On the relationship between Exclusion Zones and Coherence Domains in water

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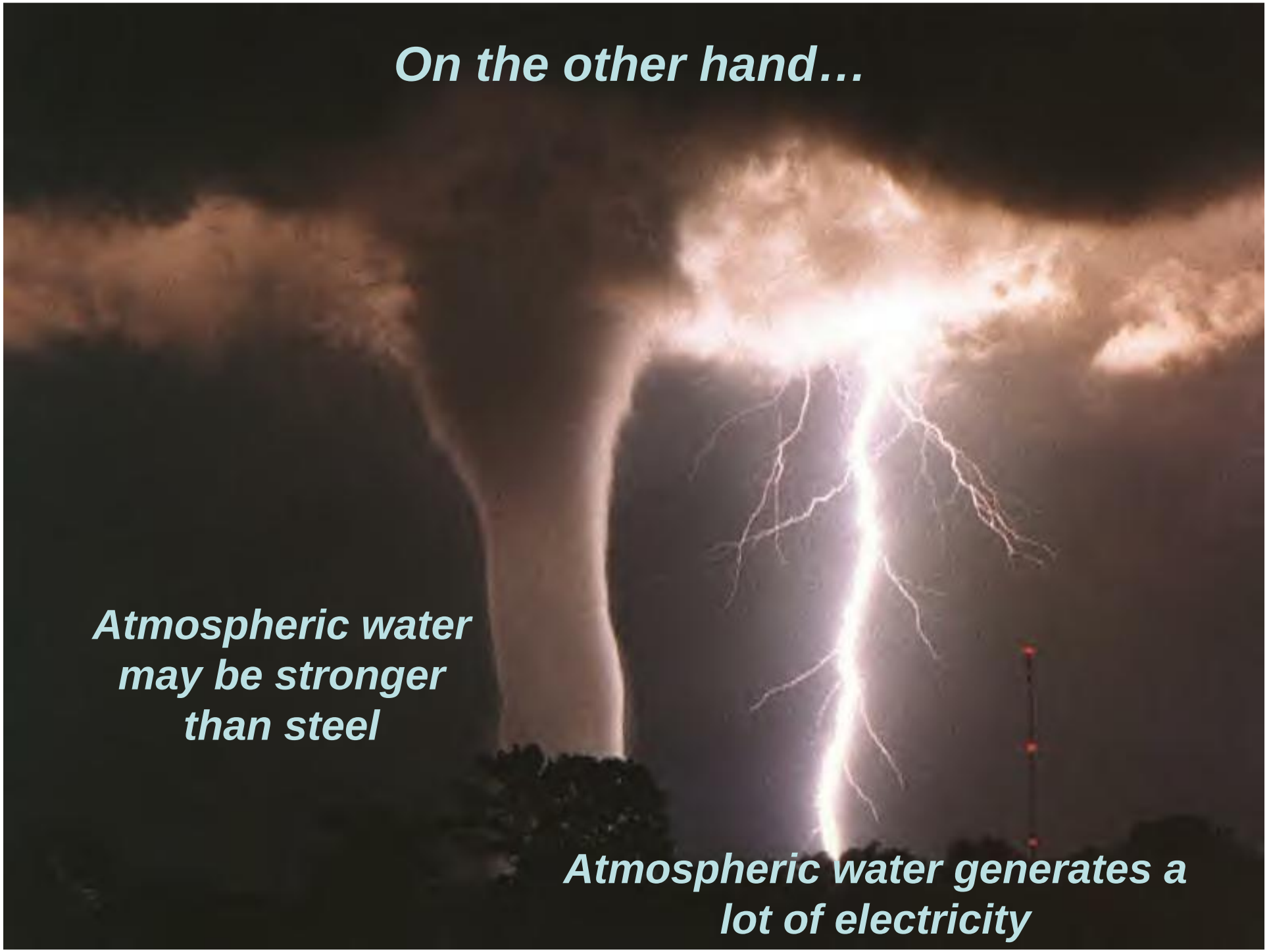
Water is the most customary and at that the most enigmatic substance


Our customary feeling about water – vapor:
What can be softer than clouds?

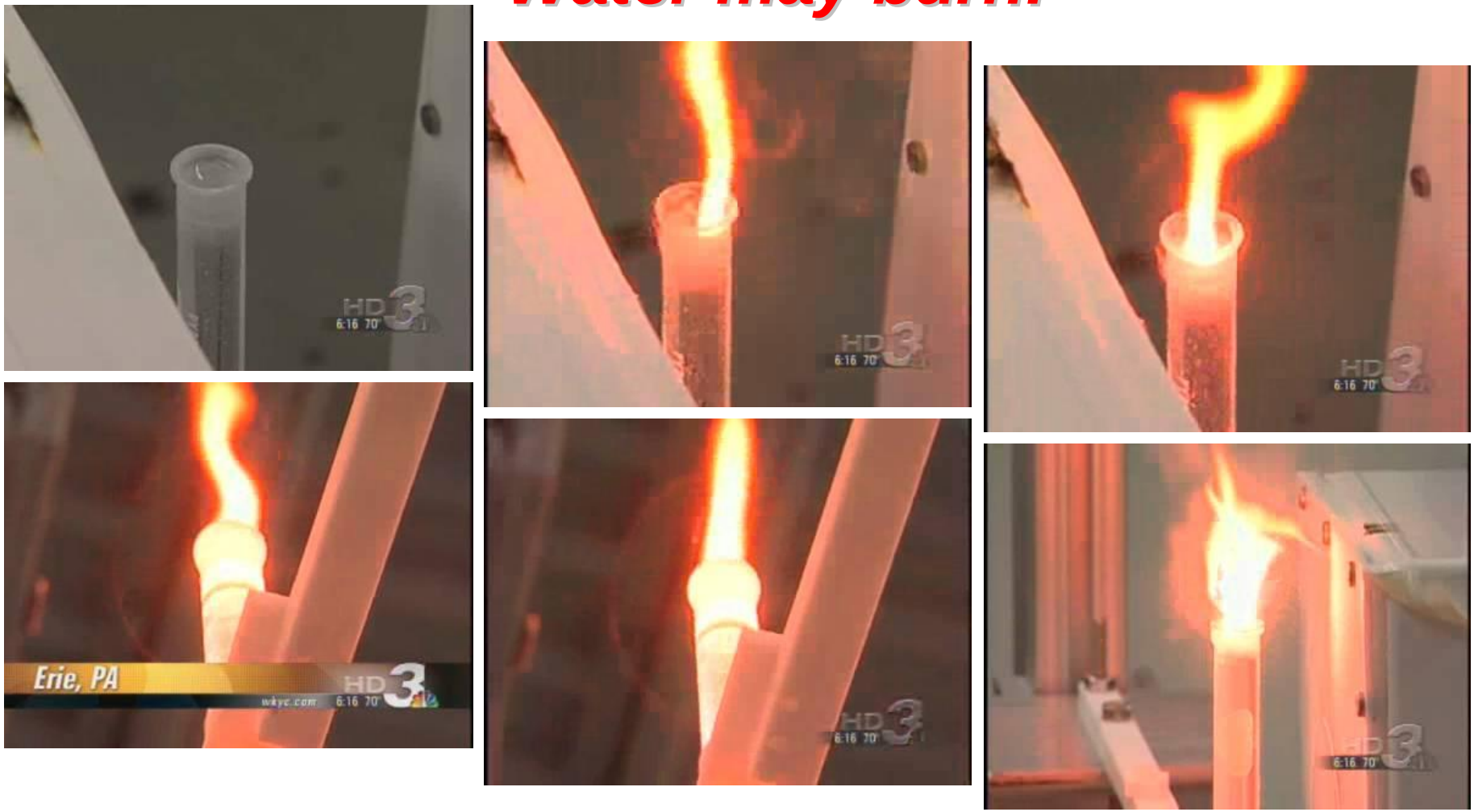
Our customary experience about humidity: dry air provokes electrization, humid air prevents it


On the other hand…
Atmospheric water may be stronger than steel
Atmospheric water generates a lot of electricity

Everybody knows that water extinguishes fire

On the other hand…

Water may burn!



Burning of salted (sea) water under irradiation of radiowaves (13,56 MHz, 200-400 Watt). Temperature of flame > 1500^0 C.

John Kanzius, 2007


Why water
is so
enigmatic?


REAL WATER is never
a plain (homogeneous) substance,
it is always a COMPLEX SYSTEM.
(In particular) Any water contains
INTERFACIAL water and
BULK water


Interfacial water of a living individual, e.g. Jellyfish, does not mix up with bulk water
Water content may reach > 99% by weight

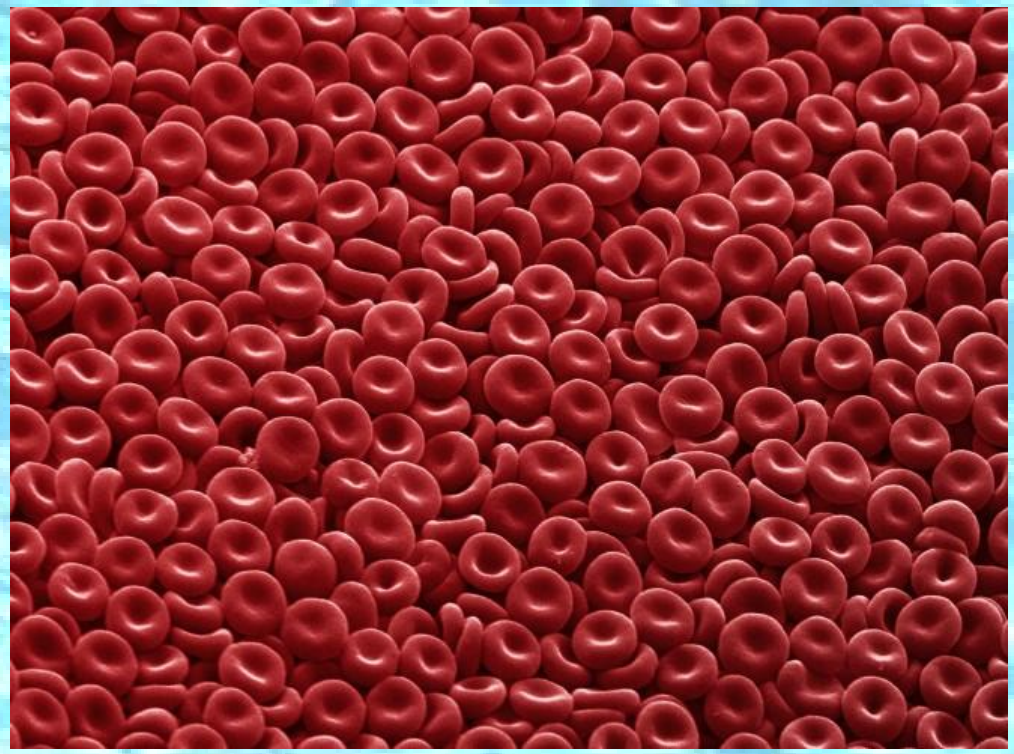
Interfacial water in a tissue

BLOOD :

~83% of water, 17% of solids.

Surface area ?

