

Induced chemical defense of a mushroom by a double-bond-shifting polyene synthase.

Brandt P, García-Altare M, Nett M, Hertweck C, Hoffmeister D (2017) Induced chemical defense of a mushroom by a double-bond-shifting polyene synthase. *Angew Chem Int Ed* 56(21), 5937-5941.

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Abstract

The antilarval mushroom polyenes 18-methyl-19-oxoicosaoctanoic acid and 20-methyl-21-oxodocosanoic acid appear in response to injury of the mycelium of the steriaceous mushroom BY1. We identified a polyketide synthase (PPS1) which belongs to a hitherto completely uncharacterized clade of polyketide synthases. Expression of the PPS1 gene is massively upregulated following mycelial damage. The synthesis of the above polyenes was reconstituted in the mold *Aspergillus niger* as a heterologous host. This demonstrates that PPS1 1) synchronously produces branched-chain polyketides of varied lengths, and 2) catalyzes the unprecedented shift of eight or nine double bonds. This study represents the first characterization of a reducing polyketide synthase from a mushroom. We also show that injury-induced de novo synthesis of polyketides is a fungal response strategy.

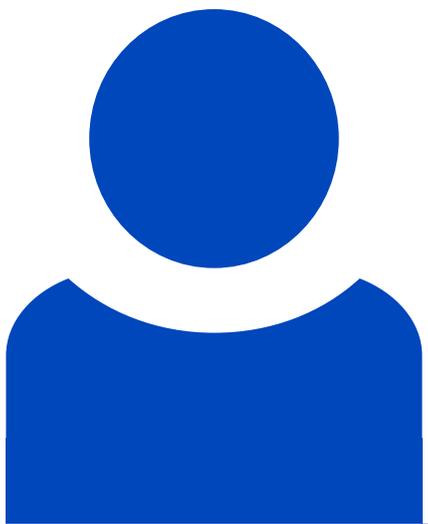
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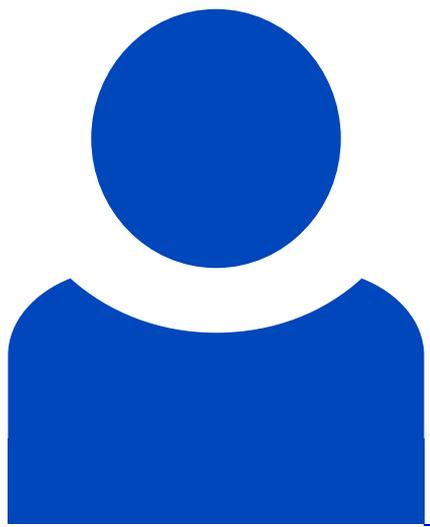
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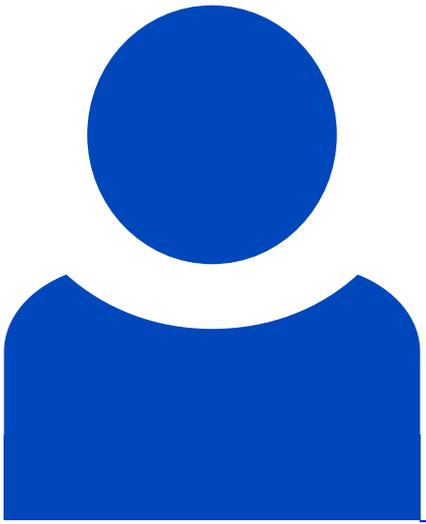
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