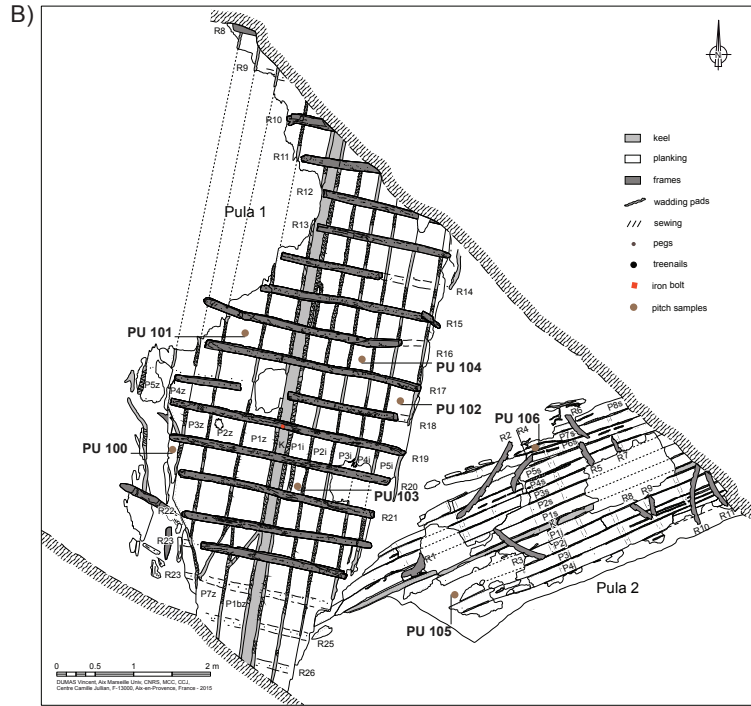


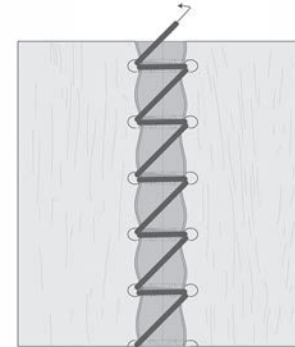
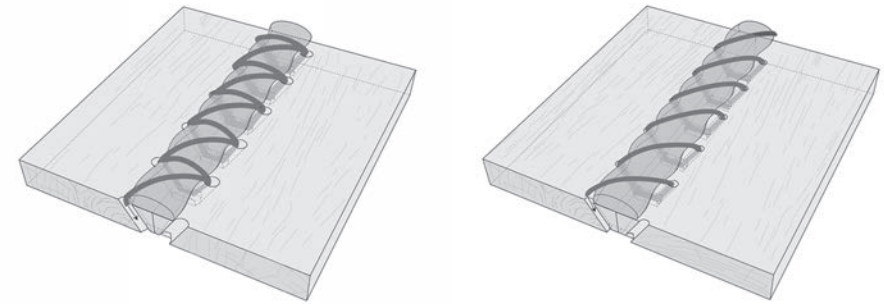
Figure 1. (A) Geographical location of the study area in Croatia. The position of Pula is shown in red (from Dumas and Boetto, Aix Marseille University, CNRS, CCJ). (B) Location of Pula 1 and 2 shipwrecks in Pula. (from Boetto, Aix Marseille University, CNRS, CCJ).



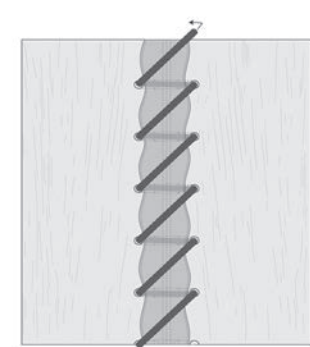
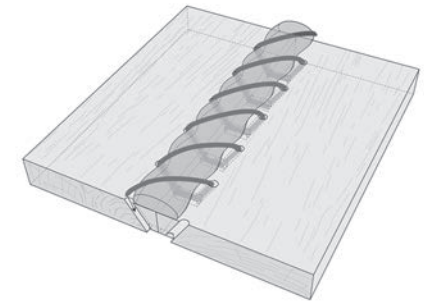
A)



B)



A



B

stitch channels oblique (in section)
and perpendicular (in plan view)
to the plank edge

Figure 2. (A) The Roman sewn boats of Pula during excavation: in the forefront Pula 2, in the background Pula 1 (photo: Braiković). (B) Plan of the wrecks (from Dumas, Aix Marseille University, CNRS, CCJ).

