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New species of ice nucleating fungi in soil and air

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Primary biological aerosol particles (PBAP) are ubiquitous in the atmosphere (1). Several types of PBAP have been identified as ice nuclei (IN) that can initiate the formation of ice at relatively high temperatures (2, 3). The best-known biological IN are common plant-associated bacteria. The IN activity of these bacteria is due to a surface protein on the outer cell membrane that catalyses ice formation, for which the corresponding gene has been identified and detected by DNA analysis (2).
Fungal spores or hyphae can also act as IN, but the biological structures responsible for their IN activity have not yet been elucidated. Furthermore, the abundance, diversity, sources, seasonality, properties, and effects of fungal IN in the atmosphere have neither been characterized nor quantified.
Recent studies have shown that airborne fungi are highly diverse (1), and that atmospheric transport leads to efficient exchange of species among different ecosystems (4, 5). The results presented in Fröhlich-Nowoisky et al. 2012 (6) clearly demonstrate the presence of geographic boundaries in the global distribution of microbial taxa in air, and indicate that regional differences may be important for the effects of microorganisms on climate and public health.
Thus, the objective of this study is the identification and quantification of ice nuclei-active fungi in and above ecosystems, and the unraveling of IN-active structures in fungi. Results obtained from the analysis of various soil and air samples and the presence of new fungal ice active species will be revealed.

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