

Can we rebuild a cell? Bryopsis — an experimental model!

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Generally speaking a violent mechanical treatment applied on a living cell or a unicellular organism destroys its structural and functional integrity and leads to death; any tentative to re-build the destroyed cell from the remaining cellular fractions turned into failure. There are few exceptions; one of them is the coenocytic seaweed *Bryopsis*. This widespread seaweed has the ability to be restored from its cellular fractions beginning with the spontaneous aggregation of cytoplasm and organelles (in the presence of seawater) and continuing with the formation of a temporary polysaccharide membrane surrounding the cytoplasm aggregates, formation of a lipid-based membrane and restoration of the cell wall; the result is a cell that has the ability to growth and form a new *Bryopsis* thallus. In the experimental approach to re-build the coenocytic alga *Bryopsis*, in early events after the mechanical destruction, cytoplasm and organelles can be mixed with biological (*E. coli* living cells carrying the *gfp* gene for the Green Fluorescent Protein) or inorganic particles (Fe_3O_4 nanoparticles for Ferrofluids) so that the new particles would be incorporated in the re-constructed *Bryopsis* protoplast/cell. The behavior of *Bryopsis* protoplasm and particles will be presented and discussed using Optical and Transmission Electron Microscopy investigations. The preliminary experimental data support the belief that the reconstruction of a designed *Bryopsis* cell, including artificial or natural foreign elements, will become a reality in the nearest future.