Figure 3. Axonometric illustrations of the sewing systems of: (A) Pula 1 and (B) Pula 2 (from Poveda, Aix Marseille University, CNRS, CCJ).

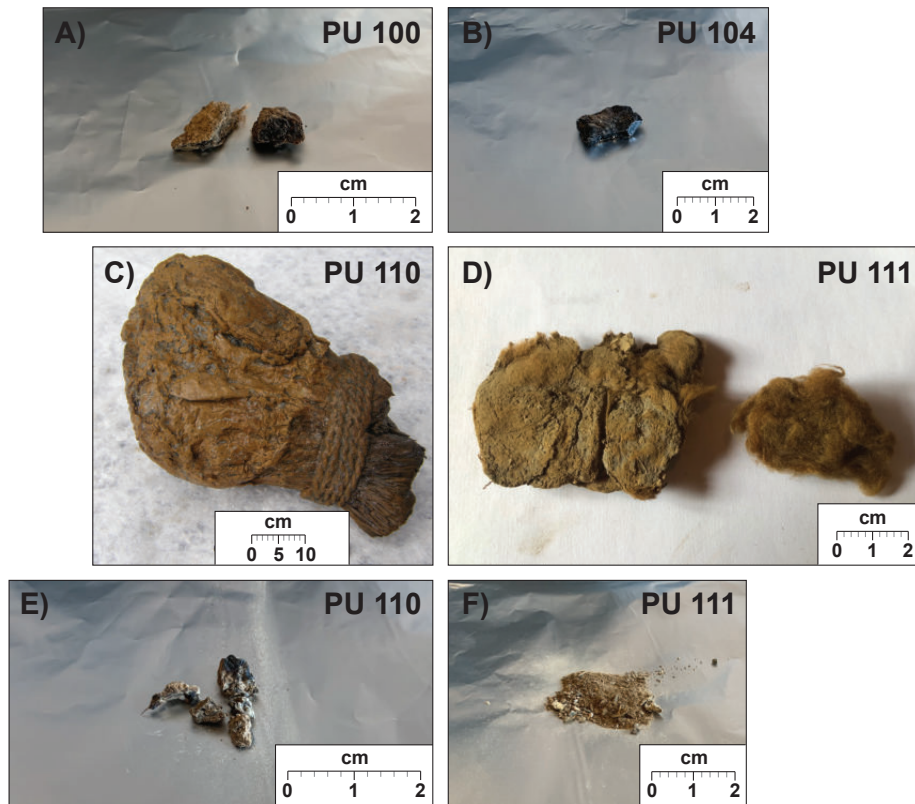


Figure 4. Examples of samples of pitch analysed in this study. Pula 1 wreck: (A) PU 100 and (B) PU 104. Artefacts found in the harbour sediment near the wrecks: (C) Pitch-coated brush - PU 110. (D) Pitch-coated fibrous mass - PU 111 - harbour artefact. (E) Pitch extracted from the brush - PU 110. (F) Pitch extracted from the fibrous mass - PU 111. (photos: Couillebault, Aix Marseille University, CNRS, CCJ and Braiković).

