

# Pietra Pece (Pitch Stone) : historical and geological memory of the Hyblean plateau (South-eastern Sicily)

Punturo R.<sup>(1, 2)</sup>, Indelicato V.<sup>(1)</sup>, Cirrincione R.<sup>(1)</sup>, Maniscalco R.<sup>(1)</sup>, Cassarino G.<sup>(3)</sup>

*Rocks that have run across... ..much road!*

(1) Dipartimento di Scienze Biologiche, Geologiche ed Ambientali, Università degli Studi di Catania (2) IGA-CNR Roma (3) Geologo libero ricercatore, ex Direttore Museo Regionale dell'asfalto di Castelluccio e Tabuna e Direttore U.O. Archeologia della Soprintendenza di Ragusa.

## Introduction & Geological context

The «**Pietra Pece**» (i.e., pitch stone) is a carbonate rock impregnated with natural **bitumen** that outcrops in the Ragusa area, on the south-eastern area of Sicily. The impregnations are found mainly in the carbonate rock levels of the **Irminio Member of the Ragusa Formation**, which represents the reservoir rock. These impregnations rise from the blackish clays of the **Streppenosa Formation** (the source rock) thanks to faults. Asphaltic rock was extracted both open pit and in tunnels, as in the mines of Tabuna, Cava Pece, Streppenosa and Castelluccio. Pitchstone is characterized by excellent physical-mechanical properties and has therefore been widely used over the centuries as a **valuable material** in art, for the creation of statues, sculptures and tombs, and as a **construction material**, for example for road paving (the asphalt from Sicily arrived on the roads of Berlin, Paris, Amsterdam, London, Milan and Palermo) and architecture (especially in the reconstruction of the cities of south-eastern Sicily after the earthquake of 1963, recognized and included in the **UNESCO World Heritage List "Late Baroque Cities of Val di Noto"**). It has also been used in the industrial field for the **extraction of hydrocarbons**.

