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Original Research Article

„Fourth Phase Water“ –„Liquid Crystalline Water“ in Plant Polysaccharide Gels?

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This communication is a short follow-up-note to two recent publications: Mayer F “Exclusion Zones” in Biological Cells? Swift Journal of Medicine and Medical Sciences 1 (3) pp. 018 – 022 (October 2015-1) and Mayer F Plant Polysaccharide Gels – Some Properties and Applications in Irrigation Systems, Horticulture, and Soil Protection. Swift Journal of Agricultural Research, Vol 1 (5) pp. 047 - 048 October 2015-2. In the first of these two communications, a short description of “Fourth Phase Water” (“Liquid Crystalline Water”) and of “Exclusion Zones” is presented. Pollack and his group, Department of Bioengineering at the University of Washington, Seattle hypothesize that “exclusion zones” – their discovery -, formed on hydrophilic surfaces in water-containing objects and excluding any kind of solutes, are not composed of bulk water, but of water with a so-far unknown structural organization (Pollack 2013). This feature appears to confer to this kind of water surprising properties, e.g., as mentioned above, the capability to form “exclusion zones”. It is generally expected that these new findings will have remarkable impact on new approaches and developments (Pollack 2013, Mayer 2015).

Keywords: “Fourth Phase Water“, „Liquid Crystalline Water”, “Exclusion Zones”, Plant Polysaccharide Gels, Barrier Function, “Fourth Phase Water” in Polysaccharide Gels?

INTRODUCTION

The second publication mentioned above might be the initiation for more detailed investigations of the properties of Fourth Phase Water. One of the remarkable properties of plant polysaccharide gels is their “barrier function” against freshwater and seawater; we have presented this finding already in the year 2000 at the EXPO 2000, and Pollack (2013) did also mention this phenomenon. Plant polysaccharide gels are, by nature, hydrophilic. Gels of these macromolecules, formed as soon as water has access to polysaccharide powder, can be envisaged as “water containing objects” (s. above).

The gels possess a huge inner surface, i.e. the surface of the polysaccharide macromolecules, and all these surfaces taken together constitute a large hydrophilic surface. Hence, it would not be surprising to find that this surface causes formation of Fourth Phase Water within the gel as soon as bulk water is added to polysaccharide powder and swelling of the polysaccharide mass has come to the end of its capa city for water uptake.

This “barrier function” could be an explanation for the “Exclusion Zones”: if bulk water, containing emulsified materials and solutes, cannot penetrate into a layer of “Fourth Phase Water”, also solutes and materials emulsified in the water are “excluded”.

FINDINGS

Above, it is mentioned that the new findings, i.e. the existence of Fourth Phase Water, may have remarkable impact on new approaches and developments. A precondition for this impact will be a much better knowledge on the properties of Fourth Phase Water. Plant polysaccharide gels might be an “unlimited” source for this kind of water. Up to now, Fourth Phase Water appears to be just a water lining of various depths on simple hydrophilic surfaces in water-containing objects. Hence, until now the desired higher volume of this water moiety for experiments is not yet available.

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