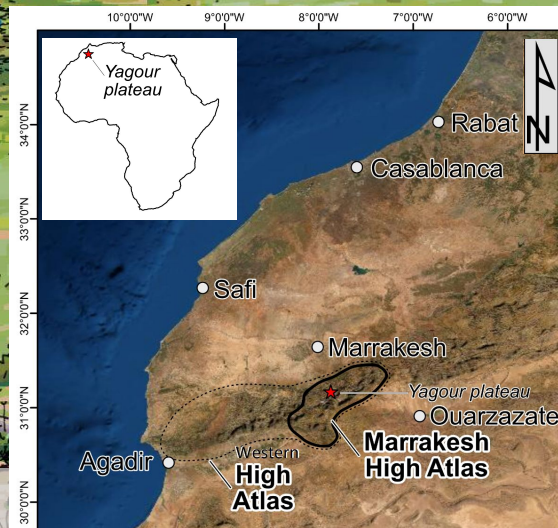
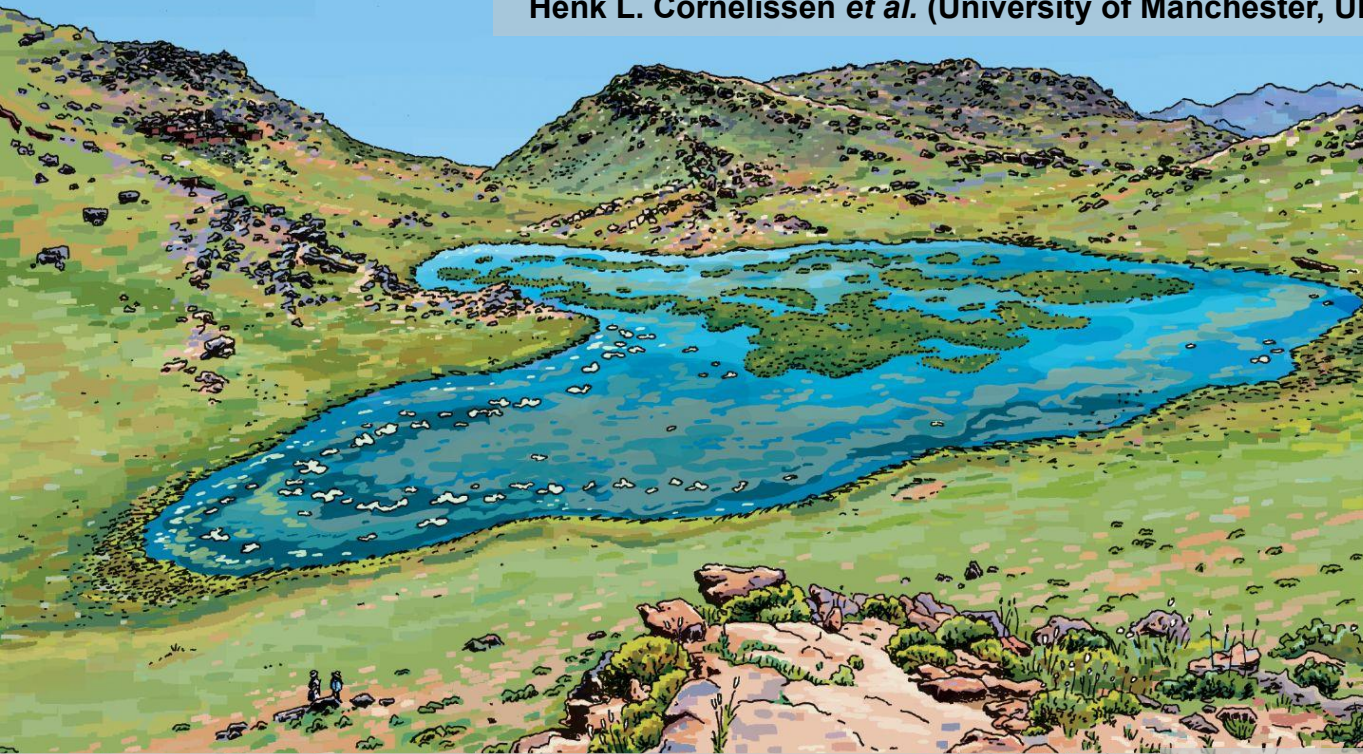


Ancient steroids: Human faecal signals and environmental data from a Holocene sediment record of the Yagour Plateau, High Atlas, Morocco. EGU General Assembly 2022 (27-05)

Henk L. Cornelissen *et al.* (University of Manchester, UK)



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Illustration:
Lae Schäfer
(2021)

Yagour plateau: 31.31°N, 7.60°W, 2460 m.

YP19-3 Record

- Yagour plateau
- Marginal lake core
- 2.8 metres
- Holocene and Late-Glacial

Record chronology

- Radiocarbon dating of pollen concentrates and bulk sediments
- Robust Holocene age-depth model
- 21 data points

Agdal system

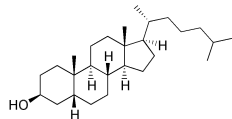
- Community institution
- Regulates access to pastoral resources
- Yagour plateau is closed in spring months
- Protects springtime development of vegetation



Analysis of human faecal signals

Indicators for human presence:

- Coprostanol concentrations
- R1 and R2 values
- 25 data points



Palynology

- e.g. arboreal groups, grazing indicators
- 101 data points

Charcoal analysis

- Macrocharcoals ('local' fire signal)
- 228 data points

Five key stanol (steroid) compounds:

