

EFFECTS OF LATE QUATERNARY CLIMATIC CHANGES ON AN EXPOSED CLAY LAYER IN THE LAGOON OF VENICE (ITALY)1

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Well-dated evidences of different nature, from stratigraphy, sea level and coastline changes, to pollen and paleobotanical findings, have indicated climatic changes in the Venetian basin during the transition from the Late Pleistocene to the Holocene. The sedimentation or lack of it during that period, carries the imprint of those changes. Within this sedimentation sequence is a series of compacted clay layers, locally called *caranto*, from few centimeters to few meters thick, that is the subject of this study. These clay layers represent the last continental, lacustrine-fluviatile, sedimentation during the Late Pleistocene. They carry the marks of climate changes that characterized the last phase of the Pleistocene and the early part of the Holocene. This cold and dry to very dry climate of the Pleistocene Würm glacial period, about 20,000 years B.P., characterized the last continental

sedimentation. A period of emergence of about 11,000 years (from 18,000 to 7,000 years B.P.) characterized the final phase of the Pleistocene, with almost no sedimentation. During this time the climate improved and the carbonate muds were drained, desiccated, compacted and oxidized to form the overconsolidated clay level representative of the Holocene/Pleistocene limit. While the climate improved the sea level began to rise over the northern Adriatic paleoplain (Flandrian transgression), and the coastline moved northwards its present position. The intense fluvial activity at first and the marine one later, partly eroded and reworked the hard clay layers leaving deep scars in the morphology. This study gives the result of physical, chemical, mineralogical, textural and geotechnical investigations of the compacted clay layer that is considered as the Pleistocene/Holocene limit.

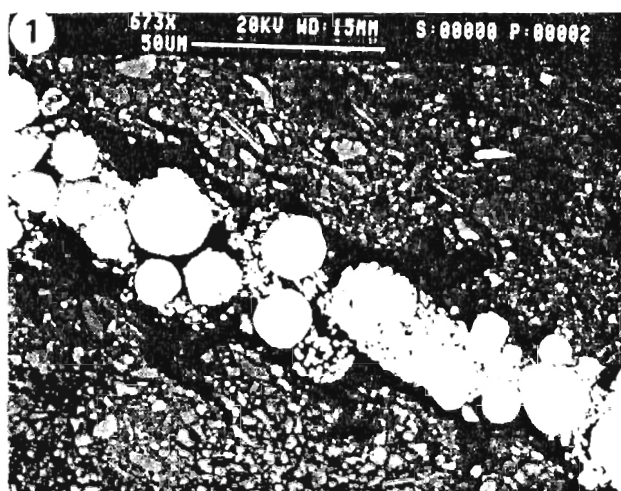


Fig. 1: Framboids of authigenic pyrite microcrystallites (bright grains, <2 m) growing along a crack in the sediment (bar scale 50 m).

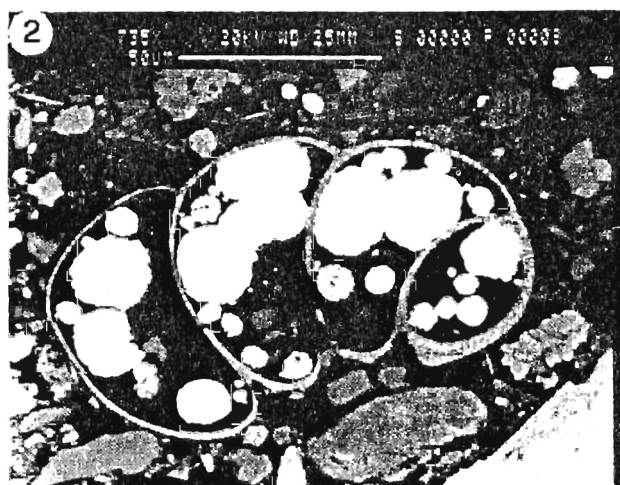


Fig. 2: Framboids of pyrite microcrystallites as replacement in a gastropod (bar scale 50 m).

