Distribution of sterigmatocystin in filamentous fungi

During the last 50 y, the carcinogenic mycotoxin sterigmatocystin (ST) has been reported in several phylogenetically and phenotypically different genera: Aschersonia, Aspergillus, Bipolaris, Botryotrichum, Chaetomium, Emericella, Eurotium, Farrowia, Fusarium, Humicola, Moelleriella, Monocillium and Podospora. We have reexamined all available strains of the original producers, in addition to ex type and further strains of each species reported to produce ST and the biosynthetically derived aflatoxins. We also screened strains of all available species in Penicillium and Aspergillus for ST and aflatoxin. Six new ST producing fungi were discovered: Aspergillus asperescens, Aspergillus aureolatus, Aspergillus eburneocremeus, Aspergillus protuberus, Aspergillus tardus, and Penicillium inflatum and one new aflatoxin producer: Aspergillus togoensis (=Stilbothamnium togoense). ST was confirmed in 23 Emericella, four Aspergillus, five Chaetomium, one Botryotrichum and one Humicola species grown on a selection of secondary metabolite inducing media, and using multiple detection methods: HPLC–UV/Vis DAD, – HRMS and – MS/MS. The immediate precursor for aflatoxin, O-methylsterigmatocystin was found in Chaetomium cellulolyticum, Chaetomium longicolleum, Chaetomium malaysiense and Chaetomium virescens, but aflatoxin was not detected from any Chaetomium species. In all 55 species, representing more than 11 clades throughout the Pezizomycotina, can be reliably claimed to be ST producers and 13 of these can also produce aflatoxins. It is not known yet whether the ST/aflatoxin pathway has been developed independently 11 times, or is the result of partial horizontal gene transfer.