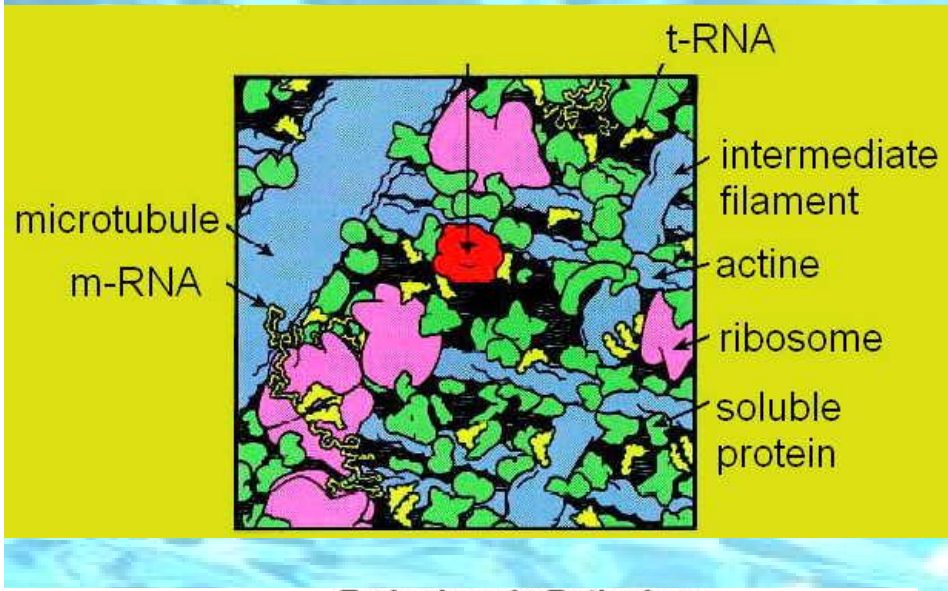
5000 m^2 of surface of erythrocytes is hydrated by 3 liters of plasma water

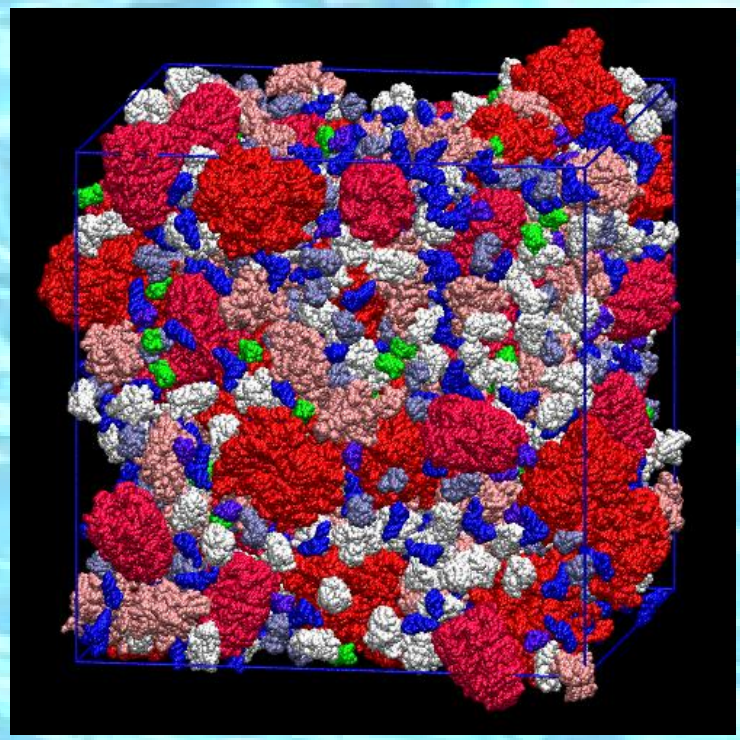


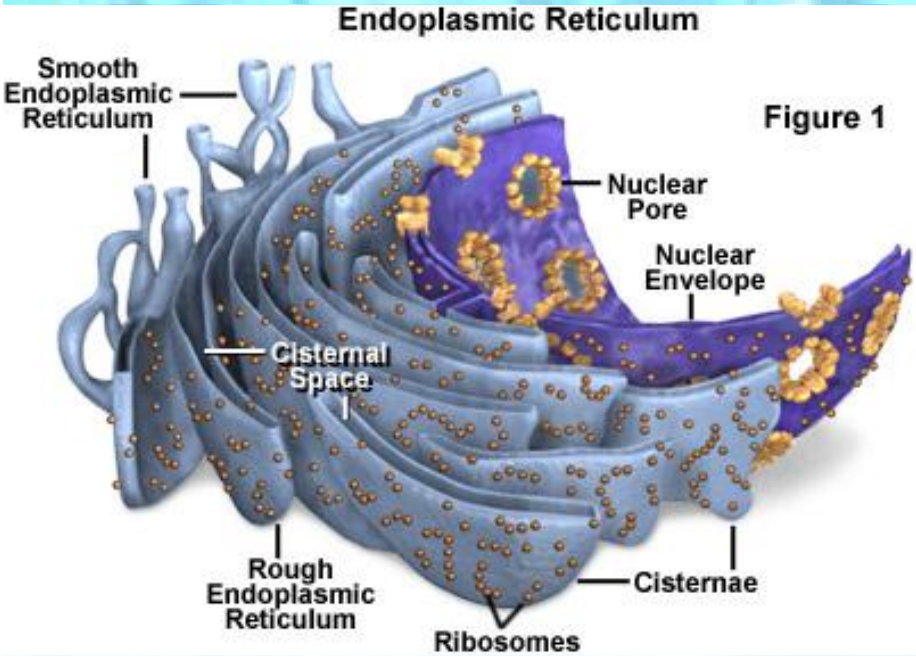
If to distribute 3 liters of water on 5000 m^2

the thickness of water layer will be < 1 mkm

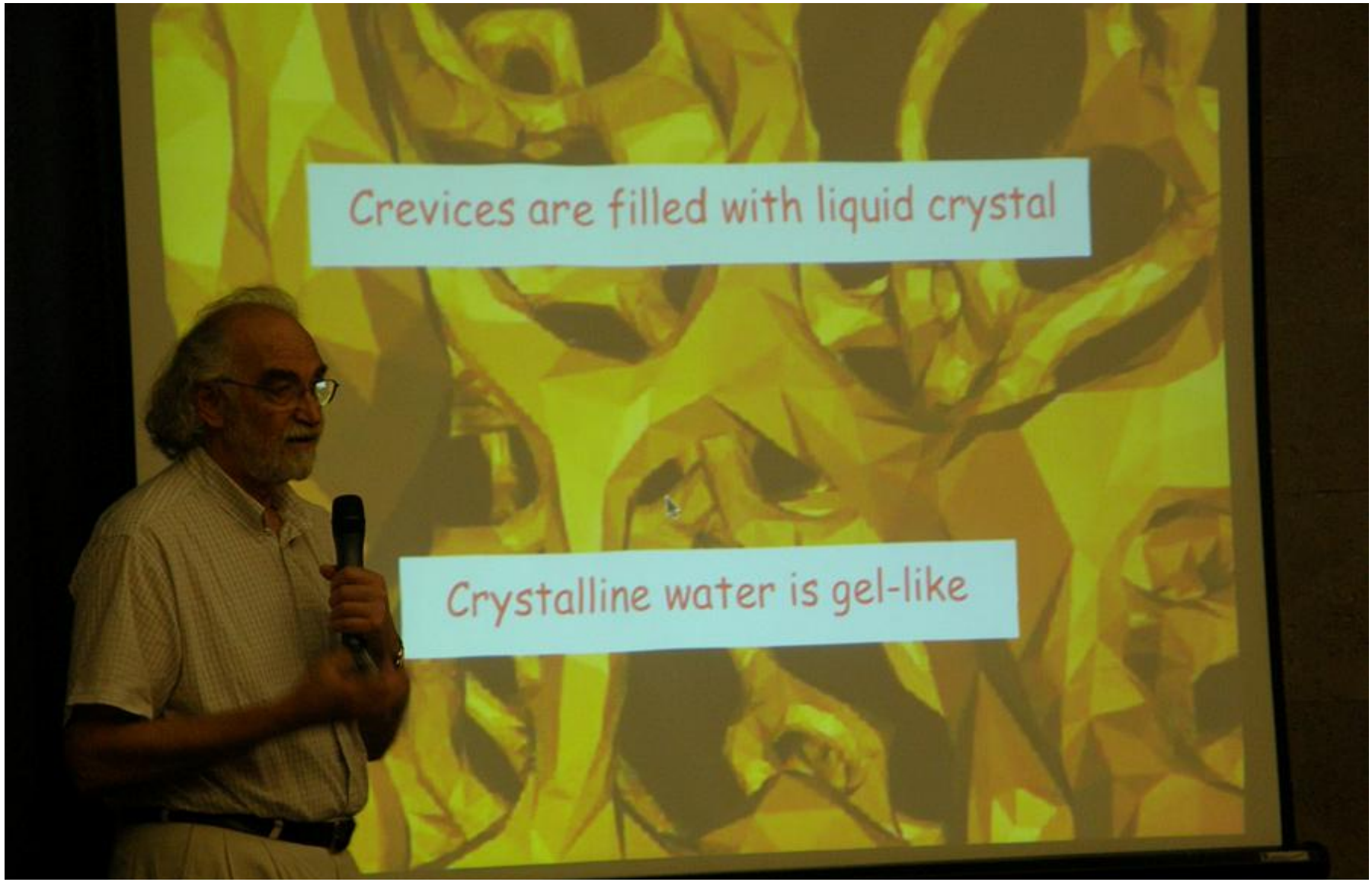
Interfacial water in a cell: macromolecule crowding and confinement







Distance between surfaces of macromolecules and membranes in a cell does not exceed 7-12 water layers



Thick layers of organized water form near hydrophilic surfaces

Jerald H. Pollack, experimental results of 2003-2012

REVIEWS OF MODERN PHYSICS VOLUME 21, NUMBER 2 APRIL, 1949

The Depth of the Surface Zone of a Liquid*

J. C. HENNIKER
Stanford Research Institute, Stanford, California

so deeply as to modify the molecular state of a skin some hundreds of microns in depth," that is, some millions of angstroms. The accepted analysis of evidence showing that surface properties differ from those of the bulk liquid.

