Figure S1. Marble samples (source), and analyses carried out. (a) SMF1 (NW), cross sections and PAS staining, ultra-thin sections, SEM, FT-IR; (b) SMF2 (NW), cross sections and PAS staining, SEM, FT-IR; (c) SMF6 (SE), cross sections and PAS staining, ultra-thin sections, SEM, FT-IR; (d) SMF7 (SE), FT-IR; (e) SMF8 (NW), cross sections and PAS staining, FT-IR; (f) SMF9 (SE), cross sections and PAS staining, FT-IR.

Figure S2. FT-IR. FT-IR transmission spectra of the SMF2 (NW sample) and SMF9 (SE sample), characterised by the peaks of calcite (absorbance at 1420, 871, and 712 cm^{-1}), silicates (absorbance at 1033 cm^{-1}), and gypsum (absorbance at 1796, 1641, and 1115 cm-^{1}).

Figure S3. Light microscope observation of marble powder suspensions in PBS (a,b) and cultures in BG-11 medium (c,d). (a) An aggregate of algae and cyanobacteria; (b) A detail of a black fungus in a multispecies aggregate; (c) Chains of black fungi; (d) A possible beginning of lichenization between a black fungus and a green alga.

Figure S4. Polished cross-sections of SE marble samples. A black fungus inside the sample SMF6 poorly visible focusing the marble surface (a), and more clearly visible focusing deeper (b) due to the marble transparency. (c) An area of SMF9 with many black fungi; (d) A magnification of the area in the white rectangle of (c).

Figure S5. Some fungi isolated in this study. The colonies of strain SB (*Epicoccum nigrum*) (a), and of strain NT-S-5 (Dothideomycetes sp.) (b) grown on MEA medium; (c) Yeast-like cells of strain SO (*Aureobasidium pullulans*) under the contrast phase microscope; (d) Carbonate dissolution halo by strain NT-N-10 (*Cladosporium cladosporioides*) on $CaCO_3$ glucose agar medium.