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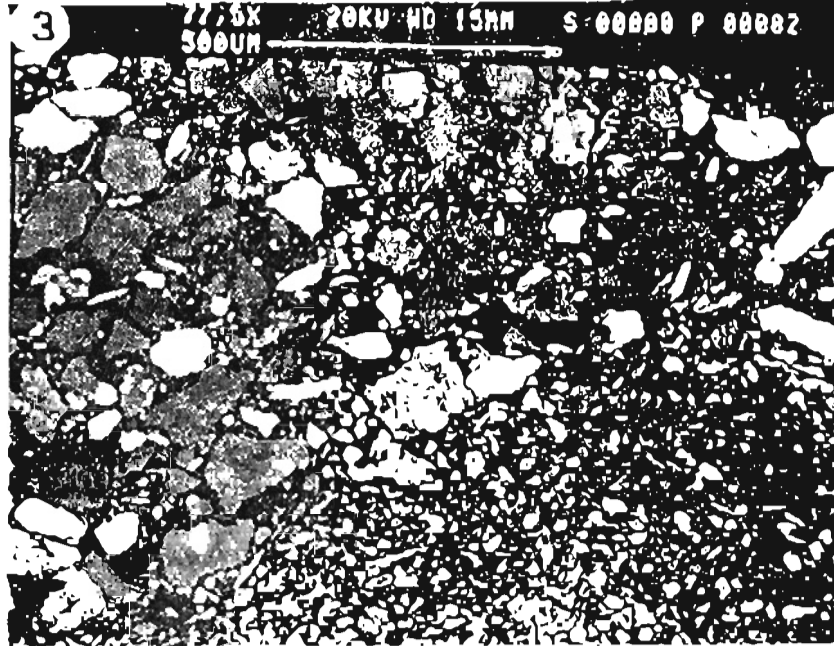


Fig 3 Example of the hard clay(*caranto*) samples. Coarse-grained zone shows poorly-sorted, subrounded to subangular carbonate and silicate detrital grains set in matrix of the same composition. Samples are heterogeneous with lenses and bands of fine-, medium- and coarse-grained zones. Dark- to medium-grey grains are silicate, white grains, carbonates; needle-like grains phyllosilicates, and mottled grains are rock fragments. Black areas are pores(bar scale 500 μ m).

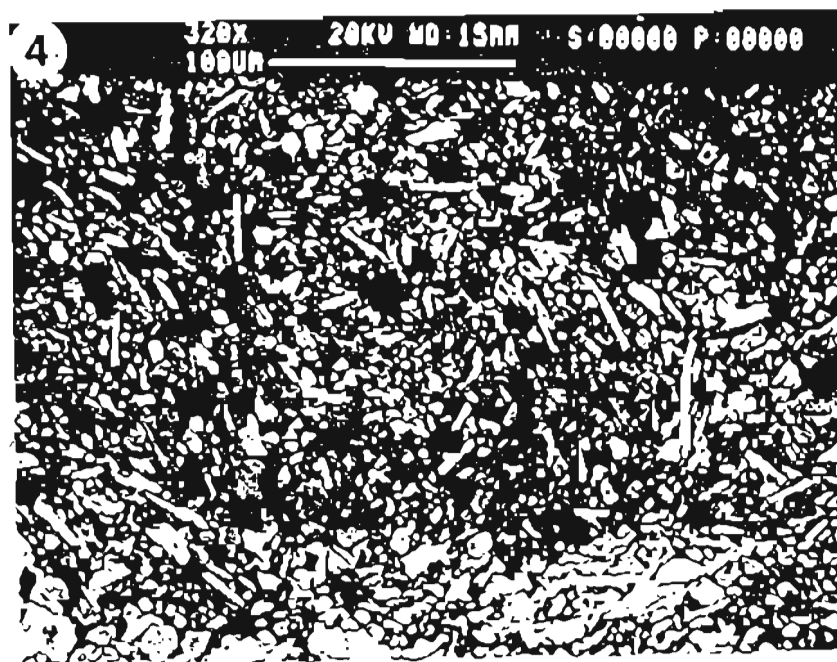


Fig 4: Close up view of a circular clay-rich lens within a *caranto* sample. Note the circular alignment of phyllosilicates(bar scale 50 μ m)

