

Quantification of farnesol production by *Candida Albicans* and other studies.

Jacob Hornby, Ph.D.  
Assistant Professor of Biology  
Division of Natural Sciences  
Lewis-Clark State College  
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Student Researchers: Ana Cornea,

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Three undergraduate students were advised in independent research goals in biomedical sciences over the past semester. In brief, the research goals included the following: 1/ development of methodology for extraction/purification of the extracellular quorum sensing molecule from the dimorphic fungus *Ceratocystis ulmi*, causative agent of Dutch Elm Disease; 2/ quantification of farnesol production by *Candida albicans* in response to temperature variation and altered carbon and nitrogen sources; and 3/ development of a library of mutagenized genes from *Candida albicans* by Tn7 transposon mutagenesis.

At the completion of the Spring semester, additional methodology for extraction of the active component (chemical identity yet to be determined) has been explored. Published protocols involve organic solvent extraction of quorum sensing molecules, however due to the apparent volatility of the active component from *C. ulmi*, distillation from the aqueous supernatant has been attempted in numerous trials and proven to be successful. Future efforts through the 2006-2007 academic year will explore the accumulation of the active compound and subsequent identification following further purification techniques. The active distillates will be further purified using silica column chromatography and analyzed either by NMR or GC/MS. Metabolic regulation of farnesol production *C. albicans* was delayed until next semester due to collaborative efforts with faculty at the University of Nebraska. This project transformed into the quantification of farnesol production by a strain of *C. albicans* that has recently been shown to mate under anaerobic conditions. A mating phenomenon in this fungus has not been shown without chemical induction, however under anaerobic conditions, natural mating has now been observed. It is currently thought that farnesol production/response could play a role in mating as it is known that anaerobic conditions significantly alter farnesol production and cellular morphology. This chemical analysis will continue into the beginning of the summer and be combined with efforts at UNL with the plan to submit a manuscript to Science. Lastly, a library of mutagenized *C. albicans* genes was successfully developed and is maintained in *E. coli*. This *in vitro* mutagenesis approach was

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developed as a random method for identifying genes responsible for various phenotypes in yeast and dimorphic fungi. Following development of the library, future research students will begin to disrupt genes within *C. albicans* cells by homologous recombination and screen mutants for a lack of production or response to farnesol in order to begin understanding the genetic regulation of the quorum sensing phenomenon in this human pathogenic fungus. The student conducting this research project will be graduating this May and continuing on to graduate school at the University of Nebraska-Lincoln to be advised by Dr. Kenneth Nickerson, Ph.D. advisor of Dr. Hornby. A student has already been identified to continue this work at LCSC beginning next August.