Polyphasic taxonomy of toxigenic fungi

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Certain species of fungi produce mycotoxins which can have toxic effects on humans or animals. *Aspergillus*, *Penicillium*, *Fusarium*, and *Alternaria* are the most important genera in food concerning toxins and widespread occurrence. *Aspergillus* is the most common in the tropics and subtropics. Likewise, *Penicillium* in the temperate and polar regions, but certain species are also common in the tropics. *Fusarium* and *Alternaria* are common world-wide. Food can be colonized by a wide range of toxigenic fungi including *Aspergillus flavus* (aflatoxins), *Penicillium verrucosum* (ochratoxins, citrinin), *Aspergillus ochraceus* (ochratoxins), *Fusarium verticillioides* (fumonisins), and *Aspergillus* section *Nigri* species (ochratoxins). Fungal classification and identification used to have morphological and physiological criteria such as colony growth, colour, structure of the sporulating apparatus and the ability to grow at different temperatures. In the last few years, molecular studies have revealed the presence of many more species than were previously known. Many of these species are not yet formally named. The new taxonomic approaches use polyphasic criteria, which combine phenotype (morphology, physiology, biochemistry) with molecular data. A great effort has been made to use the molecular data on genetic profile, and the secondary metabolism of the main toxigenic species which occur in food. A secondary metabolite is a chemical compound such as antibiotics and mycotoxins produced by a limited number of species. Correct identification to species level is very important in food mycology, since there are several characteristics associated to each species.