CHANGING OF THE SUPRAMOLECULAR STRUCTURE OF WATER DURING THE GERMINATION
OF THE ZUCCHINI SEED THEREIN
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After the appearance of the Milan school of theoretical works devoted to the supramolecular structure (SMS) of liquid water (the theory of coherent water - TCW the number of experimental studies on this issue has increased dramatically. In particular, some work was done by the authors of this article [1,2], one [1] was aimed at clarifying the influence of various external factors on the SMS of water.

The present study continues this theme, since staying (and appearance) of living matter in the test water should be manifested in a change in its SMS. Formulation of such work is highly relevant from the point of view of biological science. In particular, the main interest is the effect of biophotonic (BP) radiation [5], formed the whole direction of biophysics - biophotonics.

To solve this problem was chosen seed of well-known plants - zucchini (cucurbita pepo) and the kinetics of its seed germination in distilled water. A similar process was considered in [5].

Water evaporation isometric (weight change over time θ) accuracy ±0.5·10^−12 g; precision thermal analysis - PTA (temperature change time dT evaporation liquid, accuracy 0.001 ° C); the change of the electron work function of liquid water (dφ, accuracy 0.05 eV). Methodological details for water research these methods are given in a [2,3].

A total of kinetics of germination of four seeds. Some features of each experiment will be given in the discussion of the results.

The study produced the following depending on which characterize the state of water during germination of the seed in zucchini:
- Dependence of coherent phase Ψ on water PCD
- Temperature dependence of the isothermal evaporation of water T = f(τ) - pic. 5.
- The dependence of the electron work function of water φ = f(τ) - pic. 7.
- Dependence of the evaporation process P= f(τ) for distilled water during the germination of the zucchini seed therein. [pic. 1a]
- Changing the content of coherent domains in the water during the germination of the zucchini seeds in summer and winter periods. [pic. 2]

Phase I - the swelling (seed before the germ). Due to the fact that the study was conducted for a long time (January - June 2013), it was noted that the initial state of the seed selected in the air-dry condition to experiment with daylight saving time is not identical. Since the nature of the dependence PCD = f(τ) is similar to for convenience of discussion, these curves were shifted along the τ axis so that the experimental points form a single kinetic curve (pic. 4).

As seen from (pic.4) kinetic curve 2, Ψ = f(τ) has two characteristic regions. When monitoring for τ = 6-7 days PCD water decreases (pic. 4) or is at the lowest level (pic. 3). During this period, water enters into the seed, breaking porous protective sheath seed. Transport mechanism of the coherent domain (CD) of water through the membrane is apparently osmosis resulting seed shell is expanded, and ultimately to rupture.

Accumulation in seed CD at this stage leads to increased energy (enthalpy). This is according to the PCD, (pic.4) is devoted to the development of high-precision method for measuring the temperature of liquid evaporation, it is shown that the typical dependence of T = f(τ) (where τ - time monitoring of evaporation in seconds) for water has three characteristic regions τ:

- a) a sharp decline in T for τ = 200-300 s (b) the growth of T to the point of inflection of the curve at τ = 2000 s c) the adjustment of the temperature to the original value of T by conduction (at τ = 2000-4000-5000 s).

If a portion a) is determined mainly by volume of adhesion molecules in the liquid portion is used, b) is dependent on the structure of the liquid.

Phase II - the emergence of the germ. This stage of the study (7-9 days) is the most fundamentally important, because the inanimate matter (water) appears living matter (dividing cells of the plant).

As can be seen from pic. 4, the visual appearance of the germ is located on the 8th day of stay in the water. The number of coherent phase PCD in the water, decreasing at phase I (swelling), phase II increases dramatically. Presumably, this means that all vacant centers sorption CD filled in and the critical concentration of CD achieved. In this case, the value of τ ≈ 4 days exceeds the average of the original design documentation for distilled water (~6-7)·10^−12 g, which is probably due to the generation of newly formed CD germ cells.

To estimate the energy emitted by newly formed germ cells, consider the change in the electron work function of water during the germination of the seed from pic.7 shows the results of measurements of water at work function of electron in the seed germination of zucchini confirm the above assumptions about the mechanism of the seed with water. Values of Ψ in the first stage of observations (τ = 3-4 days) greatly reduced, due, apparently, with increasing dipole moment CD [1] in the CD transport water across the membrane of the seed. Because after τ = 4 days on the curve φ = f(τ) there is a monotonic increase of τ, it then indicates the appearance of the seed of the electromagnetic energy that destroys the CD.

Coherent domains of water sorbed in nanoscale resonant cavity cells seed decay, turning into a stable state of H2O molecules, which causes the appearance, according to the theory of photon flux (superradiance Dicke).

The process of "excitation" BP continues to τ = 9 days and reaching a maximum at τ = 8 days (after the appearance of the germ), decays. By curve φ = f(τ) can make a rough estimate of the energy radiation causing the growth work function of electron water: ΔE = 6 eV. Apparently, this energy flow is usually fixed as biophotonic radiation produced by the appearance of the CD growth (the problem of Gestaltbildung) [5].

Conclusion (Pic. 8). It is well known that the process of germination takes place in two stages - the swelling and the appearance of the seed germ. The first stage seed absorbs water and swells up until the shell is not disrupted. Then comes the second stage - the emergence of the germ. Based on the change of properties of the surrounding water, namely:
- The number of coherent domains in the SMS of water;
- Enthalpy of isothermal evaporation;
- The electron work function of water,

show that:

- the seeds of zucchini in the air-dry state differ by degree of "readiness" to germinate, which is determined apparently available to seed margin of coherent domains of water derived from atmospheric moisture, depending on the season (winter, spring, summer);

b) at the stage of swelling seed extracts actively coherent domains from the surrounding water to saturation;

c) the coherent domains of water - a "workshop" (Del Giudice), producing biophotons - adsorb nanostucture - resonator cavities cells (F-A Popp).

In the transition to a stable state of the CD bio phosphors of the many points of nanostructure grains are realized, so biophotonic radiation has a "dispenser character" [5].

The emergence of the electromagnetic radiation (super radiance Dicke) leads to the destruction of CD [1], and causes the observed increase in the work function of electron water surrounding the seed. After the appearance of the germ of the flow decreases and BF work function of electron water is reduced to the original values , ie on the surface layer of CD recovered . It should be noted that a similar phenomenon (photoluminescence) was observed in samples of porous silicon and , apparently, also associated with the radiation produced by the decay of the CD, adsorbed in nanopores of the surface topography.

**References**