Higher Fungi – A Treasure Trove of Highly Diverse Natural Products and New Chemical Defence Mechanisms

Prof. Dr. Peter Spiteller
Institut für Organische und Analytische Chemie, Universität Bremen
Leobener Straße, D-28359 Bremen, Germany
peter.spiteller@uni-bremen.de

Since well-known antibiotics and plant protection agents are becoming less and less effective due to the upcoming of resistant strains, there is a strong demand for new lead structures for the development of new drugs.\[1\] Natural products have always been an important source for such lead structures.\[1\] Nevertheless, it is becoming increasingly difficult to isolate new secondary metabolites, probably because readily accessible organisms have already been well investigated. Hence, strategies to overcome this problem are needed.

One promising strategy is to focus on organisms which are not readily accessible. In general, fruiting bodies of mushrooms are such entities since they occur only temporarily and are usually not produced in culture. Our own research is focussed on fruiting bodies of small species, such as the genus Mycena.\[2,3\] Our investigations show that several Mycena species contain a large number of different, previously unknown pyrroloquinolone alkaloids, for instance mycenarubin A\[2\] or sanguinone A,\[3\] besides polyene pigments,\[4\] chlorinated phenols or benzoxepins.\[5\]

Our second strategy to detect new secondary metabolites in fungi is based on the occurrence of wound-activated chemical defence mechanisms in fruiting bodies of mushrooms. In wound-activated chemical defence, bioactive compounds are generated only upon injury from inactive precursors. Therefore, secondary metabolites which occur only in injured fruiting bodies might play a role in wound-activated chemical defence. To identify such compounds, we compare the metabolite patterns of intact fruiting bodies to injured ones. By these means we have been able to elucidate the wound-activated chemical defence of Mycena galopus\[5\] and Aleurodiscus amorphus.\[6\] Upon injury M. galopus releases a fungicidal benzoxepine alcohol after hydrolysis of the corresponding benzoxepine ester,\[5\] while A. amorphus generates toxic hydrocyanic acid from aleurodisconitile by a previously unknown oxidative mechanism.\[6\]