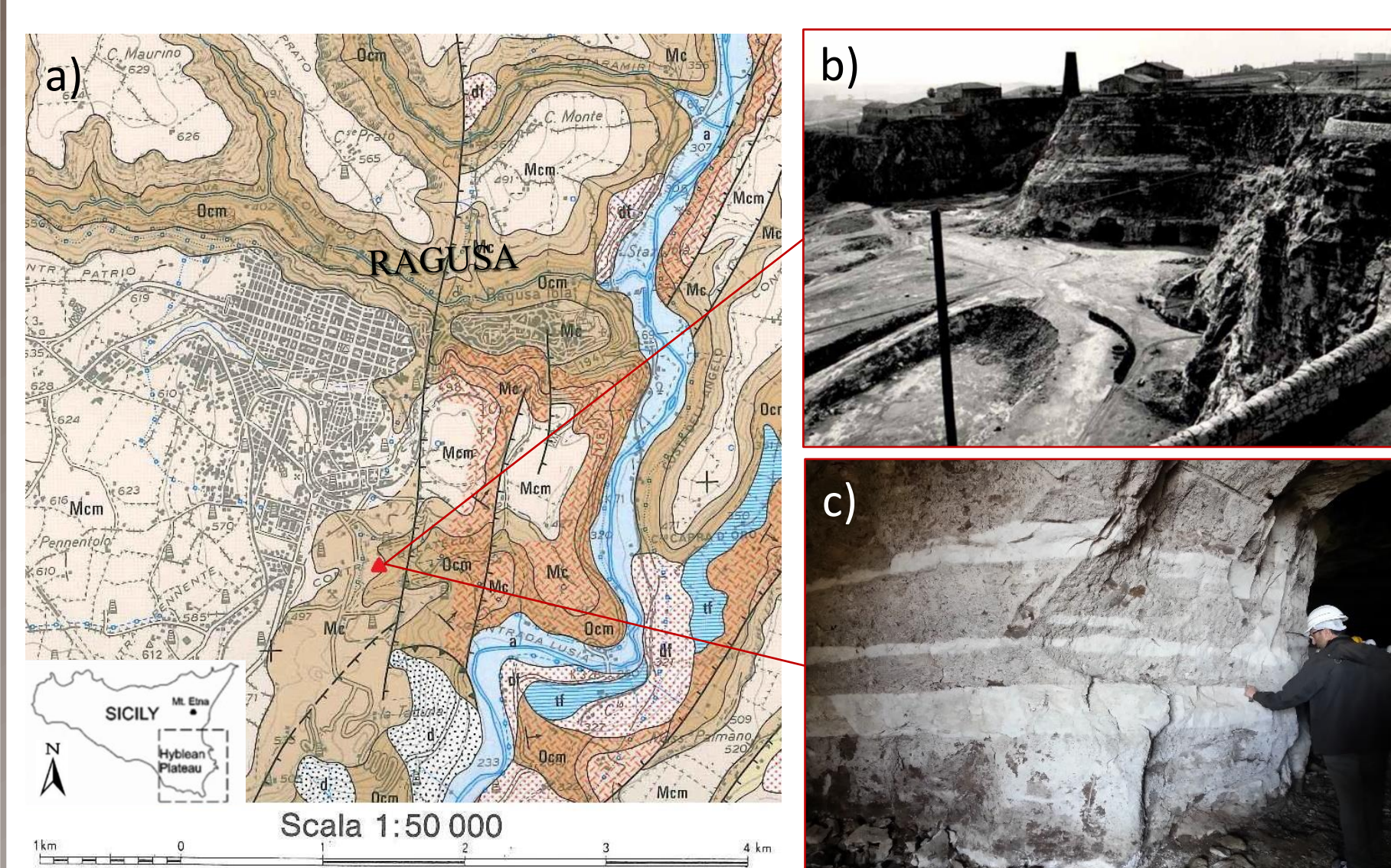


Fig. 1 – a) Localization of the mining area C/da Tabuna (marked with ▲ symbol) on the geological map of the central-southern sector of the Hyblean Plateau; b) quarry and tunnel excavation fronts in the 1950s (COLACEM document archive); c) outcrop view in the Tabuna mine (photo by Rosalda Punturo).

