**PROTEOMIC AND SPECTROSCOPIC ANALYSES OF *Bagliettoa baldensis*** [**(A. MASSAL.) VĚZDA**](http://dryades.units.it/italic/index.php?procedure=taxonpage&num=272)**: INSIGTHS INTO THE ENDOLITHIC GROWTH OF LICHENS**

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Almost one hundred years after EJ Fry’s accurate picture of endolithic lichen growth within limestone (Ann. Bot. 36, 1922), the underlying physiological and biogeochemical processes are yet to be fully disentangled. Early hypotheses on a carbonic acid-driven calcite dissolution, related to CO2 release by respiration, have already been supplemented by evidences of the mycobiont production of chelating metabolites and of carbonic anhydrase, which might modify dissolution and precipitation equilibria. In this study, proteomic and spectroscopic investigations on *Bagliettoa baldensis* [(A. Massal.) Vězda](http://dryades.units.it/italic/index.php?procedure=taxonpage&num=272) from marble outcrops in Carrara (Italy) suggest further degrees of complexity. We extracted the acid-soluble protein fraction, which was analysed by high-resolution liquid chromatography-tandem mass spectrometry. This “shotgun” approach allowed us to identify hundreds of protein sequences, which encompass the different key functions of the symbionts, including photosynthesis, respiration, stress response, protein synthesis, and DNA structuring; remarkably, it also shows the presence of fungal proteins involved in the glycerolipid pathways, not reported in the profile of other lichens. Such finding is in agreement with the well-known fact that endolithic fungi grow more or less inflated “oil hyphae”, which we also observed in *Bagliettoa* apomycobionts upon long-term culturing. We carried out µ-Raman analyses of the oil hyphae in vitro, which were compared to those of the colonized Carrara marble, obtained after strong bleaching with concentrated (12% w/v) sodium hypochlorite to remove surface-bound biomolecules. Spectra attributable to fatty acids and tryacylglycerols were collected both on the oil hyphae and the “clean” marble, also suggesting their incorporation within calcite crystals. In the wake of the pioneer questioning by EJ Fry on the involvement of oil hyphae in the endolithic growth pattern, a potential role of glycerol and glycerolipids in dissolution and biomineralization of calcite by *B. baldensis* will be discussed, also with reference to other biological systems.