

Structural Characterization of Spermidine Methyltransferase, A Novel Member of The Plant Aminopropyltransferase Family From *Erythroxyllum coca*

Dr Charles E Stewart¹, Benjamin Chavez², Dr John C. D'Auria²
¹Iowa State University, ²Leibniz Institute of Plant Genetics and Crop Plant Research
cstewart@iastate.edu

Aminopropyltransferases transfer aminopropyl groups from decarboxylated S-adenosylmethionine to amine acceptors, forming polyamines. In particular, spermidine synthases (SPDSs) catalyze the production of the linear triamine, spermidine, from putrescine. Recently, an alternative route for the biosynthesis of polyamines was discovered that emerges from the activity of spermidine methyltransferase, a novel member of the aminopropyltransferase family. Unlike SPDSs, spermidine methyltransferases prefer S-adenosylmethionine to decarboxylated-S-adenosylmethionine. In this work, we describe crystal structures of apo and protein-ligand complexes of a spermidine methyltransferase (EcSMT) from *Erythroxyllum coca* as well as a homolog that exhibits dual activity as a spermidine synthase and spermidine methyltransferase (EcSPMT). Comparative analyses of these crystallographic snapshots provide insight into the molecular basis of SMTs novel bioactivity as well as a window to view the evolutionary emergence of a novel activity within an ancient protein family.