# A NOVEL TYPE OF COLONY FORMATION IN MARINE PLANKTONIC DIATOMS REVEALED BY ATOMIC FORCE MICROSCOPY

Sunčica Bosak[1]*, Galja Pletikapić[2], Amela Hozić[2], Vesna Svetličić[2], Diana Sarno[3] & Damir Viličić[1]

[1]University of Zagreb, Faculty of Science, Divison of Biology
[2]Ruđer Bošković Institute, Division for Marine and Environmental Research
[3]Stazione Zoologica Anton Dohrn

Diatoms have evolved a variety of colonial life forms in which cells are connected by organic threads, mucilage pads or silicate structures. In this study, we provide the first description of a novel strategy of colony formation among marine planktonic diatoms. *Bacteriastrum jadranum* is a chain-forming centric diatom in which sibling cells are enclosed within the optically transparent organic matrix instead of fusing of silica between setae as it is the case in all other members of the family Chaetocerotaceae. This cell jacket structure was detected by staining procedures (Alcian Blue and Coomassie Brilliant Blue G), which showed that the polysaccharides are predominant matrix constituents and revealed that the jacket reaches the span of the setae. The scanning electron microscopy (SEM) observations showed distinguishable fibrillar network firmly associated with cells. Using atomic force microscopy (AFM), we were able to visualise and characterise the cell jacket structure at molecular resolution. At nanoscale resolution, the cell jacket appears as a cross-linked fibrillar network organised into a recognisable structure. It is composed of non-evenly distributed high density domains (patches) surrounded and interconnected by thicker fibrils. Inside the patches are the hexagonally shaped pores decreasing in size from the patch edge towards the center. The large pore openings found between the patches are formed by the robust branching fibrils and these represent the backbone of the fibrillar network. Such structure is porous, but at the same time highly flexible and mechanically stable. We conclude that the *Bacteriastrum* polysaccharide jacket represents an essential part of the cell, as such specific and unique patterns have never been found in self-assembled polysaccharide gel networks, which are usually encountered in the marine environment.