Characterization and DNA barcoding of fungi in indoor environments

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The mycobiota occurring in indoor environments have attracted an increasing interest because of the health problems and biodegradation of the residences. In many countries moulds in houses and building are representing a major problem and this has significant economic and health impacts. In this lecture a short introduction is given about the health implications and our ecological knowledge on indoor moulds. Furthermore the methods of detection and identification are discussed.

Little data are available of the indoor mycobiota occurring in the subtropics and tropics. Surveys of the indoor moulds are often done by culturing, but the uncultured profile of indoor moulds is poorly understood. In a collaborative project a set of dust samples from all continents was assembled and subjected them to standard protocols for isolation and morphological identification, high throughput dilution to extinction, and to 454 pyrosequencing. Our pyrosequencing results demonstrate a taxonomically diverse and geographically patterned mycobiota, with diversity higher in temperate zones than in the tropics.

The international research project “IMBol: A Network for the Indoor Mycobiota Barcode of Life (IM-BOL)”, was funded from Sept. 2008 to February 2011, by the Alfred P. Sloan Foundation. Recently a new application by Keith Seifert (Ottawa, Canada) and Robert A. Samson (CBS, Utrecht, The Netherlands) was awarded. The new project has the following objectives (1) Taxonomic comparison of sequences of cultured fungi using classical and dilution to extinction, (2) techniques with fungi detected by pyrosequencing; recognition and description of new species (3) Testing of genes mined from fungal genomes for utility as DNA barcodes for indoor fungi (4) Enhanced identification database for cultured indoor moulds (5) enhanced visual information added to database, (6) ‘PCR directed isolation’ of previously uncultured fungi from samples used for pyrosequencing.

Numerous data have been collected and this are available in the indoor mold database. The database on the website http://www.cbs.knaw.nl/indoor/ contains ITS data of over 3000 isolates and more information will be added.

Research on fungi in indoor environment and its economic and health implications is also important for Turkey and some recent initiatives will be discussed.