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Summary of properties of aqueous phase adjacent to hydrophilic interfaces (interfacial water)

(Gerald H. Pollack et al., 2003 – 2012)

Excludes into bulk water all studied low- and high mol. weight molecules and particles **-- EXCLUSION ZONE WATER (EZ-water)**

EZ water is physically different from bulk water in

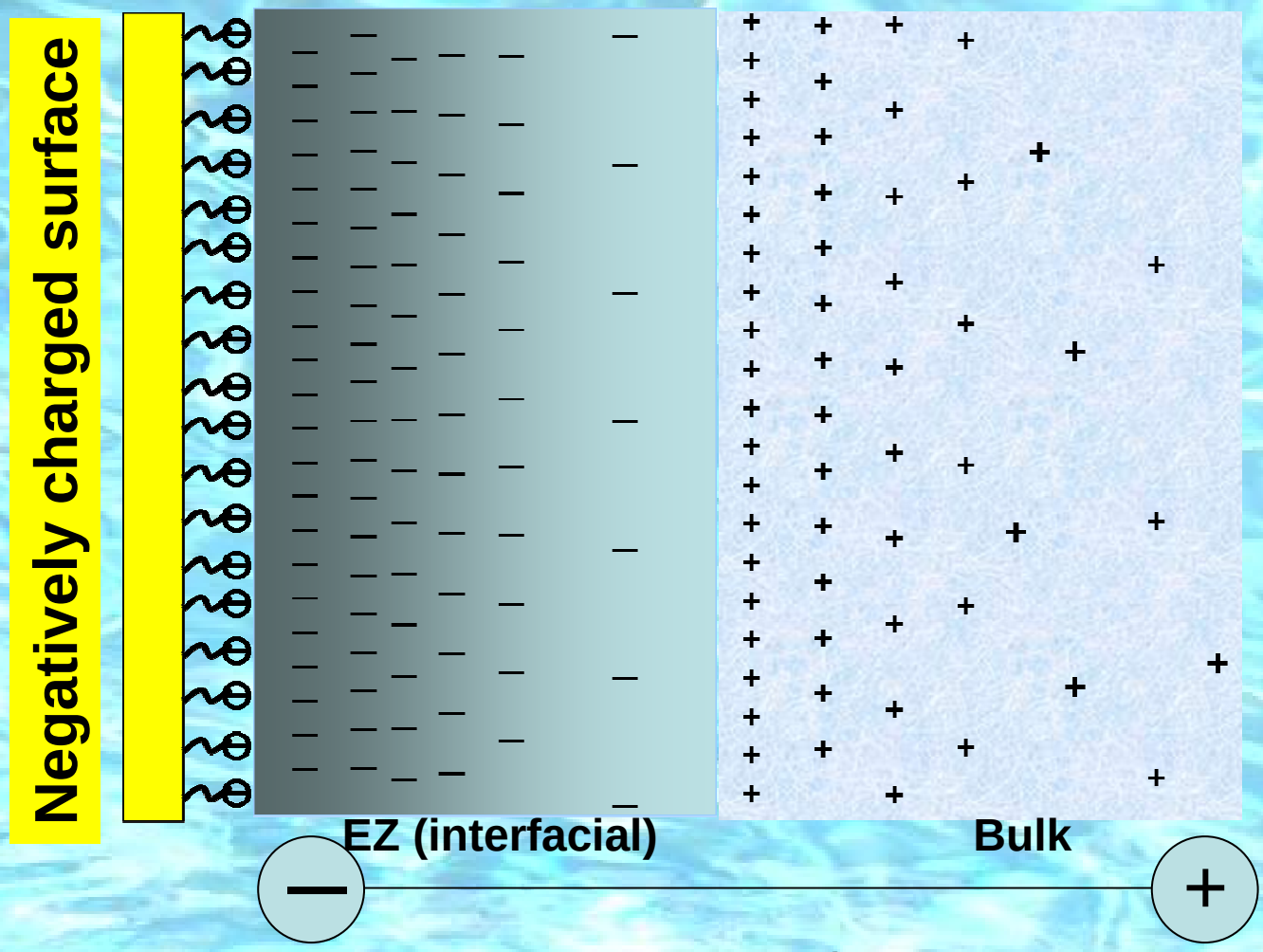
- ***Viscosity (higher)***
- ***Structural temperature (lower)***
- ***Self- diffusion coefficient (lower)***
- ***Optical properties (absorption at λ=270 nm, fluorescence)***
- ***Etc…etc…***

Thus, it is ***dynamically organized , "liquid-crystalline", quazi-polymeric***

something ***originated from water***

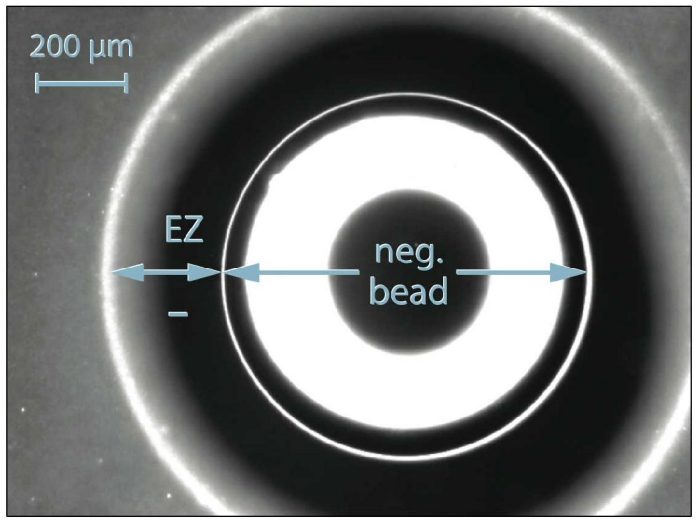
EZ- "WATER" ≠ $(H_2O)_n$

Unexpected finding – EZ-water is charged

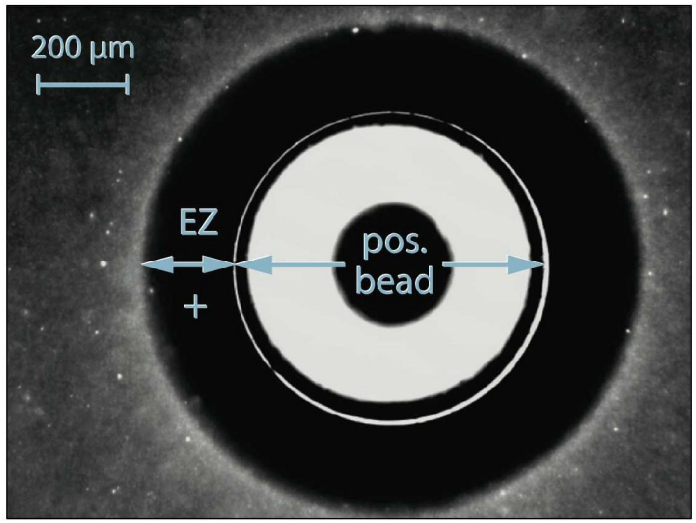


EZ- "water" may be charged negatively or positively depending on the charge of the surface forming it

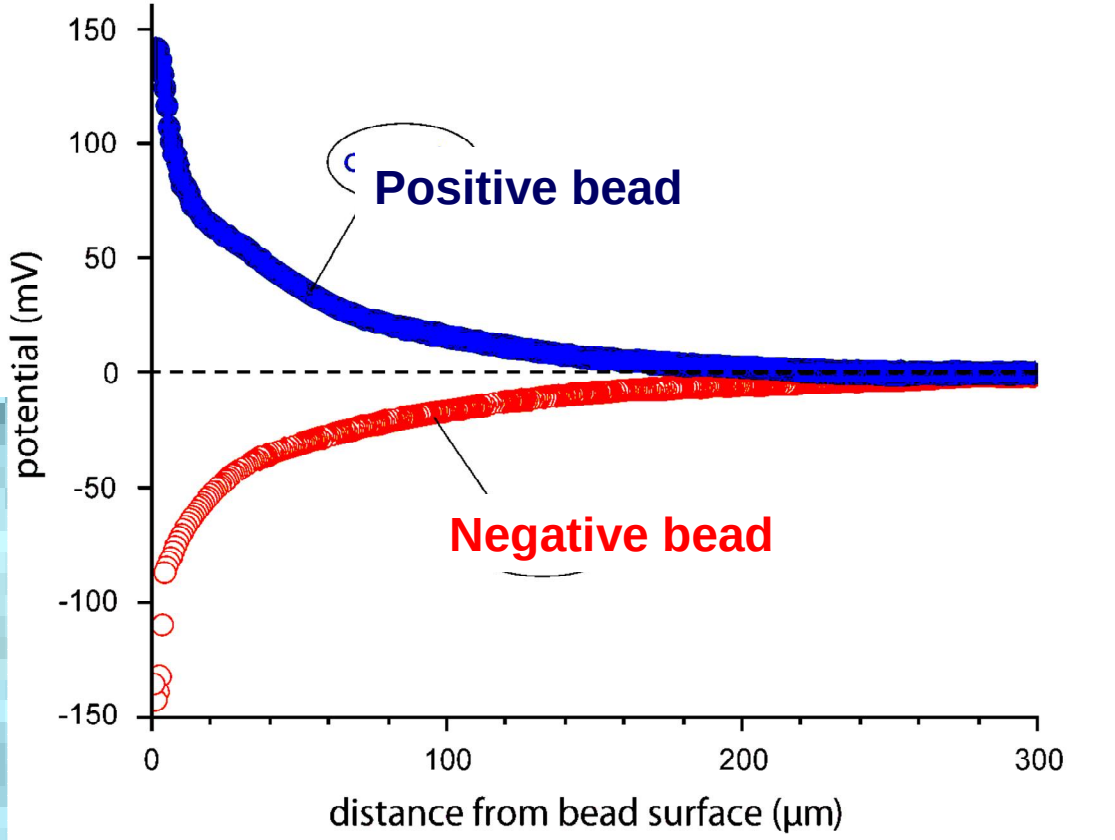
Zheng JM, Wexler A, Pollack GH.. J Colloid Interface Sci. 2009



EZ-water formed near NEG. bead is negatively charged



EZ-water formed near POSITIVE bead is positively charged

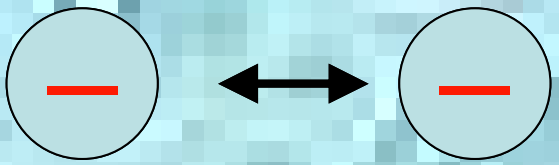


Charge distribution in respective EZ-water(s)

These properties of systems:

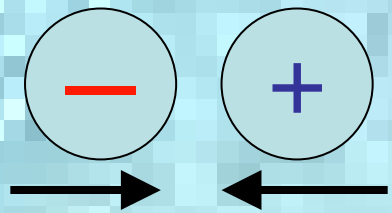
CHARGED SURFACE	***CHARGED EZ-WATER***

appear to contradict the general law of electrostatics:

