Towards a 3D Cell Model of *Chlamydomonas reinhardtii*

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1 Introduction

Chlamydomonas reinhardtii is a green alga which is often used in Biotechnology as a model organism. This single-cell organism has a size of approx. 10 µm, contains a very large chloroplast relevant for the energy production which is partly used to move by using two flagella. An important biotechnological application is the production of biofuels.

2 Cell Modeling

A visualization approach of the interpretative abstraction level is used to create the C. reinhardtii model [1]. By combining the information of different publications, microscopic images and videos at multiple scales, this project aims to present a more precise three-dimensional structure of this cell type. The cell model is generated by using Blender [2]. In addition, 3D microscopy data was used as a base to model the *Endoplasmic reticulum* which was previously segmented with FIJI [3].

To visualize the energy-relevant pathways of C. reinhardtii, a simplified network was modeled and localized using the CELLmicrocosmos 4.2 PathwayIntegration [4]. This pathway was afterwards used in Blender to illustrate the intracellular processes.

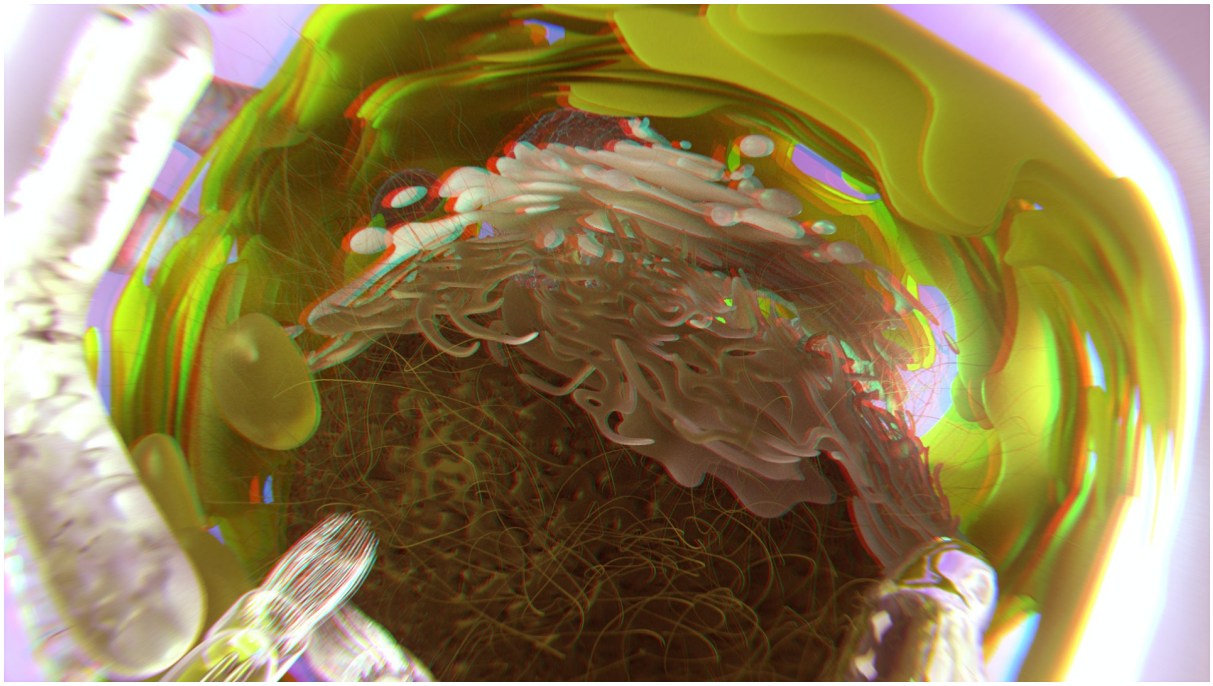

Figure 1: An anaglyph stereoscopic rendering (red/cyan) of Chlamydomonas reinhardtii

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3 Animation and Visualization

The colors of the different cell components are basically derived from the natural colors which are visible using a light microscope. For example, the color of the Chloroplast is green, caused by the Chlorophyl. There is also a number of publications and videos which are presenting the movement of the flagella. These sources have been taken into account during the modeling process [5].

4 Outlook

A first version of this video was presented at the conference “Prospects and challenges for the development of algal biotechnology” and the CELLmicrocosmos neXt workshop in September 2014. Future approaches may be the integration of the molecular level, e.g., by modeling the photo system complexes, by using the MembraneEditor [6].

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