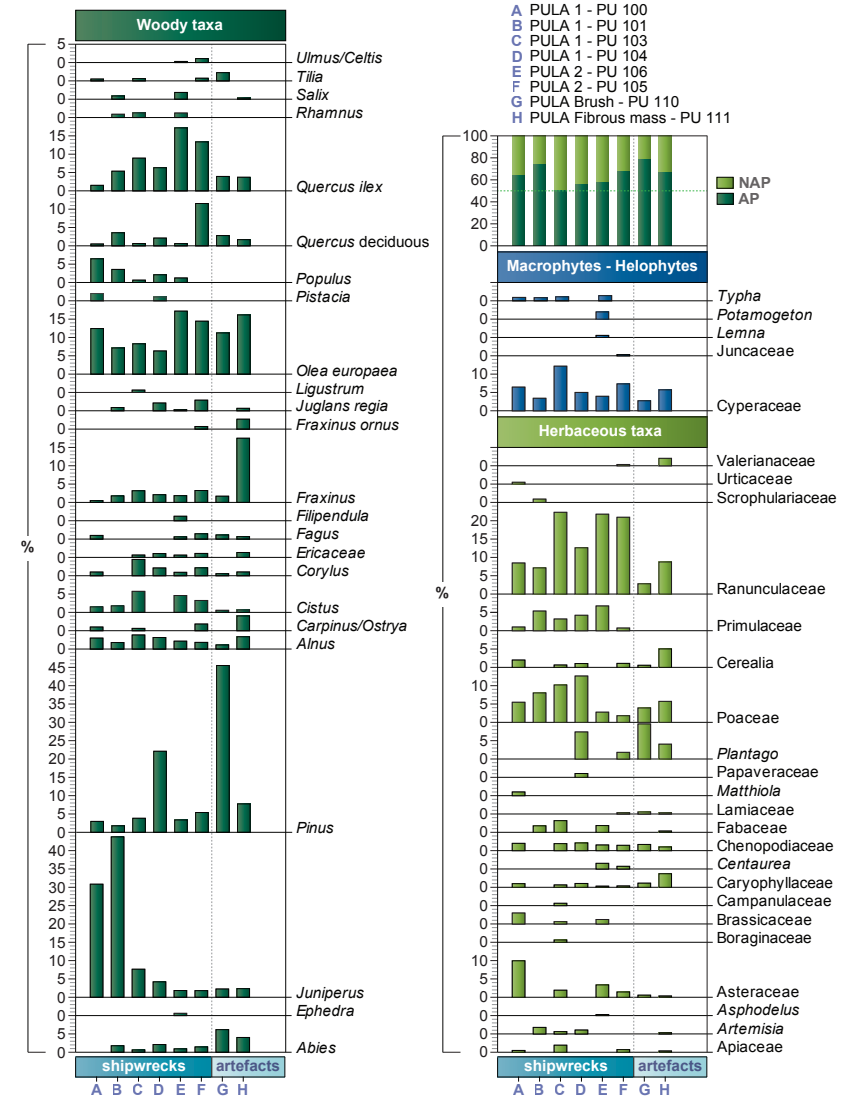


Figure 5. Detailed pollen diagram (woody and herbaceous taxa) for the two pitch samples from the wrecks Pula 1 and 2, and from the brush and wool mass. The taxa have been plotted based on the pitch samples, which have been divided into shipwrecks and artefacts recovered from the harbour sediment, such as brush and fibrous material.

