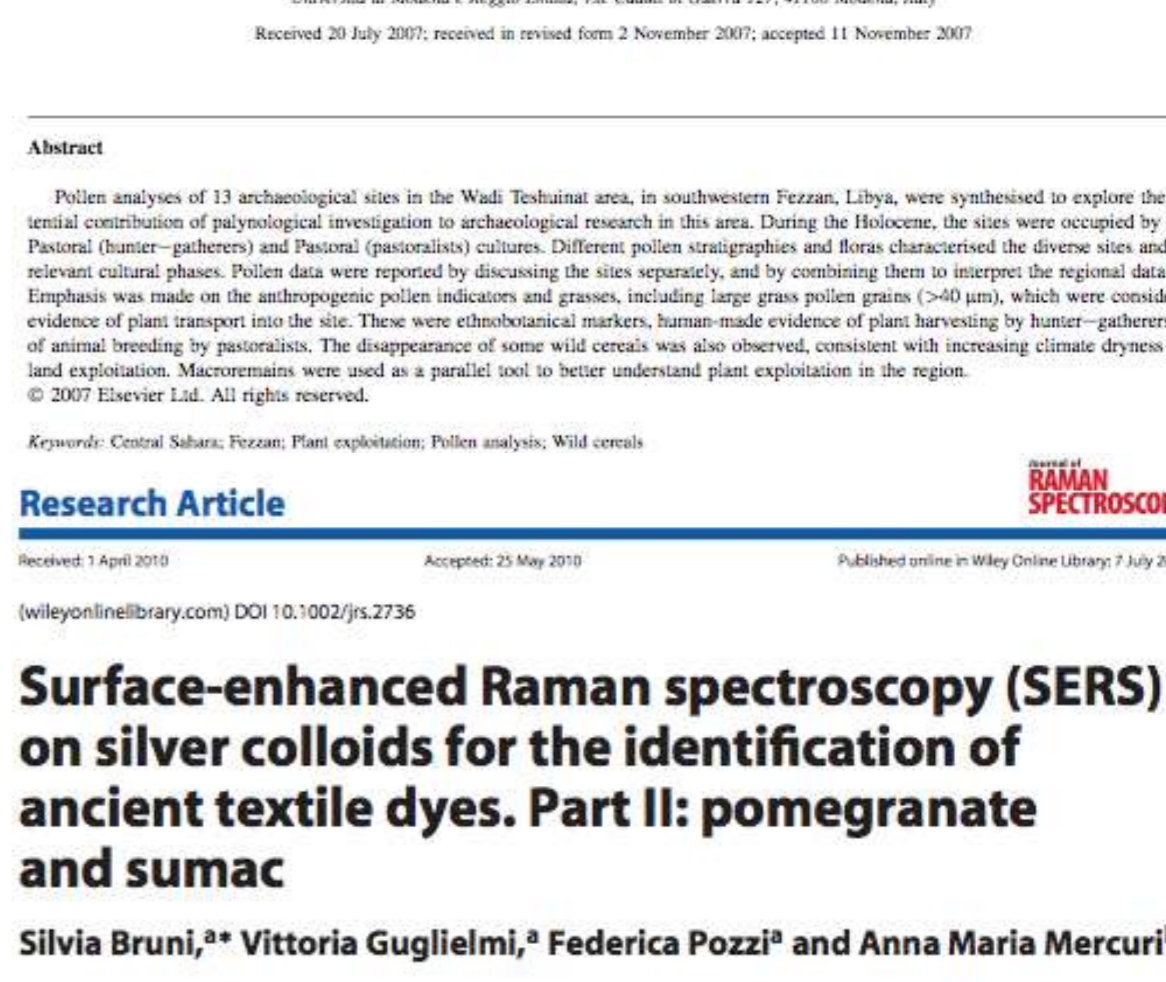
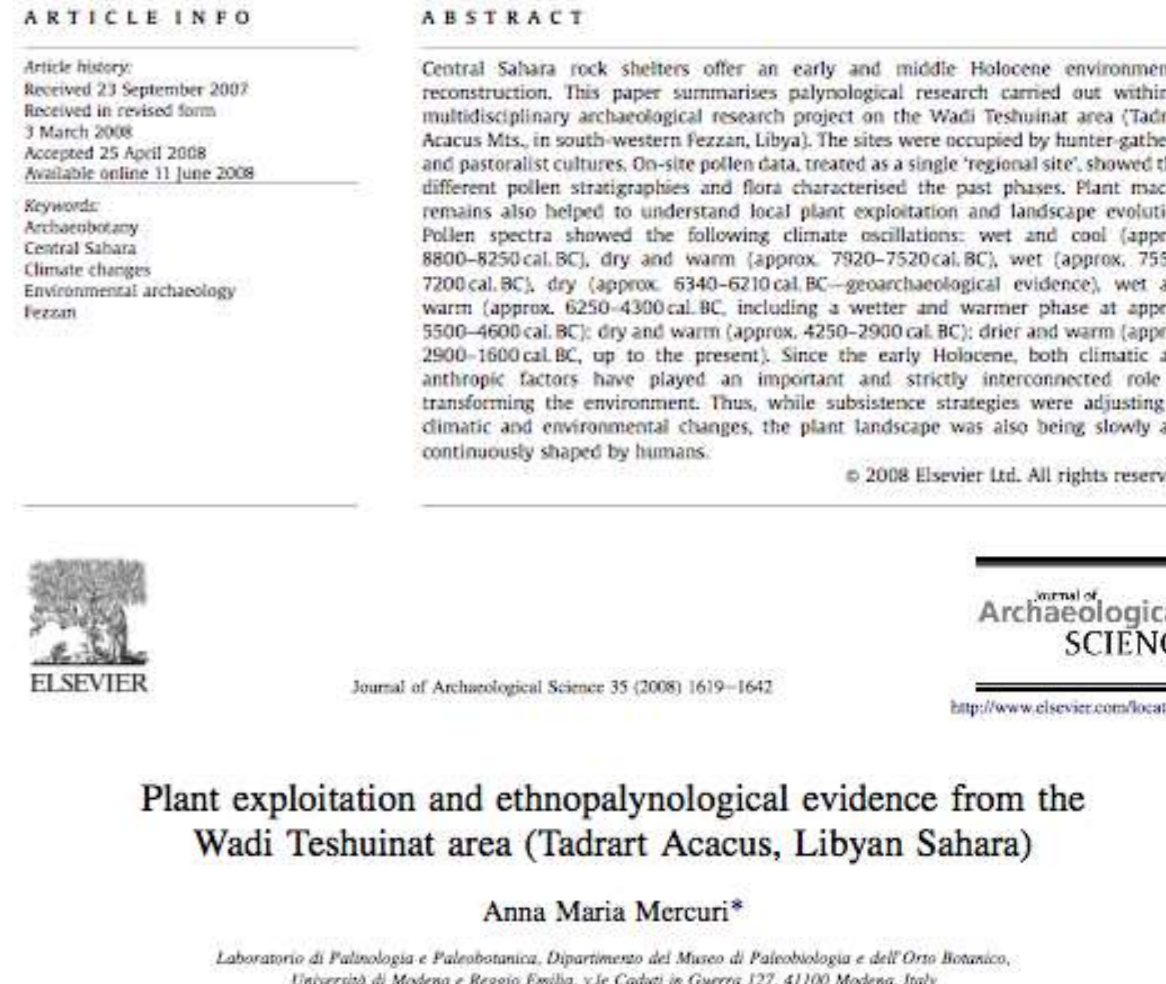
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Approximately two hundred human burials were discovered on the edge of a paleolake in Niger that provide a uniquely preserved record of human occupation in the Sahara during the Holocene (~8000 BC to the present). Called Gobero, this suite of closely spaced sites chronicles the rapid pace of biosocial change in the southern Sahara in response to severe climatic fluctuation.