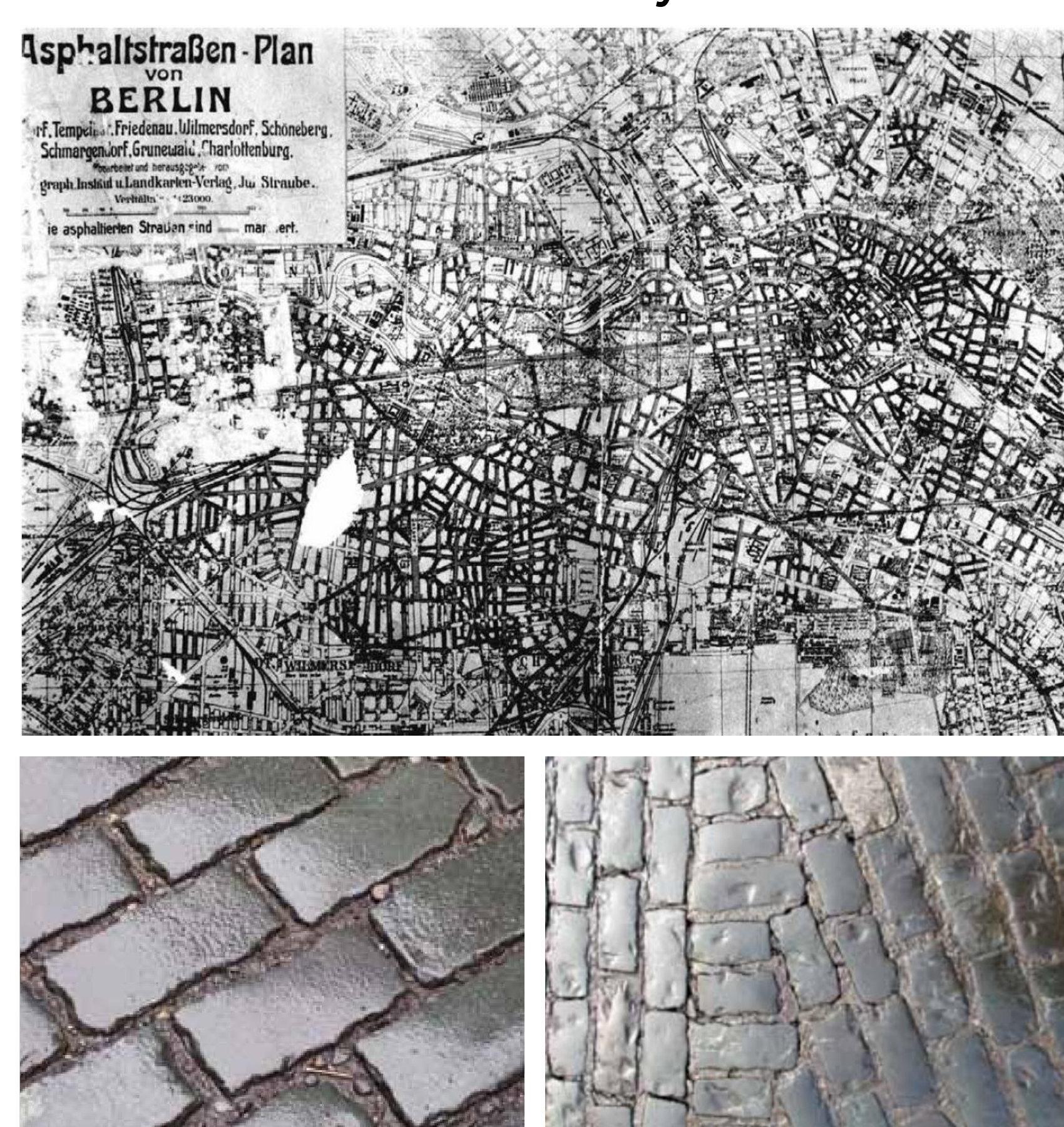


Fig. 2 – Berlin paving project and examples of pitch stone paved roads.