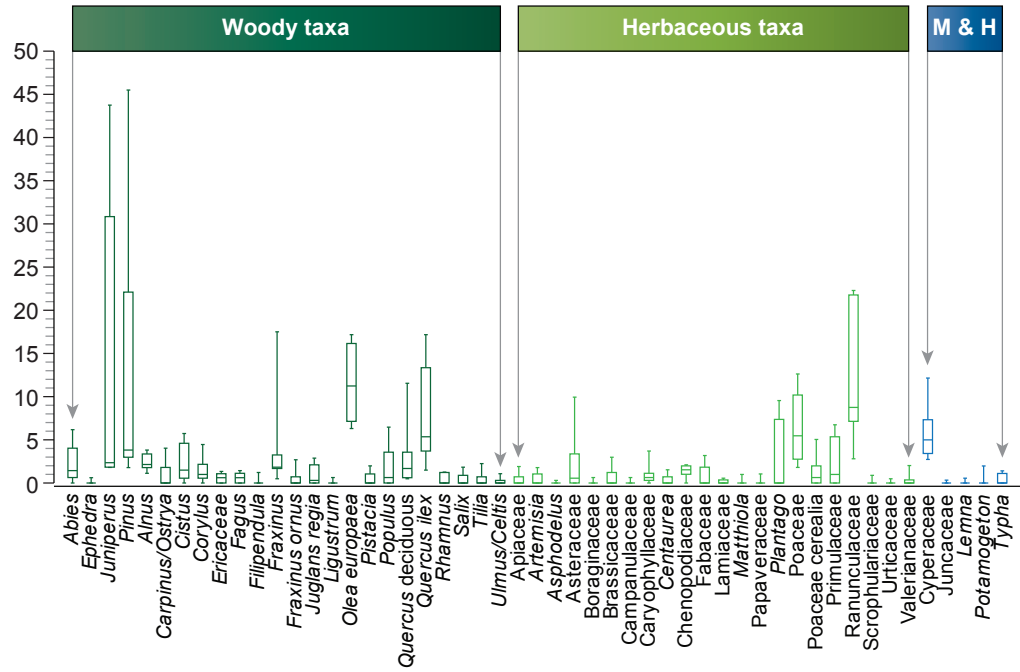


Figure 6. Boxplots depicting the importance of each taxa. Boxplots include the taxa from the 8 samples, including the wrecks and artefacts found in the harbour sediment (brush and fibrous material).

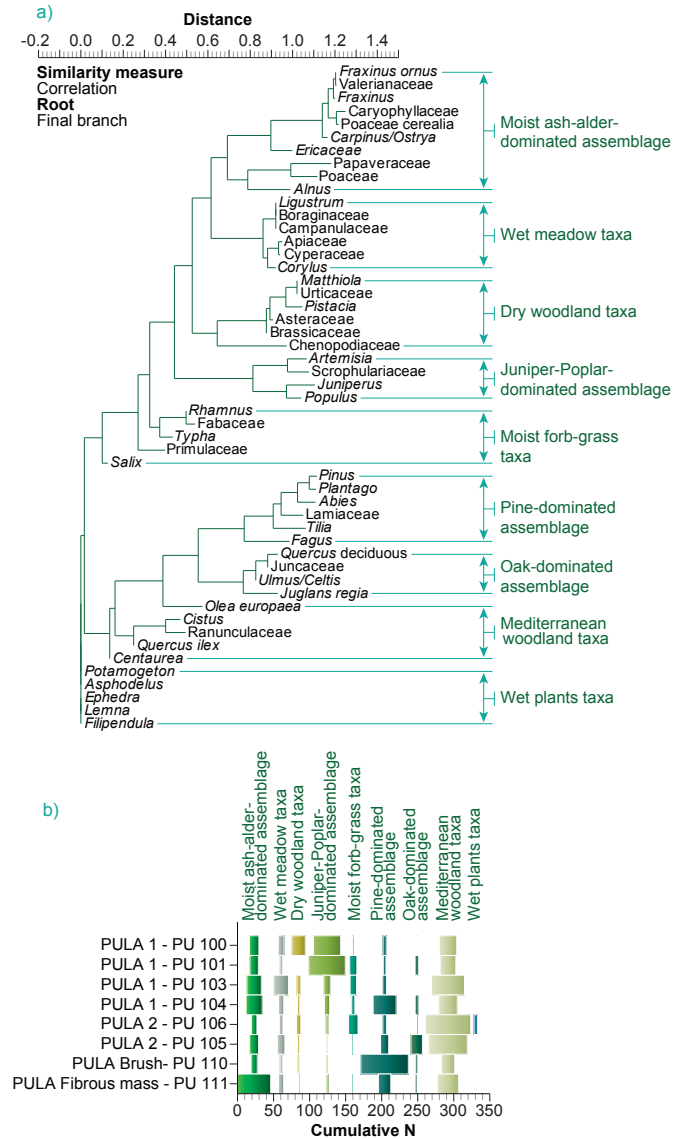


Figure 7. Pollen-based clusters from Pula. (A) A neighbour joining cluster analysis (descending type, Correlation as the similarity measure, Final branch as root) was used to define the pollen assemblages. (B) Each cluster was summed to create the PdVs, which are shown as a spindle diagram. .

