

In Situ Activity and Subcellular Localization of Glyoxysomal Enzymes in Microbodies of a Plant Pathogenic Fungus *Botryosphaeria dothidea*

Ki Woo Kim, Eun Woo Park, Young-Soon Kim, and Kyung Soo Kim¹

National Instrumentation Center for Environmental Management

Seoul National University, Suwon 441-744, Korea

¹Department of Plant Pathology

University of Arkansas, Fayetteville, Arkansas 72701, USA

The glyoxysomal nature of microbodies was determined in *Botryosphaeria dothidea* hyphae based on morphology and in situ enzyme characteristics by transmission electron microscopy and cytochemistry. Bound by a single membrane, microbodies had a homogeneous matrix and varied in size ranging from 200 to 400 nm in diameter. Microbodies had crystalline inclusion(s) which consisted of parallel arrays of fine tubules in their matrices. Microbodies and lipid globules were frequently placed in close association with each other, forming microbody-lipid globule complexes in hyphae. The cytochemical activities of catalase and malate synthase were localized in matrices of microbodies, showing intense electron-density of the organelle. In addition, the immunogold labeling detected the presence of catalase in multivesicular bodies and hyphal cell walls as well as in matrices and crystalline inclusions of microbodies, supporting the enzyme secretion through cell walls. Meanwhile, isocitrate lyase was localized only in matrices of microbodies. These results suggest that microbodies, particularly complexed with lipid globules, in the fungal hyphae are functionally defined as glyoxysomes, where glyoxysomal enzymes are biochemically active for the glyoxylate cycle to be a metabolic pathway in gluconeogenesis.