W. Malcolm Byrnes

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Education

- Ph.D. in Biochemistry, Louisiana State University, Baton Rouge, 1994
- Postdoctoral Researcher, Cornell University, Ithaca, NY, 1994-1996

Courses Currently Teaching

- Dental Biochemistry (director)
- First Year Medical Course: Molecules and Cells Unit IA
- Enzymology (coordinator)
- Principles of Metabolic Regulation (coordinator)
- General Biochemistry
- General Biochemistry Laboratory
- Orientation to Research
- Preliminary Academic Reinforcement Program (PARP)

Research Interests

NIH-funded research in my laboratory is focused on the characterization of anthranilate synthase and related chorismate-utilizing enzymes from bacteria. Anthranilate synthase catalyzes the conversion of chorismate to anthranilate using an amino group derived from glutamine; this reaction represents the first step of the tryptophan biosynthetic pathway. Recent work in the laboratory has involved the characterization of a fused (TrpE-TrpG) anthranilate synthase from the antibiotic-producing bacterium *Streptomyces venezuelae.* Our results showed that the enzyme, unlike other anthranilate synthases, functions as a monomer. Moreover, like certain aminodeoxyisochorismate (ADIC) synthases with which it shares high amino acid sequence similarity, the enzyme cannot use exogenous ammonia as a substrate. We have also been engaged in confirming the amino acid residues that line the chorismate site using both site-directed mutagenesis and protein homology modeling. We have identified, using site-directed mutagenesis, structural features important for tryptophan inhibition of the enzyme. Other research projects I have undertaken in the past have involved, for example, the allosteric enzyme phosphofructokinase, the streptomycin-inactivating enzymes APH(6)-Ia and –Id, and the DNA polymerase from *Thermus aquaticus* (Taq polymerase). Finally, in addition to

my work in biochemistry, I am engaged in scholarly pursuits in other areas: bioethics; ecological ethics, especially as it relates to climate change; the science-religion debate; and the scientific legacy of biologist Ernest Everett Just. More information about my background and work can be found on my ResearchGate site.

Selected Publications

- IN PREPARATION: Ashenafi M, Southerland WM, Byrnes WM. The Monomeric Anthranilate Synthase from *Streptomyces venezuelae*: Trp-168 Is Important for Transmission of Allosteric Signal but Not Inhibitor Binding
- Ashenafi M, Reddy PT, Parsons JF and Byrnes WM (2015) The Fused Anthranilate Synthase from *Streptomyces venezuelae* Functions as a Monomer. *Molecular and Cellular Biochemistry* 400: 9-15
- Ashenafi M, Ammosova T, Nekhai S and Byrnes WM (2014) Purification and Characterization of Aminoglycoside Phosphotransferase APH(6)-Id, a Streptomycin Inactivating Enzyme. *Molecular and Cellular Biochemistry* 387: 207-216
- Debebe Z, Nekhai S, Ashenafi M, Lovejoy DB, Kalinowski DS, Gordeuk VR, Byrnes WM, Richardson DR and Karla PK (2012) Development of a sensitive HPLC method to measure in vitro permeability of *E*- and *Z*-isomeric forms of thiosemicarbazones in Caco-2 monolayers. *Journal of Chromatography* B 906: 25-32
- Ashenafi M, Carrington R, Collins AC and Byrnes WM (2008) The Fused TrpEG from *Streptomyces venezuelae* is an Anthranilate Synthase, Not a 2-Amino-2-Deoxyisochorismate (ADIC) Synthase. *Ethnicity and Disease* 18(2 Suppl 2): 9-13

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