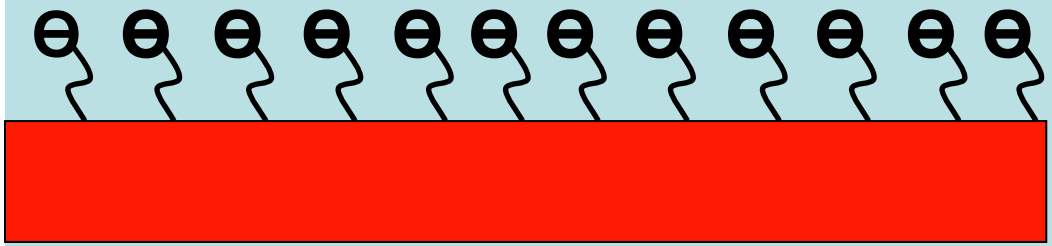


Like charges repel

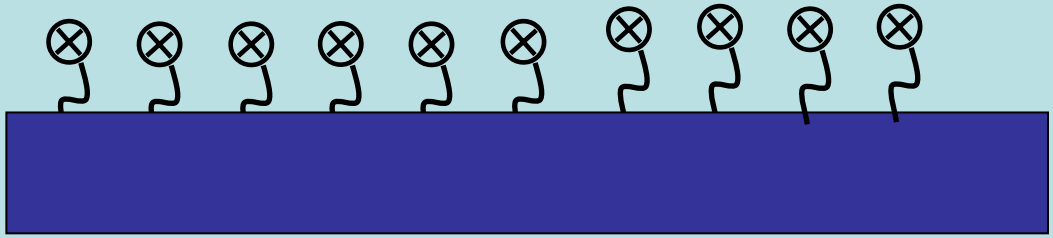
Opposite charges attract



However, we are dealing here with fixed charges

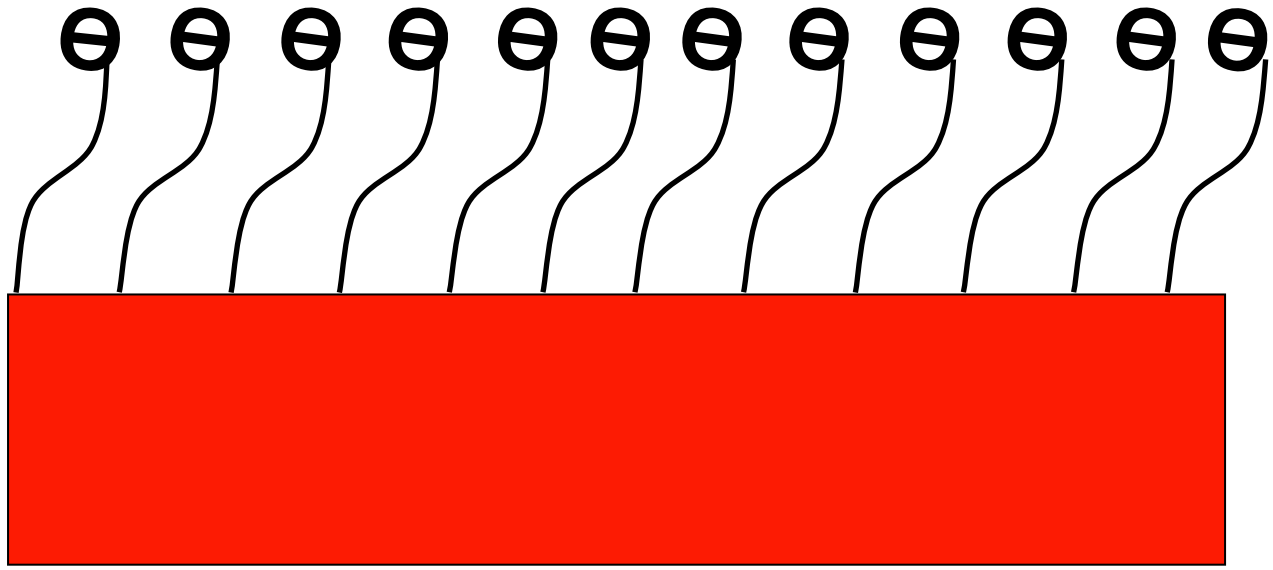


Negatively charged surface



Positively charged surface

Like charges repel each other, but as they are covalently fixed to a matrix, they all cannot but vibrate



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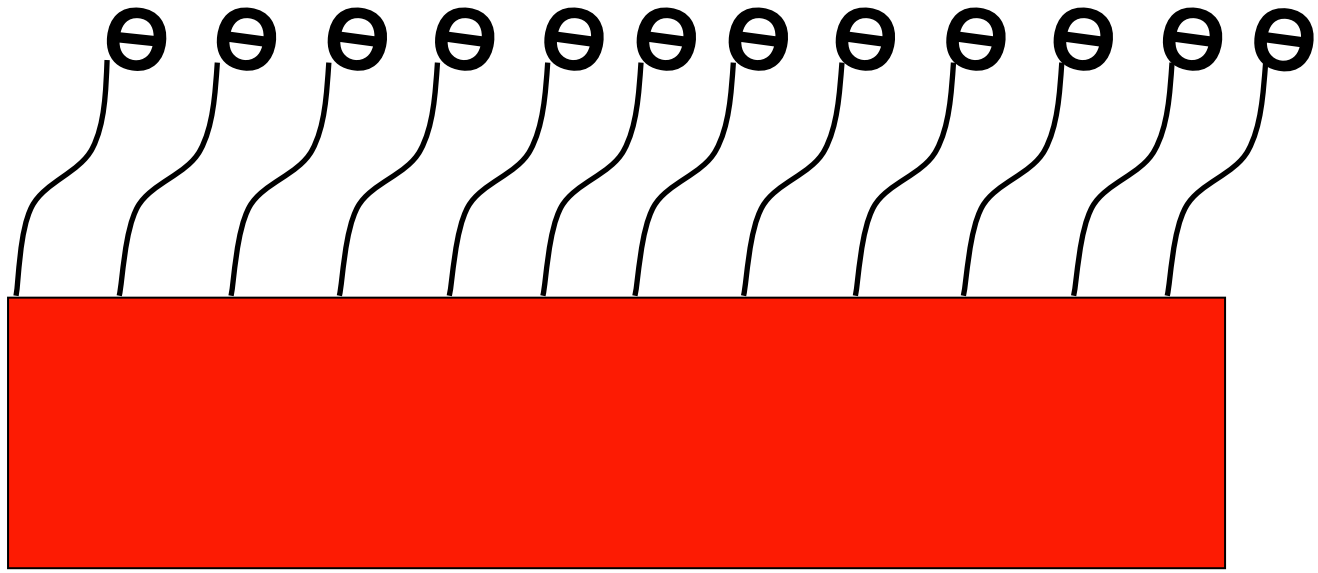
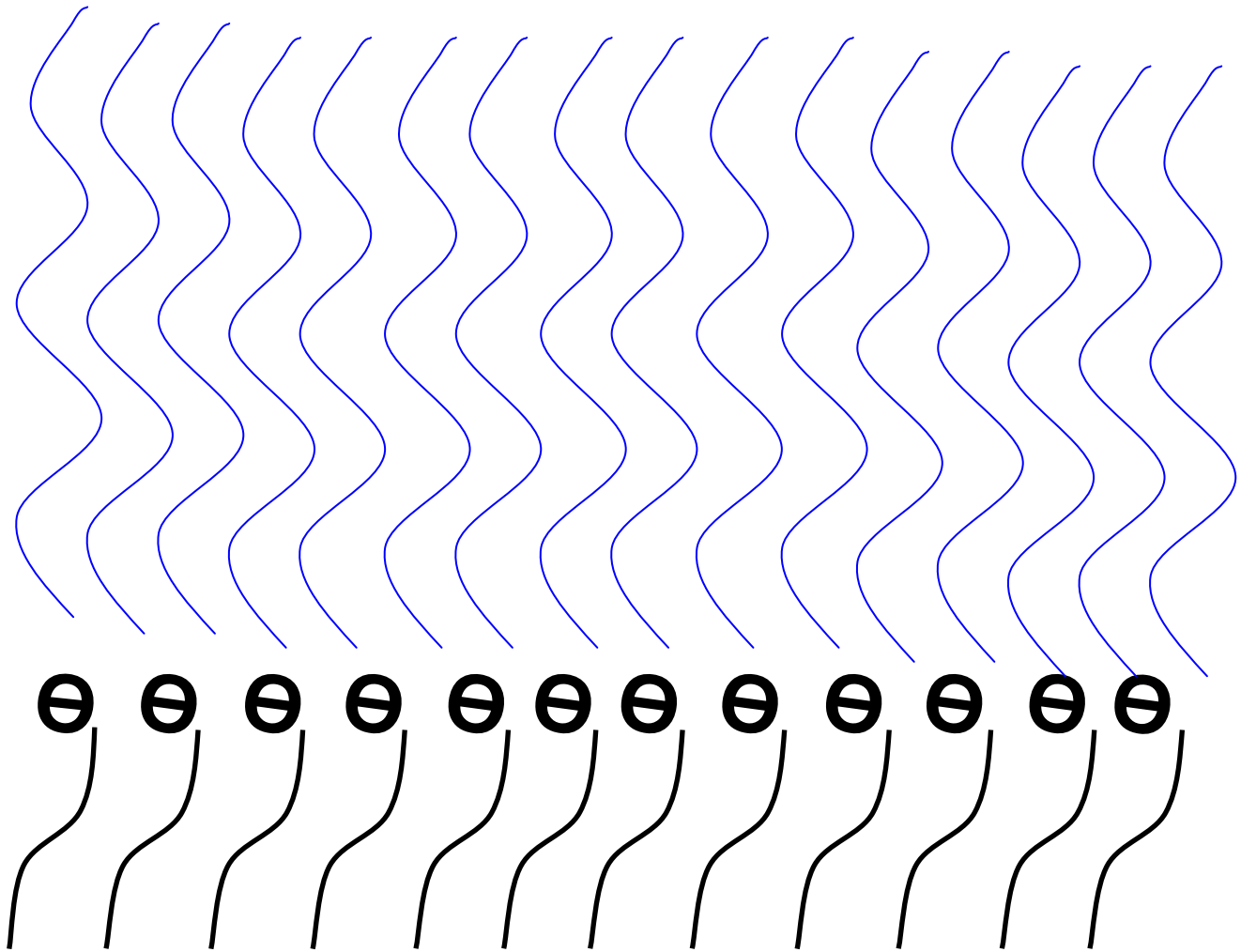


Their collective vibration could become coherent due to the principle of minimization of energy



