

Investigating the Biosynthetic Pathways to Polyacetylenic Natural Products in *Fistulina hepatica* and *Echinacea purpurea*

[Login \(/login\)](#)

- [IUPUI ScholarWorks Repository](#)
- →
- [Theses, Dissertations, and Doctoral Papers](#)
- →
- [Chemistry & Chemical Biology Department Theses and Dissertations](#)
- →
- [View Item](#)

Investigating the Biosynthetic Pathways to Polyacetylenic Natural Products in *Fistulina hepatica* and *Echinacea purpurea*

[Ransdell, Anthony S.](#)



Name: Anthony_Ransdell_ ...

Size: 20.72Mb

Format: PDF

[View/Open](#)

Permanent Link: <http://hdl.handle.net/1805/3442>

Date: 2013-08-20

Committee Chair: [Minto, Robert](#)

Committee: Long, Eric C. (Eric Charles)

Members: Li, Lei

Degree: M.S.

Degree Year: 2012

Department: Department of Chemistry and Chemical Biology

Grantor: Purdue University

Keywords: [Biological Chemistry](#); [Molecular Biology](#)

LC Subjects: [Biochemistry](#); [Molecular biology -- Research](#); [Fungi](#); [Echinacea \(Plants\)](#); [Biosynthesis -- Research](#); [Fatty acids -- Synthesis](#); [Acetylene compounds](#); [Chemical bonds -- Research](#); [Polyacetylenes](#); [Organic compounds -- Synthesis](#)

Abstract:

Polyacetylenic natural products, compounds containing multiple carbon-carbon triple bonds, have been found in a large collection of organisms. Radiochemical tracer studies have indicated that these bioactive metabolites are synthesized from fatty acid precursors through a series of uncharacterized desaturation and acetylation steps. To date, there are three main pathways believed to be involved in acetylenic natural product biosynthesis. However, it is apparent that the

crepenynic acid pathway is the origin of a vast majority of the known plant and fungal acetylenic products. This investigation provides concrete evidence that the polyacetylenic natural products found in the fungus *Fistulina hepatica* and the medicinal plant species *Echinacea purpurea* are biosynthesized from crepenynic acid. Through heterologous expression in *Yarrowia lipolytica*, two acetylenases capable of producing crepenynic acid were identified from *E. purpurea*. Furthermore, heterologous expression of two diverged desaturases isolated from *F. hepatica*, uncovered a $\Delta 12$ -acetylenase and the first multifunctional enzyme capable of $\Delta 14$ -/ $\Delta 16$ - desaturation and $\Delta 14$ -acetylenation.

Description:

Indiana University-Purdue University Indianapolis (IUPUI)

This item appears in the following Collection(s)

- [Chemistry & Chemical Biology Department Theses and Dissertations \(/handle/1805/2052\)](/handle/1805/2052)



[Show Statistical Information \(#\)](#)

My Account

- [Login](#)
- [Register](#)

Statistics

- [Most Popular Items](#)
- [Statistics by Country](#)
- [Most Popular Authors](#)

[About Us \(/page/about\)](/page/about) | [Contact Us \(/contact\)](/contact) | [Send Feedback \(/feedback\)](/feedback)

[_\(/htmlmap\)](/htmlmap)

FULFILLING *the* PROMISE

[Privacy Notice \(http://ulib.iupui.edu/privacy_notice\)](http://ulib.iupui.edu/privacy_notice)



Copyright (<http://www.iu.edu/copyright/index.shtml>) ©2015

The Trustees of Indiana University (<http://www.iu.edu/>),

Copyright Complaints (<http://www.iu.edu/copyright/complaints.shtml>)