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Metagenomic detection of bacteria and fungi in the atmosphere of Mexico City

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Bioaerosols significantly affect atmospheric processes. The identification of airborne bacteria and fungi has traditionally been performed by retrieval in culture media, but in this way their diversity in the air is underestimated. Advances in DNA sequencing technology have produced a broad knowledge of genomics and metagenomics, so the objective of this study was to efficiently recover microorganisms from the air and standardize monitoring protocols, sample processing and molecular detection of bioaerosols of the Mexico City. To examine this bioaerosols we performed deep sequencing on the 16S rRNA and ITS genes from air samples collected during ten weeks (February to May, 2016) in south of Mexico City. Three samplers were used: a Durham-type spore trap (Durham), a seven-day recording volumetric spore trap (HST), and a high-throughput 'Jet' spore and particle sampler (Jet). A simple and efficient method for collecting bioaerosols and extracting good quality DNA for deep sequencing was standardized. The most abundant bacteria phyla in the air were Actinobacteria, Proteobacteria and Firmicutes. The HST sampler collected the largest amount of airborne bacterial and fungal diversity, however it may be preferred to use one or the other sampler, as each one collected preferentially some groups, i.e. Durham favors the sampling of Cyanobacteria and HST the sampling of Firmicutes. The most abundant fungal phyla in the air were Ascomycota and Basidiomycota. Methods of sampling and processing of samples for metagenomic detection of bacteria and fungi in the air were standardized, which allows a deep exploration of the diversity of airborne bacteria and fungi.

Biography

Nancy Serrano-Silva has her expertise in molecular methods to study microbial communities in environmental samples, mainly soils and air. Currently she is a Postdoctoral Researcher in the Center of atmospheric sciences at National Autonomous University of Mexico. Serrano-Silva and Calderón-Ezquerro have been working since 3 years ago in the implementation of metagenomic to evaluation of air quality (indoor and outdoor) in Mexico City. This is one of the first jobs that report the use of equipment such as the Hirst spore trap and the Durham sampler to collect and identify the microbiota of the atmosphere by using a metagenomic focus.

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