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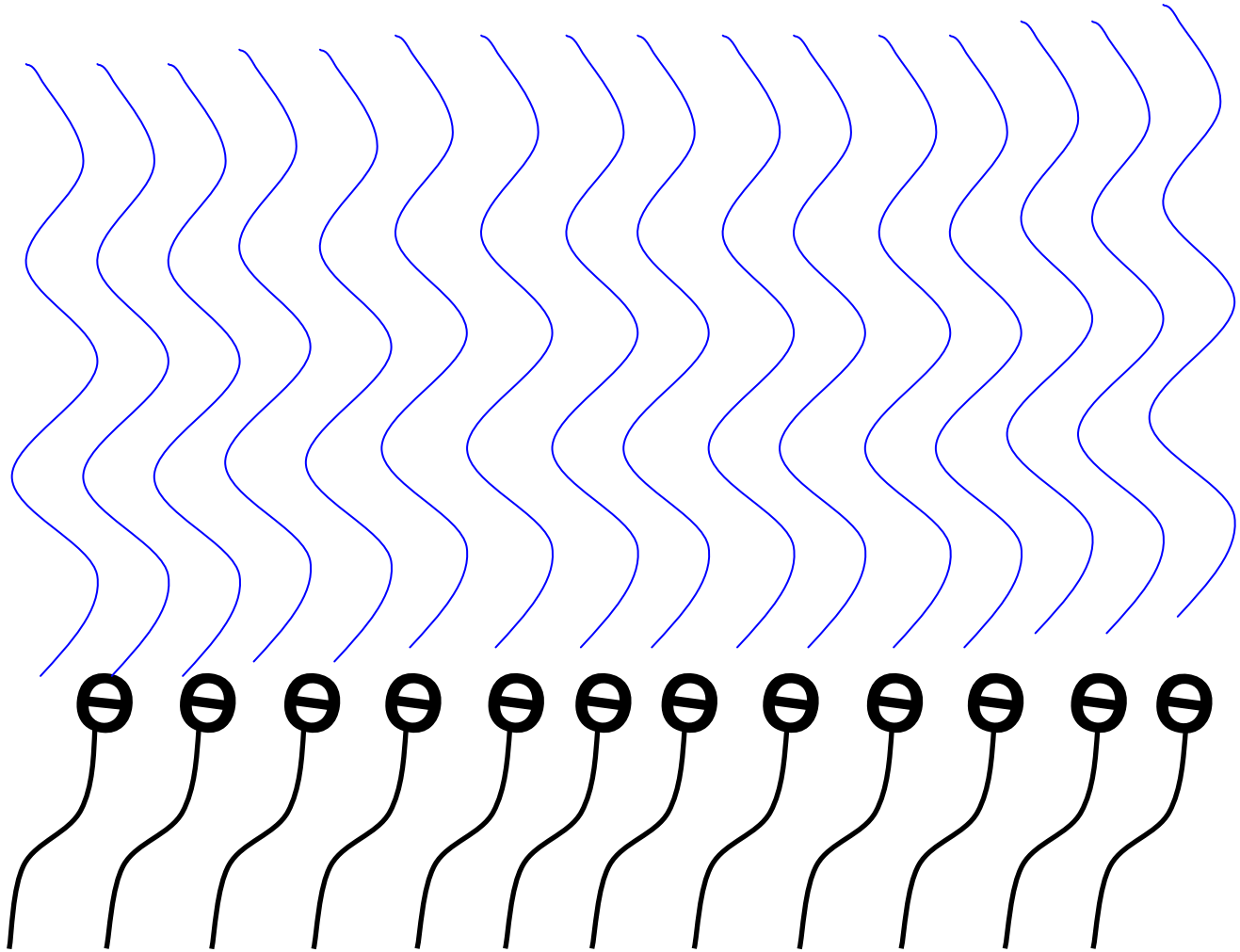
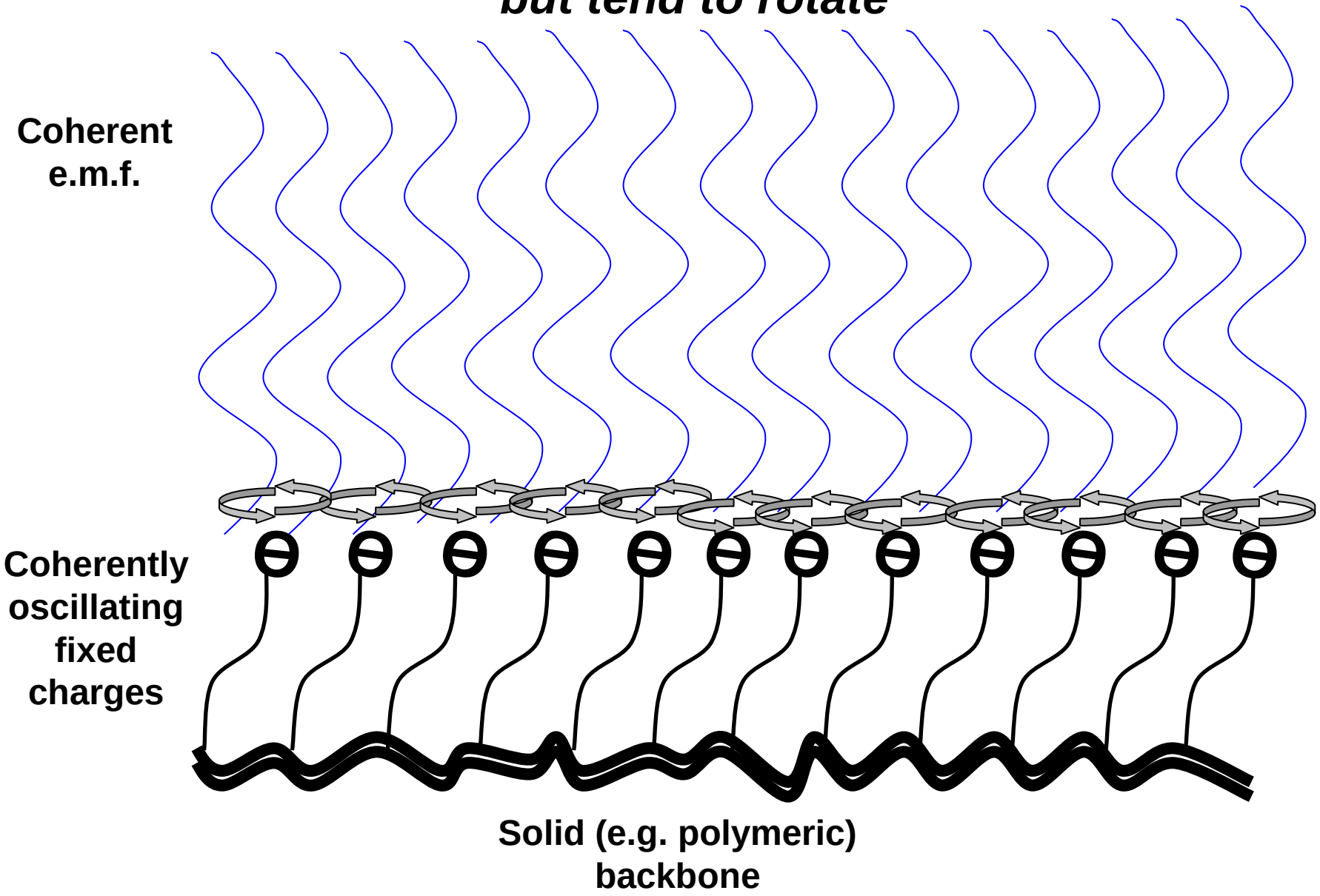


Since the charged surface is at least 2-dimentional, fixed charges oscillate not in a planar fashion but tend to rotate

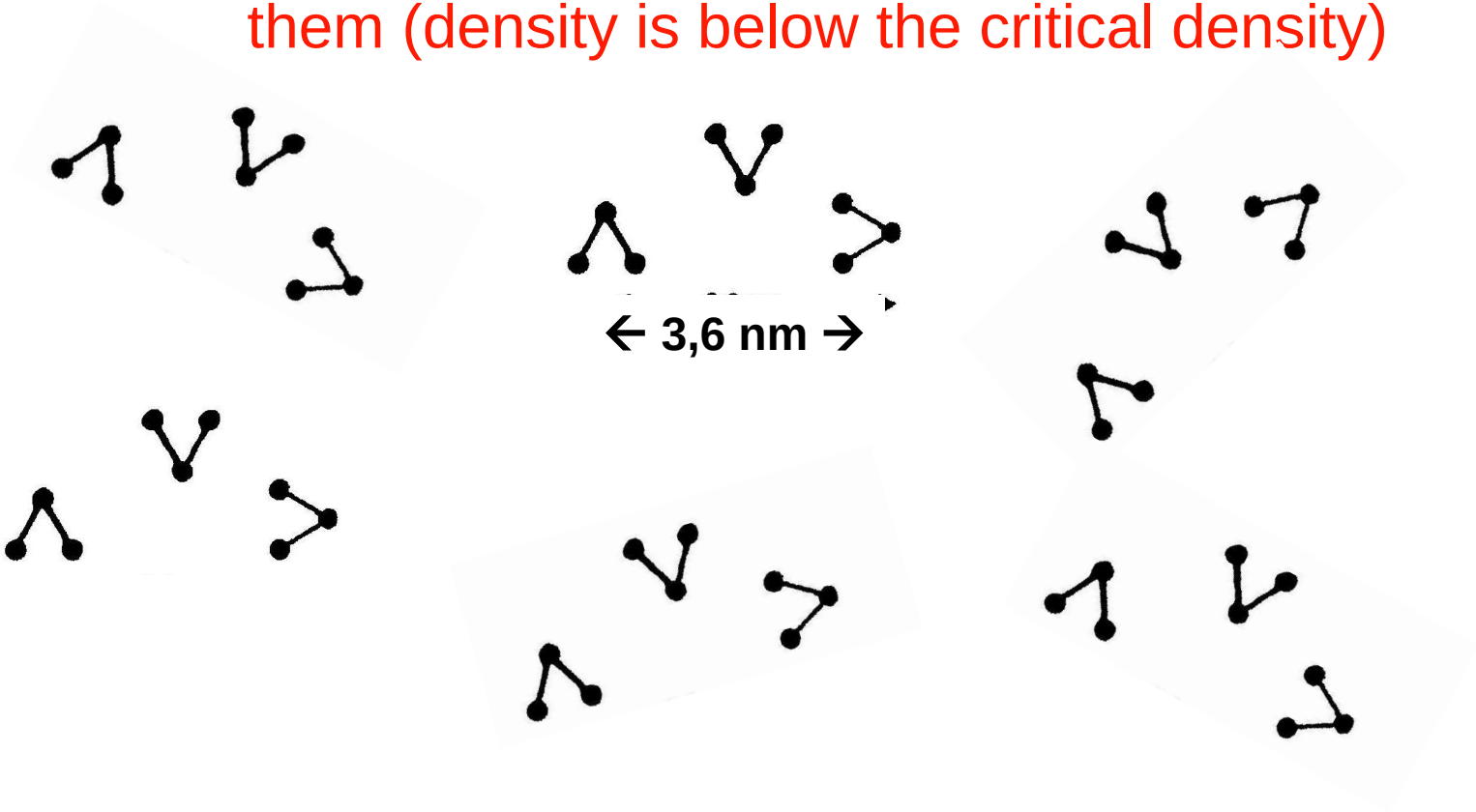


Single water molecules do not “feel” EMF radiated by a charged surface immersed in water.

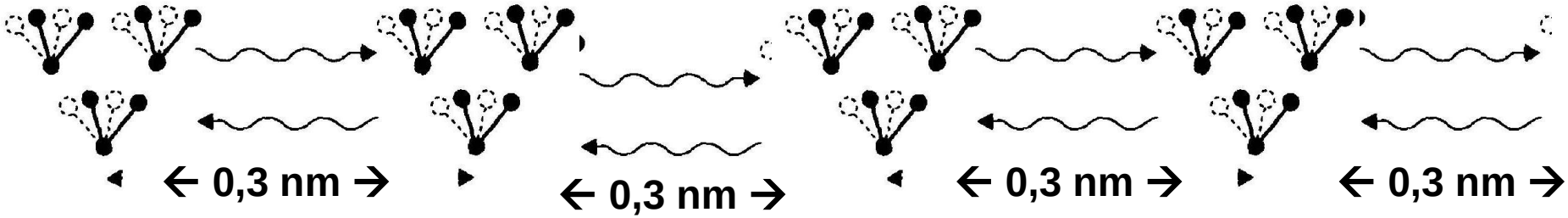
But any water water contains “receptors” of this field as it follows from Preparata – Del Giudice water model

Preparata-Del Giudice model of water is based on Quantum Field Theory – the foundation of the modern physics

