

A Mediterranean free-floating peat mire hosts microbial communities shared by cold latitude habitats

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The microbiological features of a peculiar and hitherto unexplored environment, *i.e.*, a 4m-deep, free-floating peat island located within the Posta Fibreno lake (central Italy), were analyzed via DNA-based techniques. Methods included RealTime PCR targeting for nitrogen (N) cycle genes (nitrification from eubacteria and archaea, denitrification, N fixation), and Next Generation Sequencing (NGS) using an Illumina platform of prokaryotic (16S) and eukaryotic (ITS) amplicons to assess community members identity and abundance. Two depths were sampled at ca. 40 and 280 cm from the surface, the former corresponding to a portion of *Sphagnum* residues accumulated less than 30 yrs ago above the water level, and the latter mainly consisting of silty peat belonging to the deeply submerged part of the island, dating back to 1520-1660 AD. Bacterial gene abundances for the N cycle were consistently higher in the deeper sample. Sequencing analyses allowed identifying for the surface sample 1738 prokaryotic and 310 eukaryotic Operational Taxonomic Units (OTUs), while, for the deeper sample, the corresponding values were 2026 and 291 respectively. There was a very limited taxa overlap between the two layers' communities in which dominant taxa featured two different sulphate-reducing Deltaproteobacteria for prokaryotes. For eukaryotes, the surface sample was dominated by the *Neobulgaria* (Ascomycota) genus, while in the deeper one three quarters of the ITS reads were featured by a taxon observed in Antarctic lakes. The functional guilds represented pertain mostly to species involved in slow organic matter degradation and contexts in which dissolved organic carbon contains one-atom compounds, supportive of methylotrophy and methanogenesis. The identity of taxa partitioning between the acidic surface layer and the neutral core is very reminiscent of the differences reported between bogs and fens peatland types respectively, supporting the view of Posta Fibreno as a hybrid between the two main models. A remarkable feature is the coincidence of most taxa observed with database subjects isolated from mires and lakes in boreal/polar environments in spite of the fact that Posta Fibreno is located in sub-Mediterranean climate conditions. This instance suggests a common ecological feature linking peat-forming mires and habitats alike, in which the process factor would rule in determining the biotic composition in spite of the macroclimatic and geographical variables. The principle offers interpretive clues for a deeper understanding of a number of other biotic-environmental interplay contexts.