Induction of a Nonribosomal Peptide/Polyketide Biosynthesis Gene Cluster by Plant Compounds

Dan Ondrusek*, Jennifer Leising, Spring 2004 Genetics & Microbiology classes, Cathy Wheeler, & Brad Goodner, Department of Biology, Hiram College, Hiram, OH 44234
& the K84/S4 Genome Consortium (1)

Abstract:

Several years ago, we presented some initial bioinformatics and functional characterization of a large gene cluster in *A. tumefaciens* C58 that appears to encode a pathway for the synthesis of a hybrid nonribosomal peptide/polyketide (2-3). We found no evidence that the gene cluster was expressed during a normal growth curve in rich or minimal media, or during starvation. Also, we found no clear phenotype for a mutant missing one of the enzymes in the pathway and so we put the project on the back burner at that point. This spring, as part of a new research project within our genetics course, we used a *lacZ* fusion in AGR_L_2329/Atu3672, a gene within the cluster that encodes a multidomain polyketide synthase, to monitor expression of the gene cluster in response to a variety of conditions. Acetosyringone, low pH, and iron starvation were a few of the treatments that failed to induce the gene fusion. The only condition that showed induction was addition of an aqueous extract from radish seeds or seedlings. Interestingly, these extracts also contain a bacteriostatic growth inhibitor. In this poster, we will present further data on the expression of this gene, the possible nature of the inducer and the growth inhibitor, and the evolutionary conservation of the gene cluster and its regulation.

References:

1. K84/S4 Genome Consortium: Frank Arnold, Tom Burr, Sigrid Carle, Zijin Du, Adam Ewing, Stephen Farrand, Brad Goodner, Barry Goldman, Guixia Hao, Sara Heisel, Jinal Jhaveri, Subha Krishnan, Jing Lu, Nancy Miller, Eugene Nester, Gary Olsen, Dan Ondrusek, Nicole Pride, Joao Setubal, Steve Slater, Mark Vaudin, Lindsey Wilson, & Derek Wood.
2. Lappas et al., 1999, 20th Crown Gall Conference.
3. Doughty et al., 2000, 21st Crown Gall Conference.