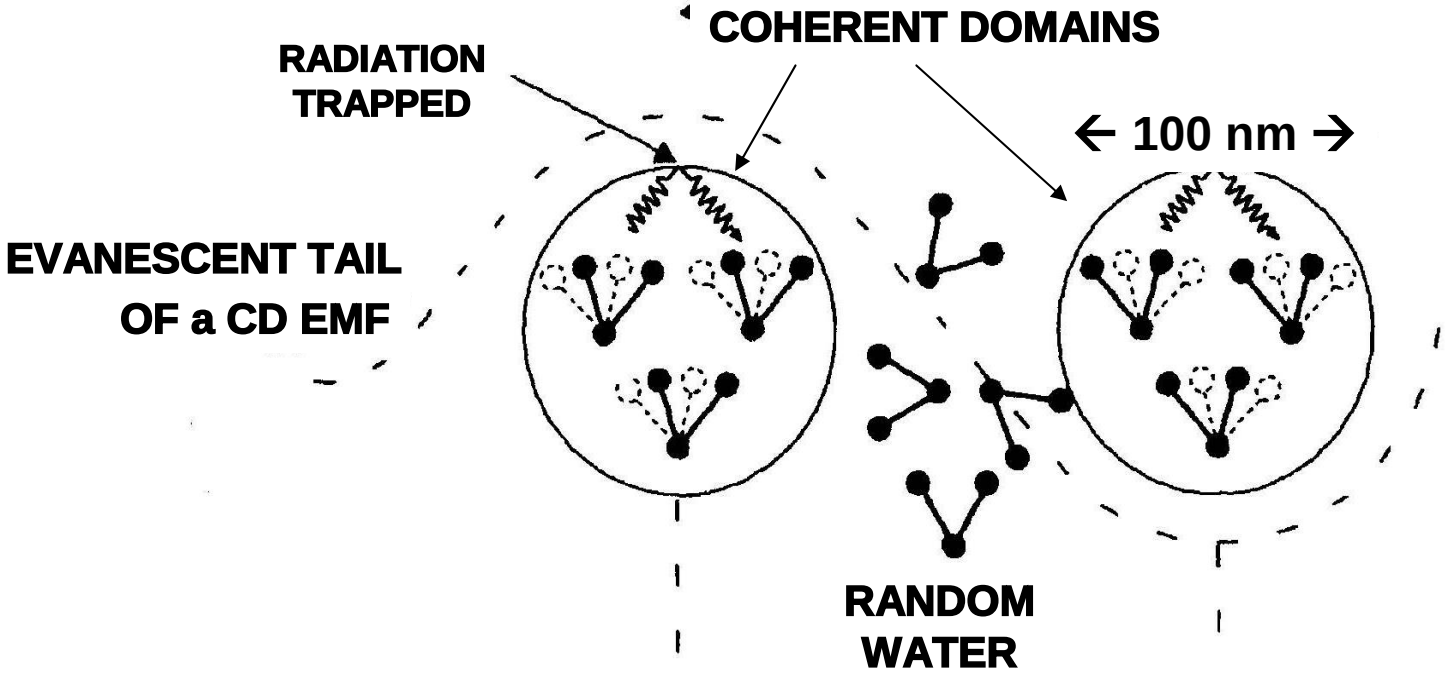
According to QFT all particles and associated fields cannot but oscillate. Water molecules in vapor oscillate, but independently of each other – non-coherently because of long distances between them (density is below the critical density)



When vapor condenses into water (temperature decreases below a threshold and density increased above a threshold), water molecules become to oscillate in phase (minimum of energy) – the condition for coherence.



Coherently oscillating water molecules get together with associated EMFs in Coherent Domains immersed in dense gas-like non-coherent water



Quasi-free ELECTRONS accumulate at the surface of Coherent Domains

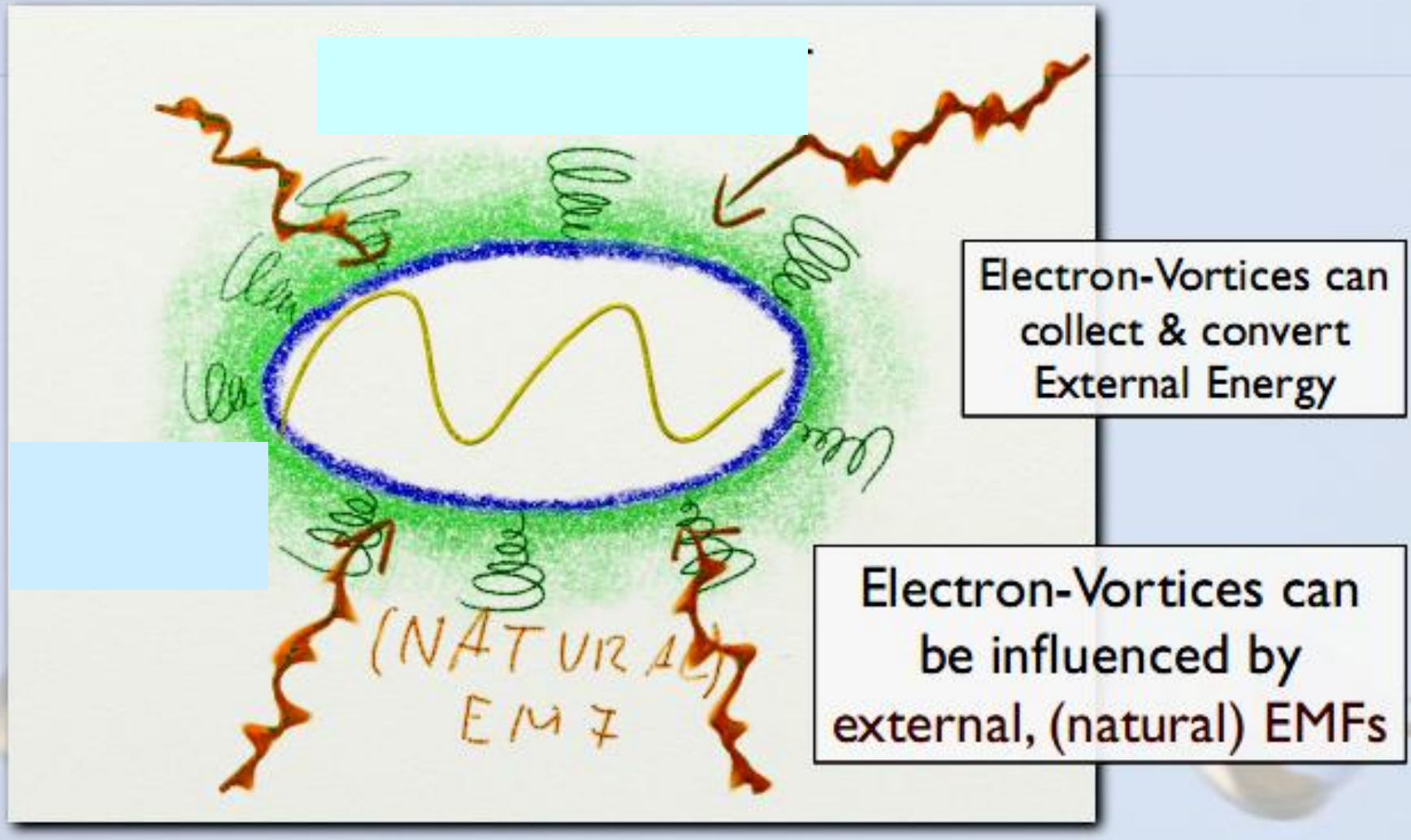
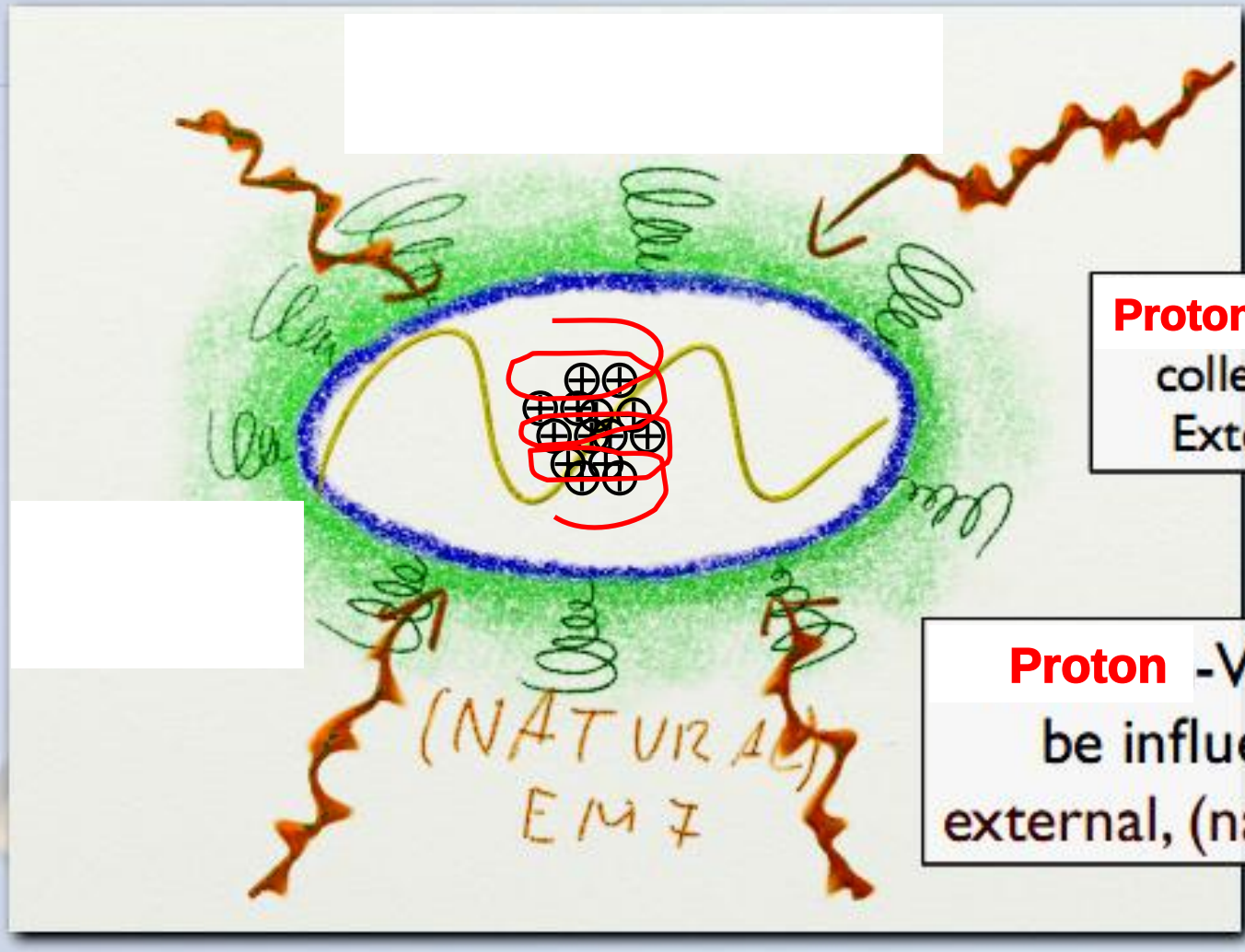