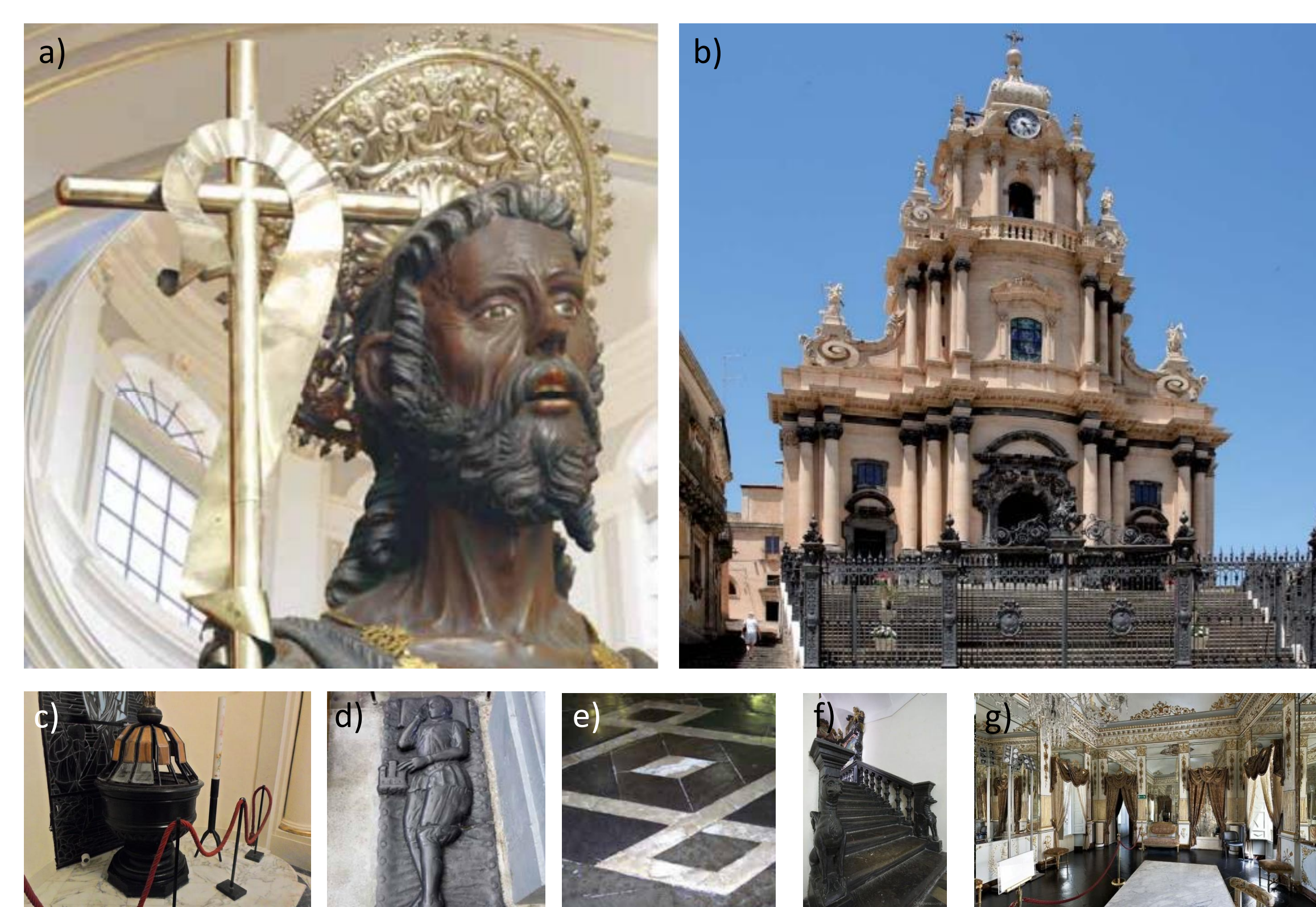


Fig. 3 – a) Statue of “San Giovanni u Niuru” preserved in the Cathedral of Ragusa Ibla; b) Bichromatic façade of the Cathedral of San Giorgio (Ragusa Ibla); c) baptismal font from 1545; d) 16th century tombstone; e) flooring in the Cathedral of San Giovanni Battista (Ragusa); f) staircase of the convent of San Francesco all’Immacolata (Ragusa); g) flooring at Donnafugata Castle (Ragusa).

