大台北地區大氣中生物性微粒分佈之探討

The study of ambient biological composition in the Taipei area

中文摘要

自然環境中充滿了各種的生物性微粒，包括了微生物、部分的微生物及微生物所產生的代謝物或有毒物質等，人們在日常生活及工作環境中無時無刻地暴露在這些生物性微粒之下。台灣地區雖然在過去有數個大型研究進行戶外生物性微粒之監測，但僅有探討真菌孢子與花粉的分佈，並因爲採樣方法的限制以及資料分析不完全，使得我國仍缺乏大氣中生物性微粒的背景資料。因此本研究利用主動式採樣在大台北地區進行長期的調查，以建立大台北地區生物性微粒之背景資料。大氣中生物性微粒的採樣分析項目包括真菌及細菌兩部分。真菌的採樣包含了可培養性真菌(culturable fungi) 以及真菌孢子(fungal spores)，細菌的部份則爲可培養性細菌(culturable bacteria)。在 2003 年至 2004 年研究期間，大台北地區可培養性真菌的平均濃度爲 2233.4 CFU/m3，最常出現的真菌種類包括 Non-Sporulating fungi (未產生孢子之真菌)、Cladosporium (芽枝黴菌屬)、Penicillium (青黴菌屬)、Curvularia (彎孢黴菌屬)、Aspergillus (麴菌屬)、Fusarium (新月黴菌屬)、Alternaria (交錯黴菌屬)、Arthrinium (節菱孢屬)及 Yeast (酵母菌)。在 2003 年及 2004 年，新莊的可培養性真菌濃度較石門爲高。2004 年真菌孢子總平均濃度爲 2445 spores/m3，以採樣地點來看，新莊平均濃度(2672 spores/m3)高於石門(2146 spores/m3)。可培養性真菌總濃度及真菌孢子都有明顯的季節變化，夏季時的濃度較其他季節高。在可培養細菌方面，自 2004 年 8 月到 2005 年 3 月間，新莊的可培養細菌平均濃度爲 1924 CFU/m3，之中又以格蘭氏陰性桿菌濃度最高(平均濃度 741.7 CFU/m3)。溫度、採樣年份、採樣月份及 O3 是可培養性真菌及真菌孢子的重要影響因素，但是對於可培養性細菌則沒有發現任何顯著的相關環境因子。

大氣中的真菌及細菌會造成人體的危害，因此未來應進行長期的監測，並針對這些常見真菌及細菌的健康效應做更深入的研究，以做爲國人健康促進的參考。

英文摘要

The natural environment is full of various biological particles, including microorganisms and fragments, metabolites, and toxins produced by these microorganisms. People are frequently exposed to biological particles in their daily lives and/or in work environment. In Taiwan, several studies were conducted to monitor fungal spores and pollens in the past decades. However, because of the limitation of sampling methods and the incompleteness of data analysis of these studies, the baseline data of outdoor biological particles in Taiwan is still in lack. Therefore, we implemented a longitudinal study to collect background data of

ambient biological compositions in the Greater Taipei area.
We monitored ambient fungi (culturable fungi and fungal spores) and bacteria (culturable bacteria) over two years in two sampling locations, Shin-Jhuang and Shi-Men, in Taipei. Between 2003 and 2004, the average concentration of culturable fungi in the Greater Taipei area was 2233.4 CFU/m3. The fungal taxa recovered most frequently were non-sporulating fungi, Cladosporium, Penicillium, Curvularia, Aspergillus, Fusarium, Alternaria, Arthrinium and Yeast. In 2003 and 2004, the concentration of culturable fungi was higher in Shin-Jhuang than in Shi-Men. The average concentration of fungal spores was 2445 spores/m3 in 2004, and the concentration of the fungal spores in Shin Jhuang (2672 spores/m3) was higher than in Shi Men (2146 spores/m3). The concentrations of culturable fungi and fungal spores had obvious seasonal variations, with highest levels in summer. From August 2004 to March 2005, the concentration of total culturable bacteria was 1924 CFU/m3 in Shin Jhuang, and Gram negative rods had the highest level (741.7 CFU/m3). In multivariate analysis, we found temperature, sampling year, sampling month and O3 were important environmental factors associated with culturable fungi and fungal spores. No environmental factor was significantly correlated with culturable bacteria. Ambient fungi and bacteria are important risk factors for human health and should be further monitored on regular basis. Future studies should also be conducted to evaluate the health impacts of frequently-recovered ambient fungi and bacteria in order to protect public health in our country.