Illustration by Bernhard Pollner

Vortices of Quasi-free PROTONS concentrate at the Core of CDs



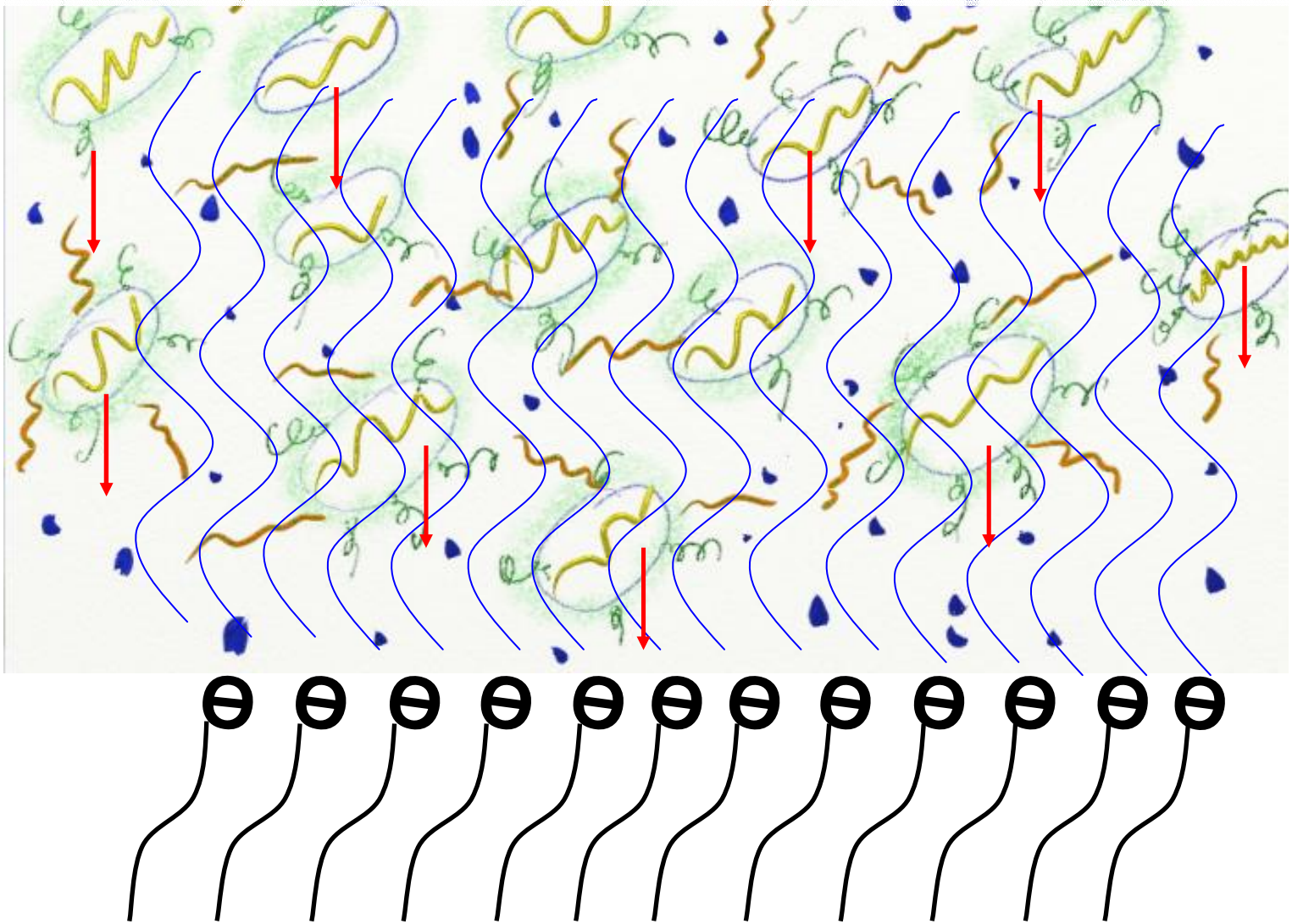
Proton -Vortices can collect & convert External Energy

Proton -Vortices can be influenced by external, (natural) EMFs

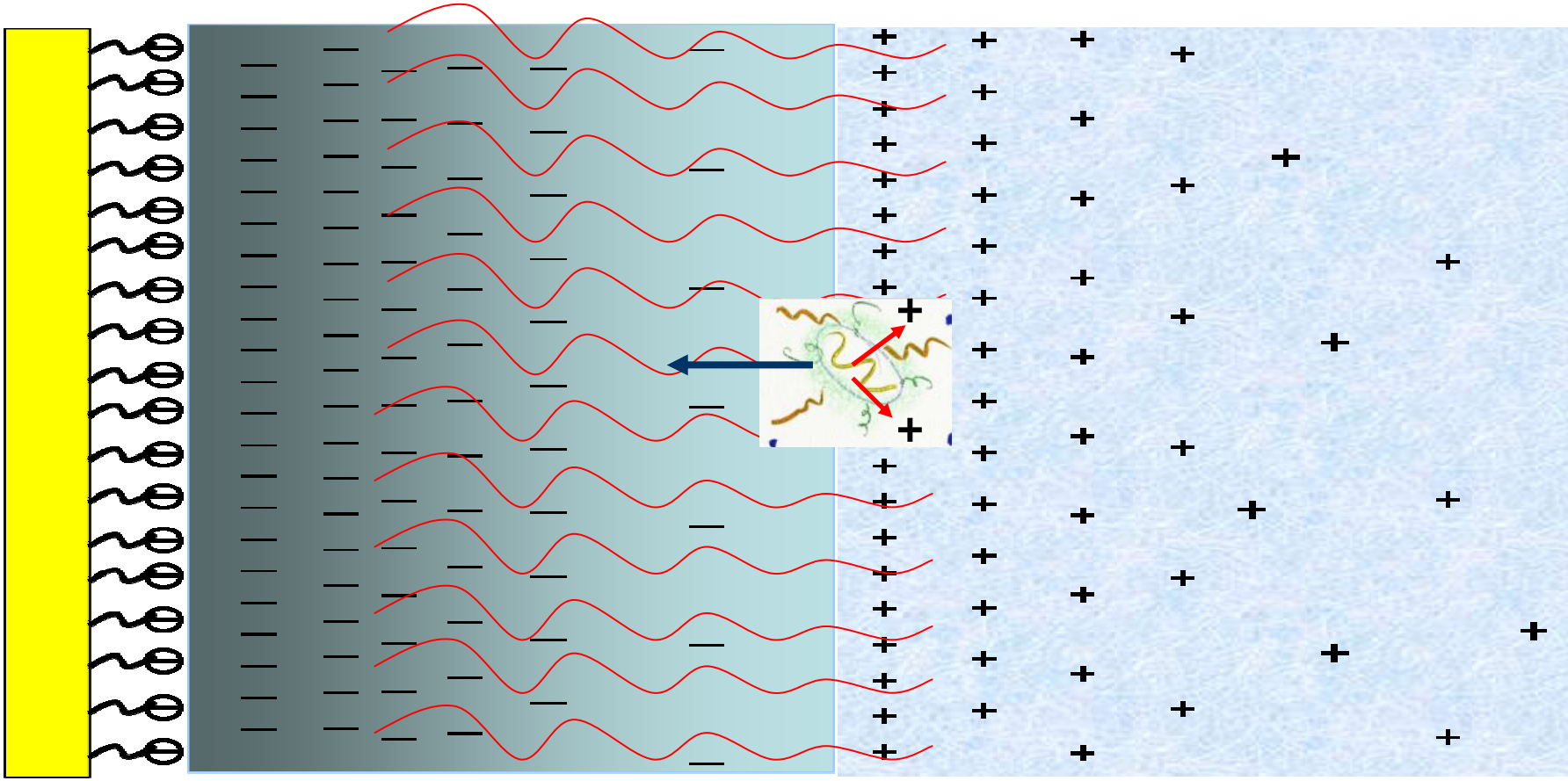
Illustration by Bernhard Pollner

EMFs produced by negatively charged surfaces may resonate with EMF produced by oscillations of the quasi-free electrons of CDs. CDs are attracted by the charged surface due to

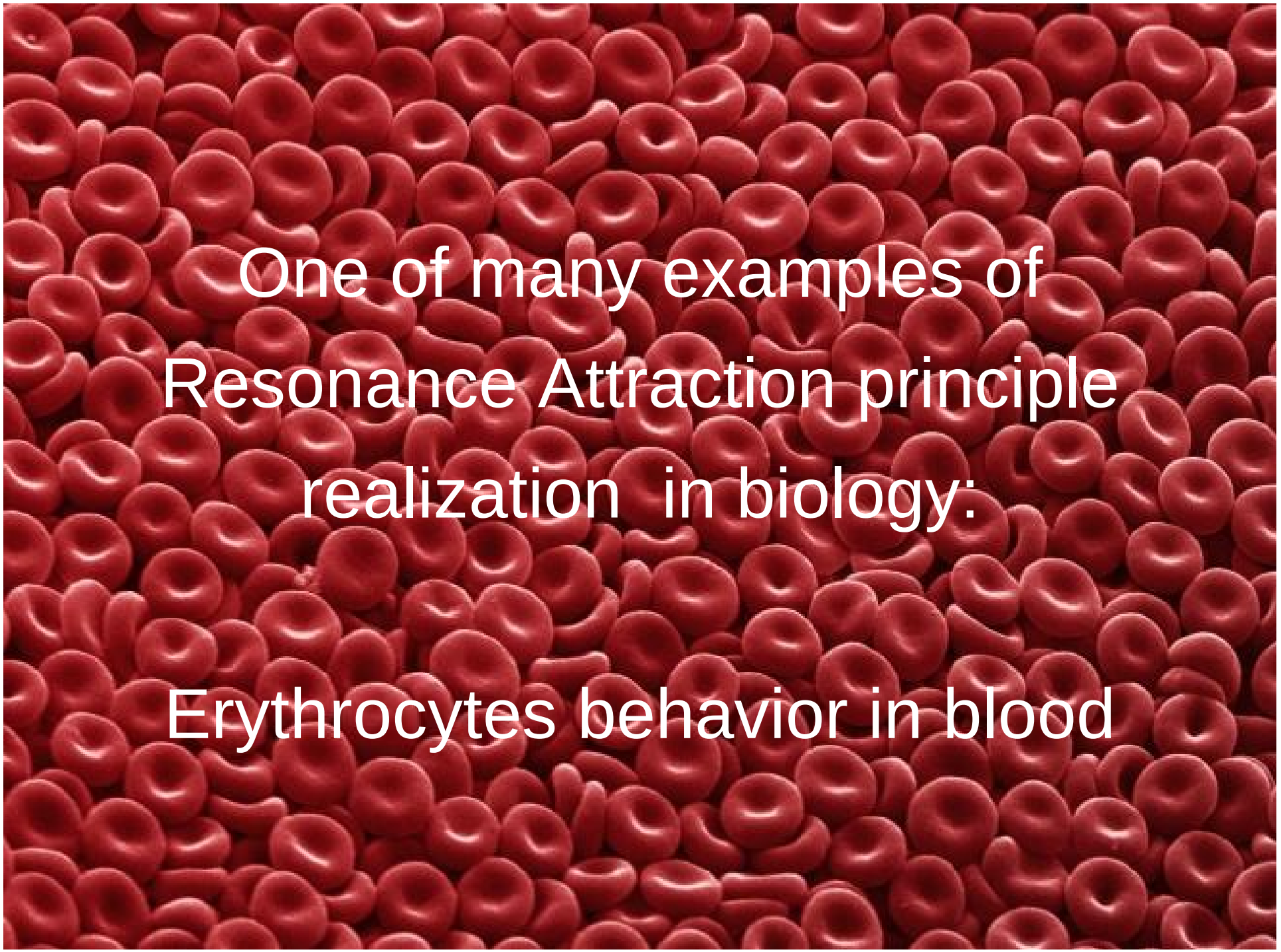
"RESONANCE ATTRACTION"



CDs attracted by the NEGATIVELY charged surface expel quazi-free protons unable to resonate with the surface EMF and turn into negatively charged COHERENT DOMAIN



Opposite should be true for the interaction of POSITIVELY charged surfaces with CDs


One of many examples of
Resonance Attraction principle
realization in biology:
Erythrocytes behavior in blood

Erythrocytes are negatively charged. Still they actively attract each other and form "rouleau" where they are held together by coherent excitations