## Petrography of the two main lithotypes

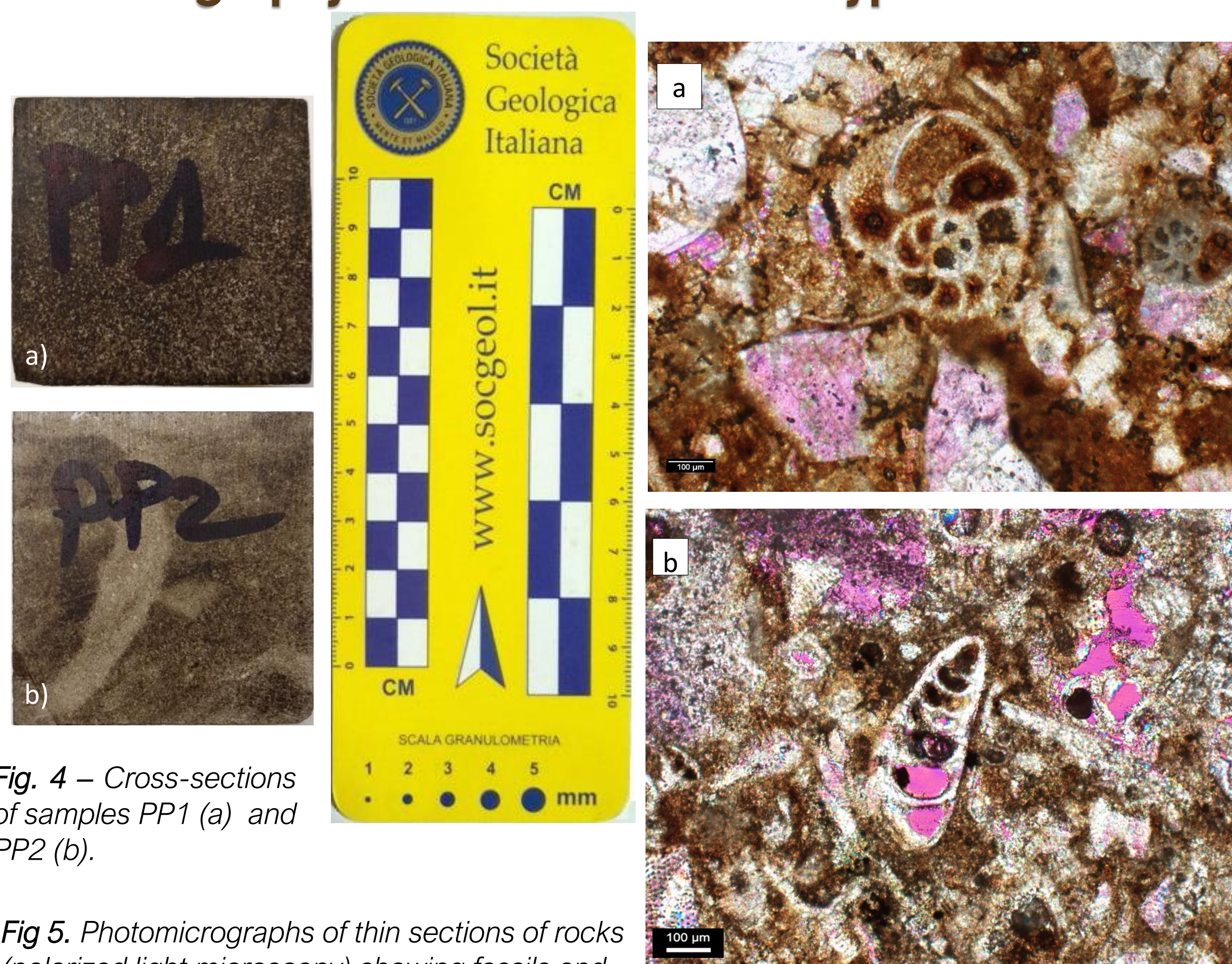


Fig. 4 – Cross-sections of samples PP1 (a) and PP2 (b).

Fig. 5. Photomicrographs of thin sections of rocks (polarized light microscopy) showing fossils and impregnation.