Top: (A) adult male (~4645 BC) buried in a recumbent hyperflexed posture. (B) Bottom view of burial in A showing a mud turtle carapace. (C) Skull from burial in A and B showing high calvarium, narrow zygomatic width and more prognathous face. (D) Mid-Holocene juvenile (~2835 BC) with upper arm bracelet of hippo ivory. (E) Mid-Holocene triple burial involving an adult female (~3315 BC) and two juveniles with intertwined arms, hands and legs. (F) Schematic showing skeletal positions in the triple burial with the adult female on right (tan) facing juveniles with estimated ages of 8 years (black) and 5 years (red). (G) Pollen of *Colasylea type trygini* discovered between the arms. Left: (1) anthropological reconstruction and (2) environmental sketches made by the NG team; (3) burial *in situ*; (4) the burial of a woman and the pollen sampling (made by Isabella Massamba N'siala); pollen shows the specific deposition of flowers of scent/medicinal plants. They are Caper (5-*Capparis*) and Myrtle (6-*Myrtus*)



Rarely do early and middle Holocene contexts feature in the same area the combination of settlement, ceremonial and rock art features so as in the Messak plateau in the Libyan central Sahara. Known for its rich rock art, the region, through our research, has also shown to preserve a complex ritual dated to the Middle Pastoral (5200–3800 BC). This was centred on the deposition in stone monuments of disarticulated animal remains, mostly cattle.