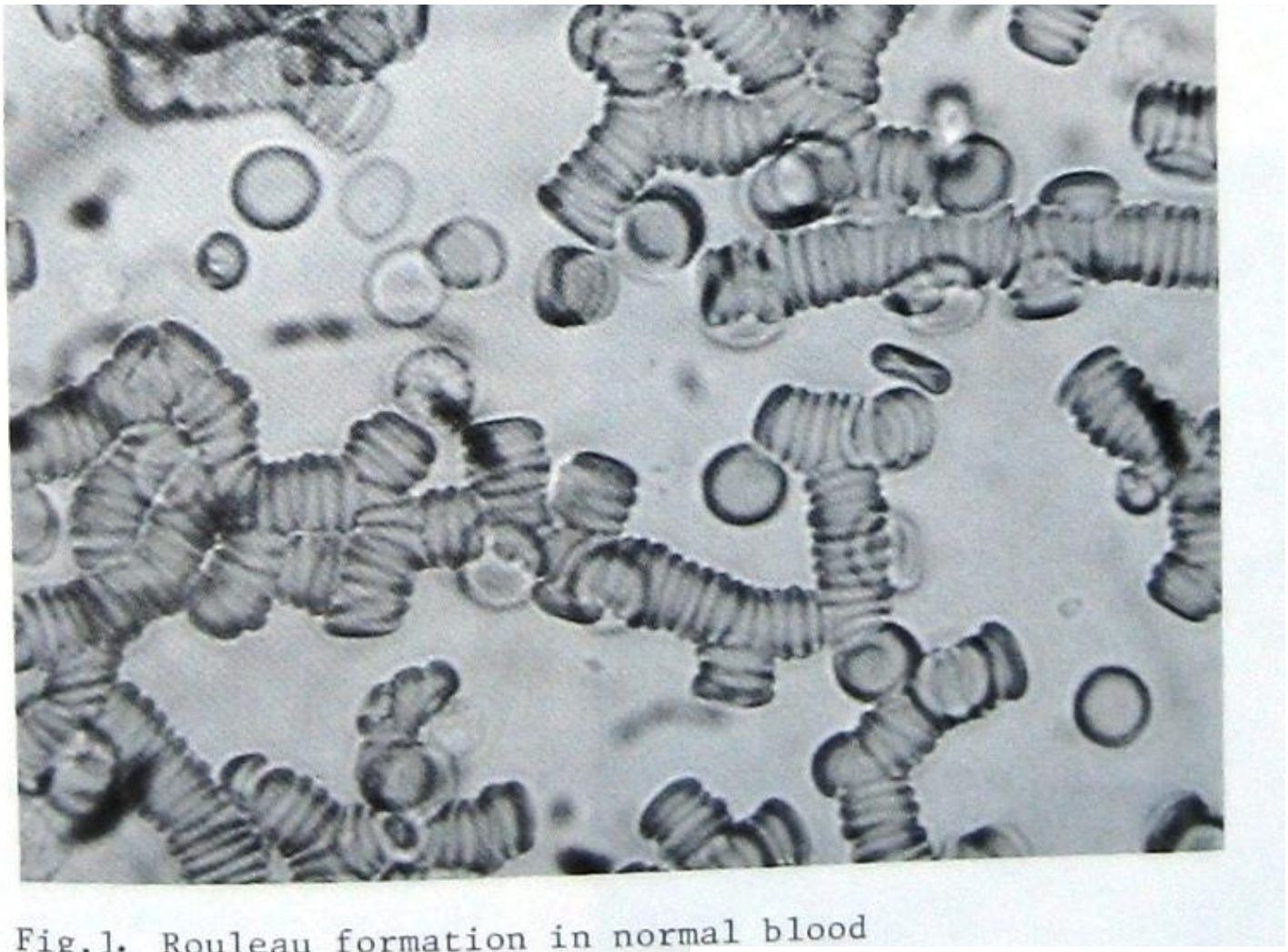
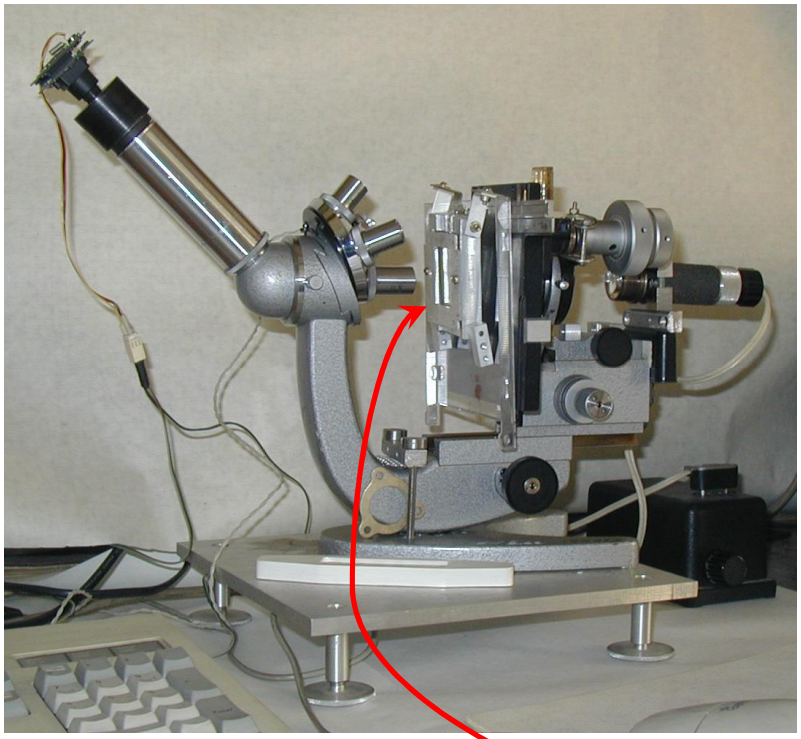
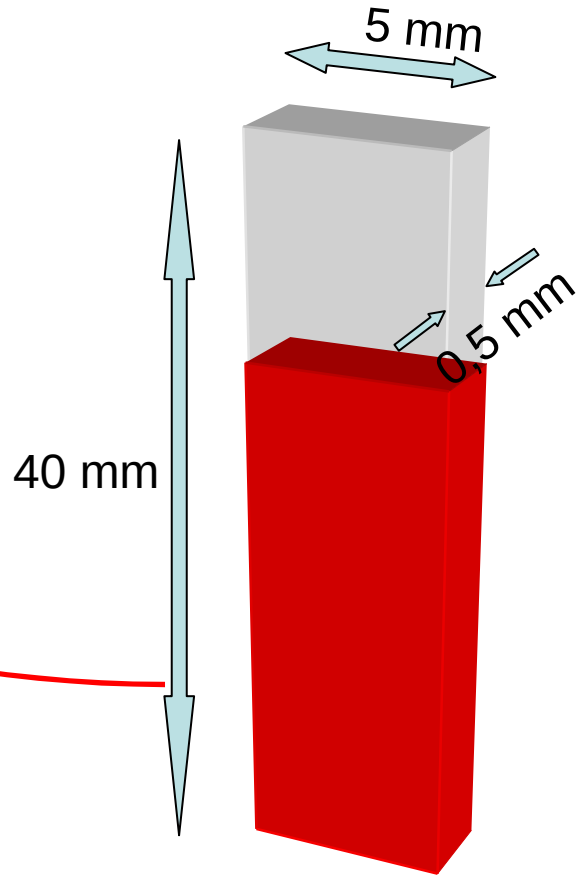


Fig.1. Rouleau formation in normal blood

Rowlands S. Coherent Excitations in Blood
In: Coherent Excitations in biological systems.
Frohlich H. and Kramer F. eds. 1983

Using experimental setup for TV-monitoring of erythrocyte sedimentation in whole blood we could observe Resonant Attraction (next slide)





A falling down single erythrocyte is attracted to the sludge of erythrocytes fixed on a cuvette wall after settling down the major mass od erythrocytes

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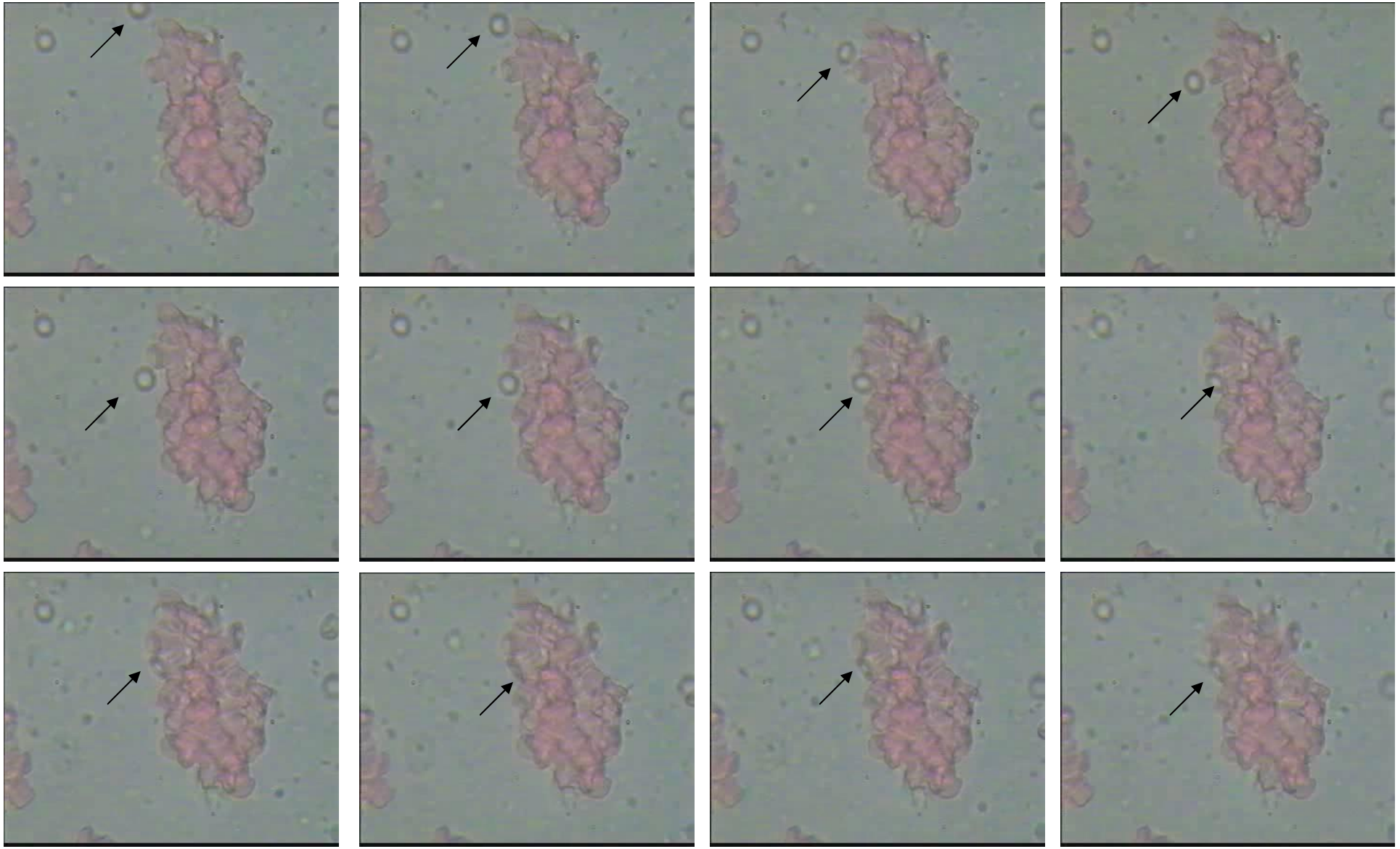


Like likes Like
If they are coherent

Water is the major agent operating the principle of Like Likes Like in the Universe

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