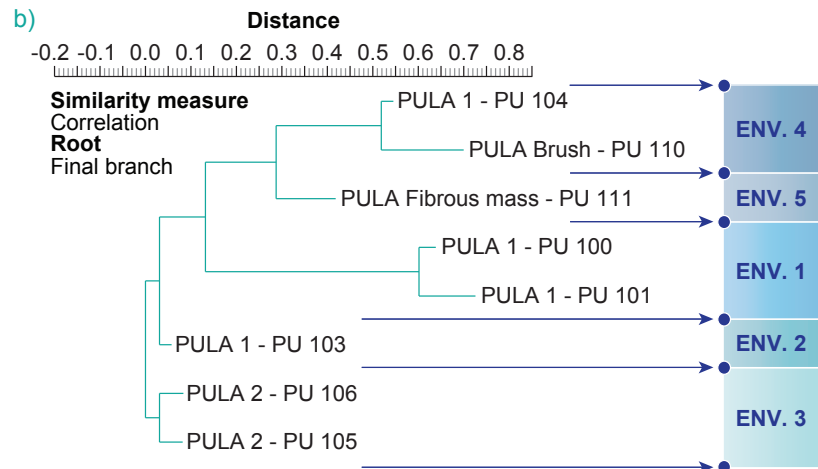
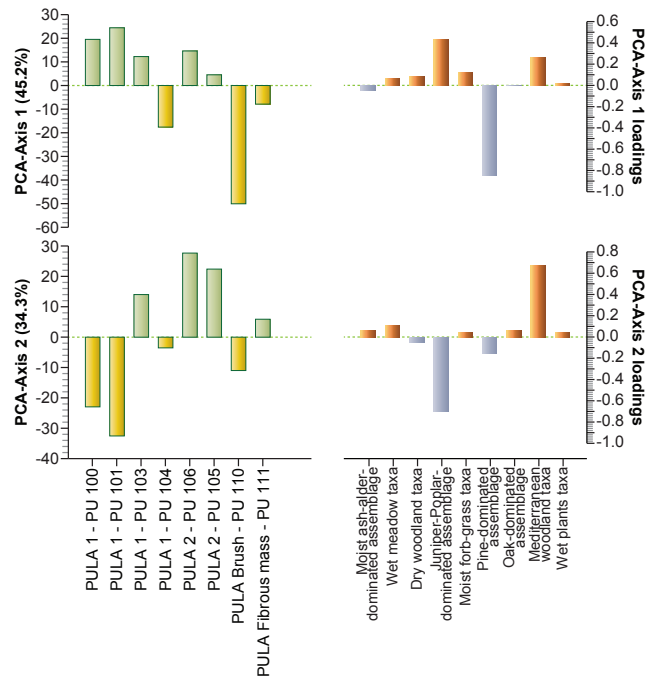
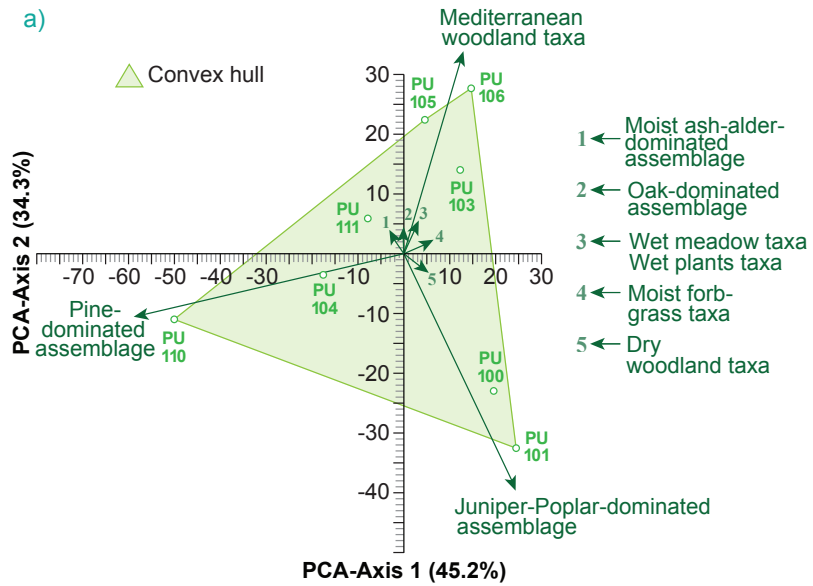


Figure 8. Pollen-based environment clusters from Pula. (A) Biplot principal component analysis (79.5% of total variance) depicting the distribution of samples according to major changes in the PdV-scores. The convex hull is drawn on the graph. (B) Neighbour joining cluster analysis (descending type, Correlation as the similarity measure, Final branch as root) defining the environmental assemblages.