## Petrophysics

### Porosity

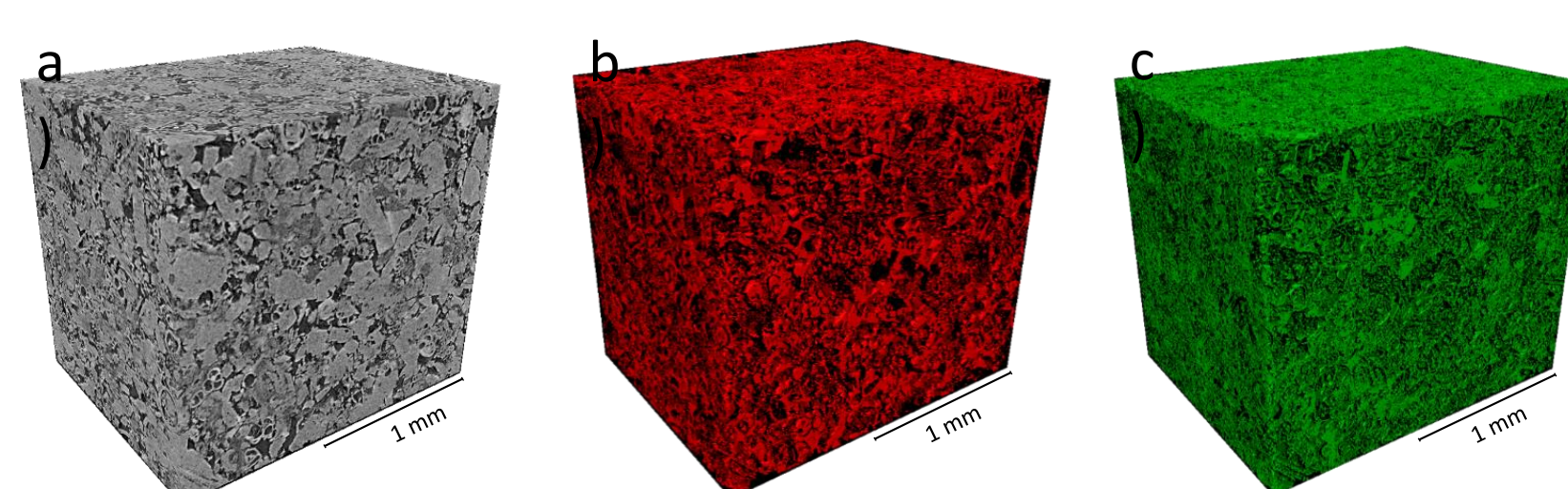


Fig. 6 – 3D reconstruction of total solid volume (a), pore volume, 19% (b) and impregnation volume, 22% (c) for sample PP1.

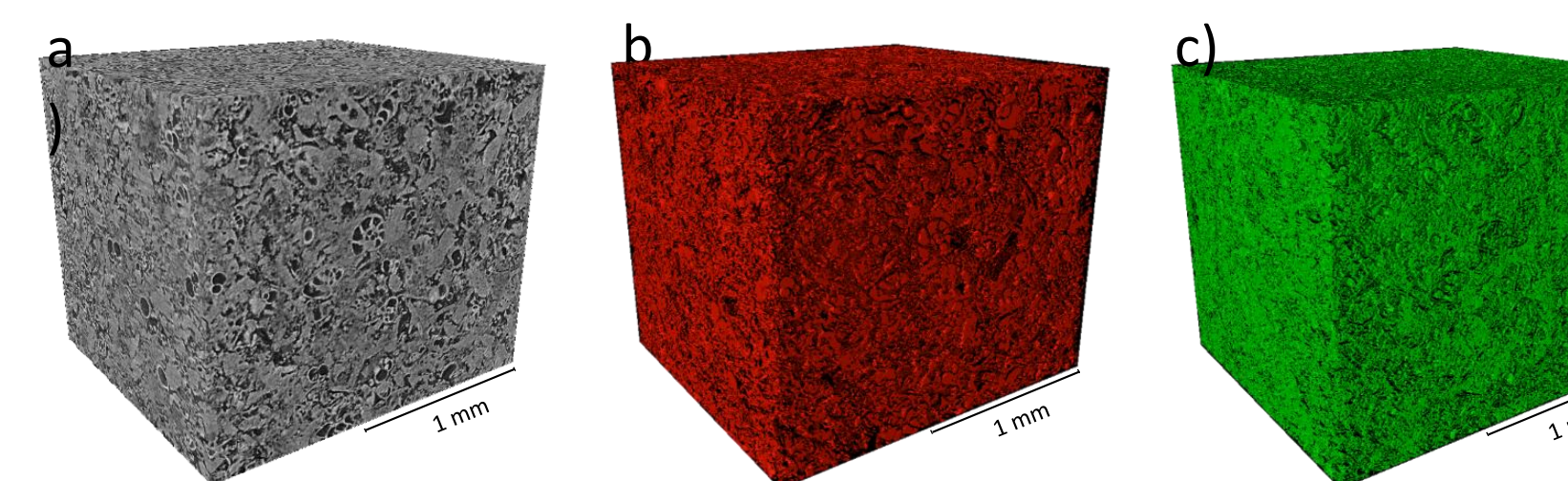


Fig. 7 – 3D reconstruction of total solid volume (a), pore volume, 24% (b) and impregnation volume, 17% (c) for sample PP1.