- 1a 5 β -coprostanol
- 1b 5 β -epicoprostanol
- 2 5 α -cholestanol
- 3a 5 β -stigmastanol
- 3b 5 β -epistigmastanol

R1 values =

Human faecal signals corrected for microbial degradation

$$\frac{1a + 1b \text{ (Epi-)coprostanols}}{1a + 1b \text{ (Epi-)coprostanols} + 2 \text{ cholestanol}}$$

(Bull et al., 2002)

R2 values =

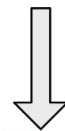
Ratio of ruminant to omnivore signals

$$\frac{1a + 1b \text{ (Epi-)coprostanols}}{3a + 3b \text{ (Epi-)stigmastanols}}$$

(Schroeter et al., 2020)

Human gut

Nutrients (e.g. Cholesterol)



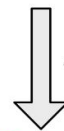
Degradation by gut microbial communities

1a 5 β -coprostanol
High concentrations in human faecal matter

(Bull et al., 2002; Leeming et al., 1984)

Ruminant gut(s)

Nutrients (e.g. plant sterols)



Degradation by gut microbial communities

3a 5 β -stigmastanol
High concentrations in herbivore faecal matter

(Bull et al., 2002)

Input in sediments

Natural environment

Degradation by soil microbial communities



1a 5 β -coprostanol

2 5 α -cholestanol 1b 5 β -epicoprostanol

Physical degradation

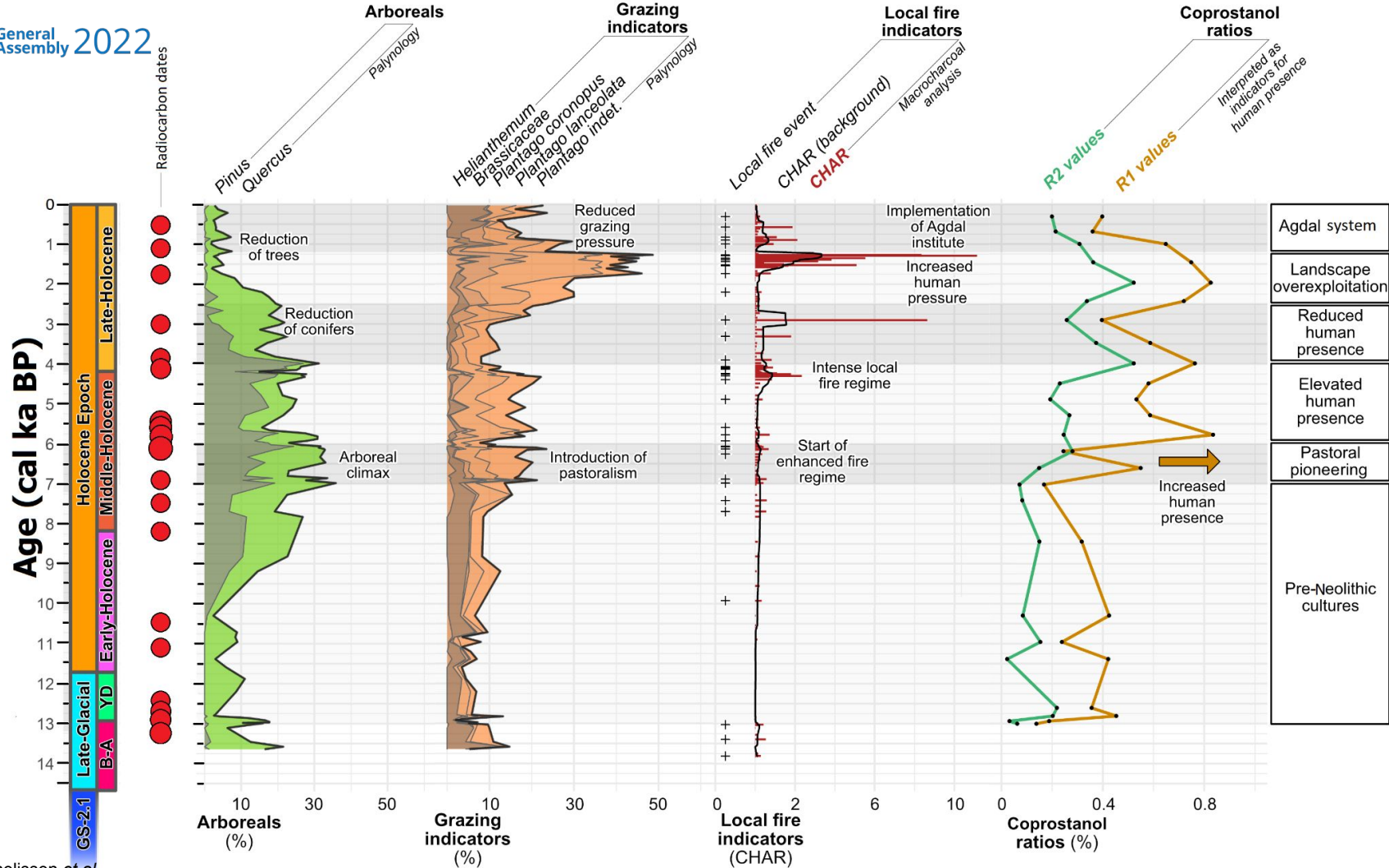


3a 5 β -stigmastanol




3b 5 β -epistigmastanol

(Bull et al., 2002)



Main conclusions:

- 1 Earliest detection of local pastoralism between 7.0 and 6.0 ka BP
- 2 Implementation of the local Agdal regulatory system tentatively dated to 1.2 ka BP
- 3 Interplay of humans and climate on the local environment since the arrival of pastoralism

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