Factors Controlling Protein Turnover and Development in the Filamentous Fungus Aspergillus nidulans

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The homothallic filamentous ascomycete A. nidulans is able to form fruitbodies (cleistothecia) either by mating of two strains or by selfing in the absence of a partner. The three-dimensional A. nidulans cleistothecium is the most complicated structure this fungus is able to form. This includes an energy and material consuming process where even parts of hyphae have to be dissolved and locally rearranged. The COP9 signalosome which is involved in the regulation of SCF E3 ubiquitin ligases required for protein degradation has been identified as a key regulator of sexual development. The ubiquitinylation activity of SCF can be modulated by reversible conjugation of the ubiquitin-related protein NEDD8/Rub1 on the cullin subunit, a process termed neddylation. Among the ubiquitin-like protein family, NEDD8 is most homologous to ubiquitin. The COP9 signalosome includes an intrinsic deneddylase activity. SCF E3 ubiquitin ligases have to be neddylated and deneddylated at their cullin subunit to perform their function in vivo. Since higher eukaryotes are not able to survive the embryonic state without a functional COP9 signalosome, we use A. nidulans as model system to understand principal mechanisms of the regulation of protein degradation