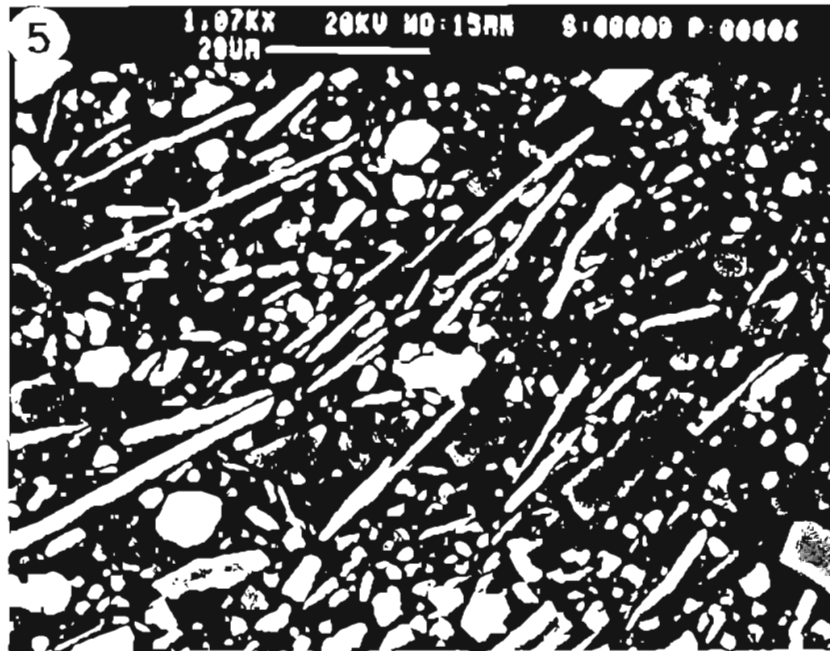


Fig 5 In some *caranto* samples the phyllosilicates exhibit a preferred orientation as a result of compaction. Dark- to medium-gray grains are silicates; white grains, carbonates, elongate bright grains, mica; and black areas are pores (bar scale 20 m)

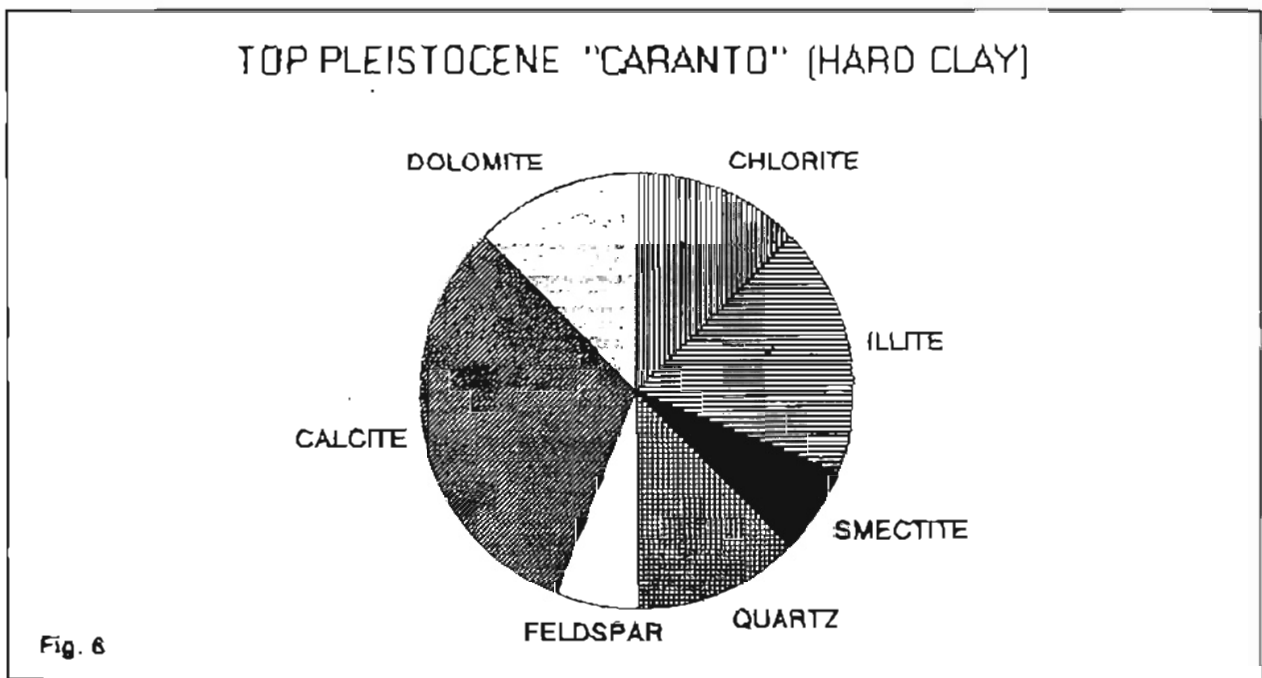


Fig 6: Mineralogical composition of the hard clay.