

“Diatoms: Life in Glass Houses” revisited: Updates and Comments

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ABSTRACT. The film “Diatoms: Life in Glass Houses”, produced in 2003, covers various aspects of this ecologically important class of algae, such as their occurrence, cell biology including cell division and reproduction, morphology, morphogenesis, motility, and the formation of colonies. The aim of this work is to review and comment on some of the aspects presented in the video in the light of current knowledge. Special attention will be given to the constraints imposed by the solid silica wall and how diatoms cope with them. No attempt is made to be comprehensive.

Keywords: diatomaceous earth, cell walls, centrics, pennates, microtubule center, motility, phototaxis, mitosis and cleavage, valve and spine morphogenesis, sex in pennates

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Preface

The Cytographics film *Diatoms: Life In Glass Houses*, is a true testament to the scientific love and passions of its creator, Dr. Jeremy Pickett-Heaps. His excitement for all things algal was evident to all of his colleagues and students, and he seemed to have a special interest in the diatoms. Their cell wall morphogenesis, their method of chromosome separation and spindle formation during cell division, and their unique manner of cell movement - they all were fascinating to Jeremy.

One of Jeremy’s biggest goals in the lab was to make high resolution detailed observations of cell phenomena, in both real-time recording and electron microscopy, in order to, in his words, “let the cells themselves tell you about what they are doing”. For his live and time-lapse filming he used high resolution optical microscopes fitted with 16mm film cameras, photo cameras, and video cameras. He often put the cells into specialized hand-made cell chambers or mounted the

cameras or lighting on numerous types of handmade platforms and brackets to get that perfect orientation for the shots. The entire filming room even had the ability to be cooled down if necessary in order to film cells that needed to be kept in cooler environments. Jeremy also had a never-ending desire to present these observations in a way that would generate the most interesting, beautiful, and instructional educational tools. His formation of the company Cytographics with his wife Julianne to produce high-quality educational films merged all of these aspirations.

This film explores many aspects of diatom behavior, using live and scanning electron microscope observations made in his lab, and demonstrates the enthusiasm Jeremy had for these beautiful cells and their unique forms of cellular behavior. It is the hope of the authors that this paper will expand upon the original presentation by discussing some of the information and observations that have emerged since the video’s initial release, and reignite some of the excitement and awe for these cells in a new generation of scientists.

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Diatoms Life In Glass Houses

Michael Brown



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