Non-grass endophytes: saints or sinners?

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Endophytic fungi or non-grass hosts are ubiquitous in their distribution and exhibit a remarkable taxonomic diversity. Since their ‘re-discovery’ in the early 1970’s there have been numerous publications on their presence and, since the discovery of the production of taxol by the endophytic *Taxomyces andreanae* in 1993, on their secondary metabolites. Japanese scientist have been very active in investigations of fungal metabolites especially those exhibiting bioactivity resulting in the publication of many novel compounds. Our work over the past 30 years has concentrated on the secondary metabolites of the family Xylariaceae. This has proved to be very rewarding for the chemists with many new structures elucidated and although the initial incentive for these studies was taxonomic later compounds exhibiting bioactivity were discovered. Cytochalasin E has long been recognised as an inhibitor of nuclear division leading to cell death and was originally reported from the important plant pathogen, *Rosellinia necatrix*. Studies in Japan revealed that this compound could be linked to phytopathogenicity with mutant strains of the fungus with low cytochalasin production being less pathogenic. We also noticed that there was considerable difference in pathogenicity between isolates obtained from diseased apple trees but this not always correlated with amounts of cytochalasin produced. The presence of a novel compound, rosnecatrone, was found to also be involved and we suggest that they are synergistic. *Rosellinia necatrix* is however a root infecting pathogen not an endophyte but we have isolated cytochalasin E and other previously unknown cytochalasins from other xylariaceous species, mainly *Xylaria*.

Studies on endophytic Xylariaceae over the past 10 or 12 years has shown that they are prolific secondary metabolite producers and that cytochalasins are common in isolates of *Xylaria* and closely related taxa such as *Kretzschmaria*. They also appear to be exceptionally frequent in topical plants. Surprisingly species of the genus *Biscogniauxia* which are frequently involved in diseases of trees do not produce cytochalasins or any metabolites of substantial toxicity. *Biscogniauxia mediterranea* has long been recognized as an important reason for the decline of *Quercus suber*, the cork oak, in southern Europe and we can relate canker diseases of various host trees in several countries to the activities of *Biscogniauxia* species. It has been possible to isolate the *Biscogniauxia* as an endophyte in each case but the mechanism for their pathogenicity remains unknown.