### Seismic behavior

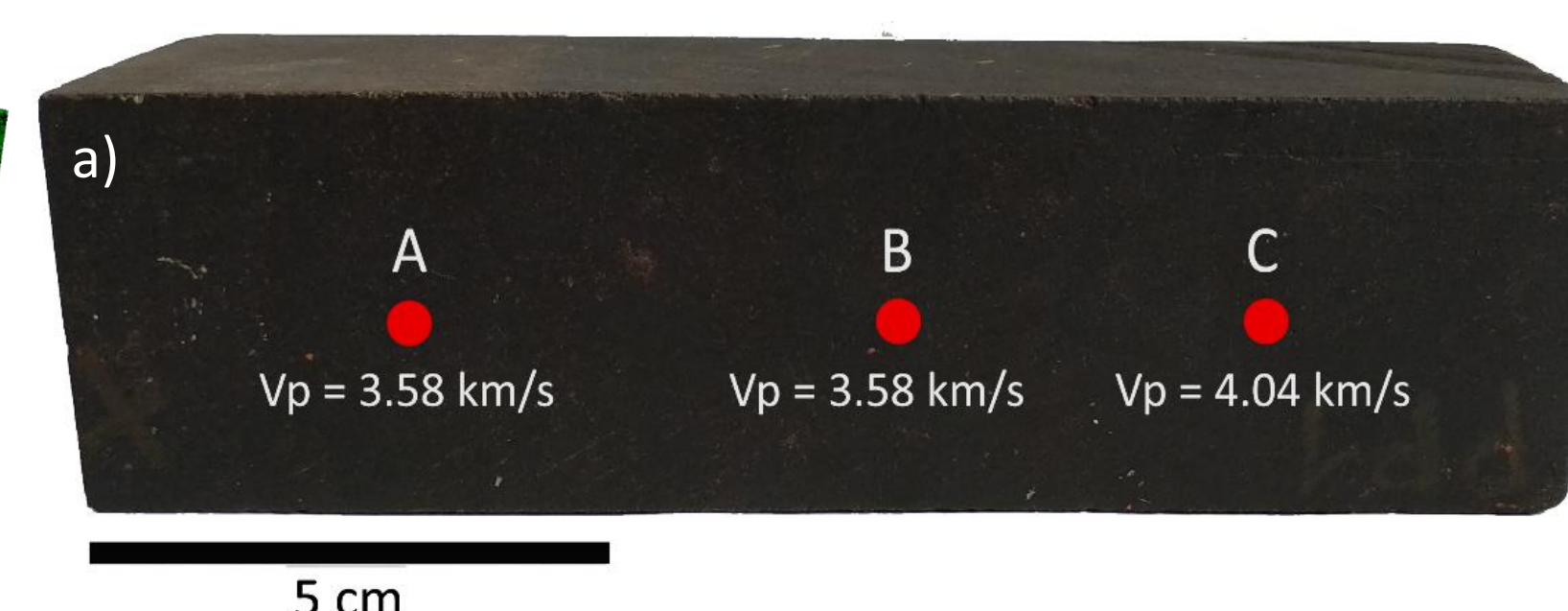


Figure 8 – P-wave transit time in samples PP1 (a) and PP2 (b).

## Conclusions

Concluding remarks are that Pitch Stone is a very versatile rock. The relatively **simple extraction** combined with excellent physical-mechanical properties (**malleability** when heated, **gelivity** and **impermeability**) and particular **chromatic shades** related to different percentages of **impregnation** make this rock widely applicable in different sectors, for example: **artistic**, **building** (e.g. for paving and design elements) and for the **extraction** of derivatives, such as oil and bitumen for roads.



Figure 9. Examples of uses of Pitch Stone as a valuable stone material, photo by Emanuele Sgarlata.

## References:

- [1] <https://whc.unesco.org/en/documents/141487>  
 [2] Punturo, R.; Maniscalco, R.; Cassarino G. La “pietra pece” di Ragusa: una roccia semplice che ha fatto molta strada. Bollettino CSC, Ottobre 2021.  
 [3] Maniscalco, R.; Fazio, E.; Punturo, R.; Cirrincione, R.; Di Stefano, A.; Distefano, S.; Forzese, M.; Lanzafame, G.; Leonardi, G.S.; Montalbano, S.; Pellegrino, A.G.; Raelo, A.; Palmeri, G. The Porosity in Heterogeneous Carbonate Reservoir Rocks: Tectonic versus Diagenetic Imprint—A Multi-Scale Study from the Hyblean Plateau (SE Sicily, Italy). Geosciences 2022, 12, 149. <https://doi.org/10.3390/geosciences12040149>.