Using Penium margaritaceum to Investigate Cytokinesis Conservation

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Little is known of the details of cytokinesis, despite it being one of the fundamental processes in biology. This project focused on the chemical inhibition of the cytokinesis of Penium margaritaceum, an algae species, to characterize the growth and the cell wall components of the algae. Algae cells were treated with Endosidin 7 (ES7), which prevents proper maturation of the cell plate. Monoclonal antibody JIM5 and secondary antibody Alexafluor 488 were utilized to label pectin. The cells underwent confocal microscopy and were compared to Dimethyl sulfoxide (DMSO; control)-treated algae. This process was repeated with secondary antibody TRITC. The JIM5-labeled pectin allowed for the visualization of the isthmus zone of the algae. The isthmus of the ES7 treated algae was greater than that of the DMSO by 150%. ES7 demonstrates cytokinesis-inhibiting qualities in P. margaritaceum, as the elongated isthmus is due to the cells' bilateral expansion before attempting to divide. Pectin specks were found in the isthmus zone, where there should be no immunofluorescence. This may indicate the algae's attempt to restabilize the forming cell plate to counter ES7's effects. No correlation could be drawn between algae growth and chemical treatment. Despite the quantification that the DMSO treated algae grew more than the experimental group by 47%, cell elongation cannot be correlated to treatment due to slightly de-synchronized cell division. This experiment will contribute to further understanding of the evolution of the cell wall (ES7 was used in complex land plants before) as well as the development of more efficient biofuel.