Phosphate Limitation Induces Sporulation In *Blastocladiella emersonii*

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The signal pathways named two components, Ras family cascade, checkpoints and metabolic balance, among others, are described to analyze cell growth requirements. TOR kinase seems to be the final target of the whole set of signal pathways in eukaryotes. The cell cycle in restricted cell growth conditions is interrupted and bypass mechanisms are triggered. When growth is not possible, the cells may eventually differentiate themselves. Although microorganisms usually differentiate under general nutrient restriction, except in the case of amino acids as a whole, the exact nutrient limitation that induces cell differentiation has not yet been described. The aquatic fungus *Blastocladiella emersonii* is induced to produce spores by changing growth conditions through a total lack of nutrients. Zoospores differentiate to germling cells that grow as coenocyte vegetative cells in defined growth medium DM_2. Vegetative cells sporulate in SS, a buffered $CaCl_2$ medium without nutrients. In current work, kinetics data from culture petri dish experiments, contrast phase and laser confocal microscopy showed that phosphate limitation is sufficient to interrupt cell growth and to induce sporulation in *Blastocladiella emersonii*. Incubated zoospores in DM_2 medium without phosphate differentiate to germling cells but interrupt growth and start sporulation, in spite of the nutritional charge. After sporulation, the two/four spores inside the zoosporangia differentiate to germling cells again and are able to initiate growth in complete DM_2. Phosphate added within 300 minutes or withdrawn at any time from cultures at 27°C restores growth or induces sporulation, respectively. These results suggest that growing or sporulation is linked to phosphate availability, with a unique opportunity to study the above mechanism and investigate the involvement of TOR activity.