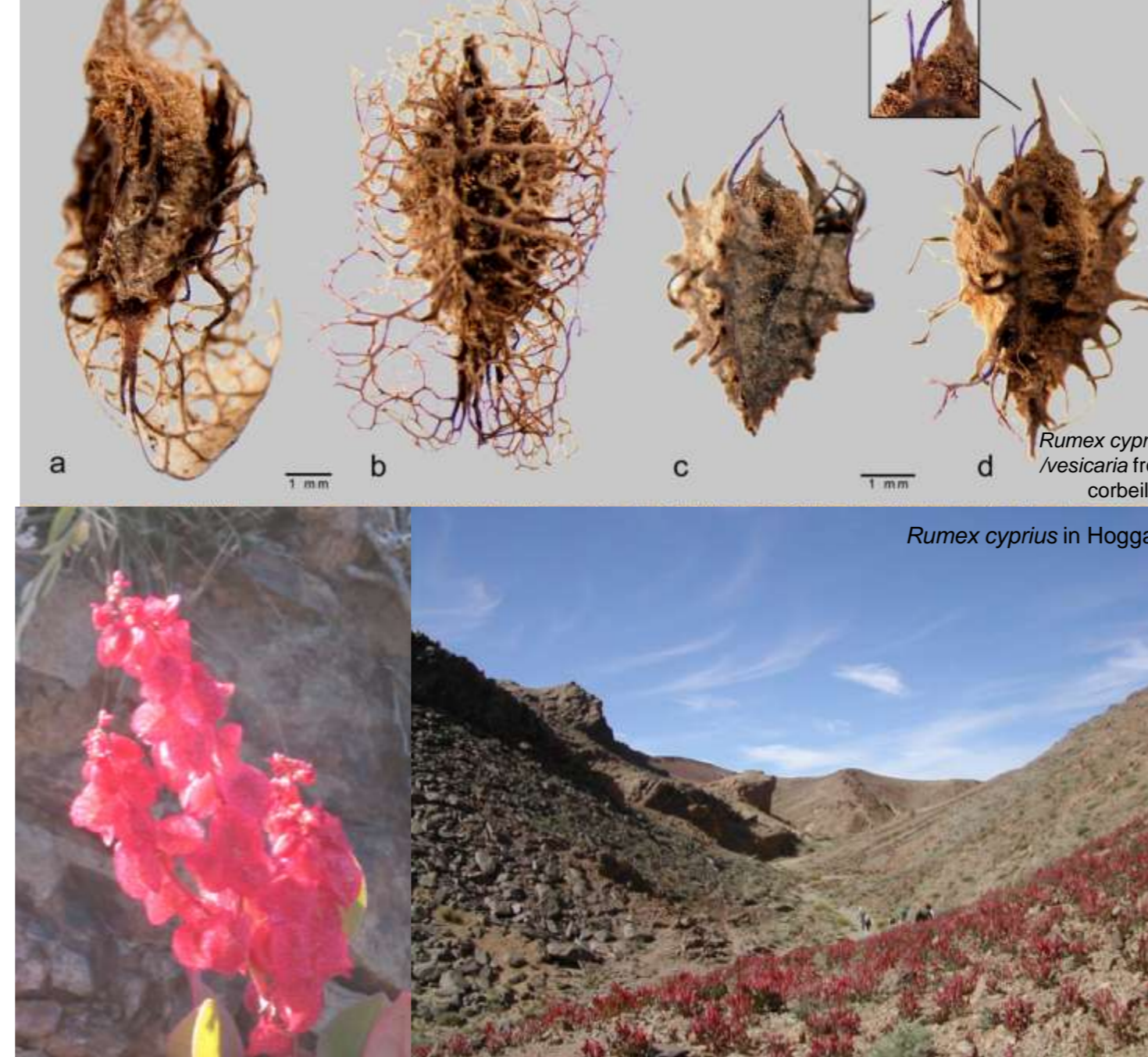


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### Inside the "African Cattle Complex": Animal Burials in the Holocene Central Sahara

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### Surface-enhanced Raman spectroscopy (SERS) on silver colloids for the identification of ancient textile dyes. Part II: pomegranate and sumac

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The effectiveness of surface-enhanced Raman spectroscopy (SERS) spectroscopy on Ag colloids has been successfully demonstrated for the identification of a yellow dye in two ancient wool threads in the Royal Tomulus of Aghelshem, Libyan Sahara, belonging to the Garamitanian period (2nd–3rd century A.D.). High-performance liquid chromatography (HPLC) highlighted the presence of ellagic acid in the extracts from the threads, excluding other chromophores. This result, together with the abundance of malic acid detected by gas chromatography-mass spectrometry (GC-MS), suggested the possible use of pomegranate rind or sumac berries as source of the yellow dye, both plants being documented in the Fezzan area during the Garamitanian period. HPLC analyses and SERS spectra acquired on the extracts of the ancient threads were therefore compared with those obtained from pomegranate and sumac extracts of the corresponding fruits and reference dyed wool samples, allowing us to identify the yellow dye as deriving from pomegranate (*Punica granatum* L.).

Keywords: Holocene, paleoclimate, northern Sahara margin, (Jefara Plain, northwestern Libya)