Review Article

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Influence of the Sun on “water memory”

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Abstract
In June 1988 an interesting report by Dr. Jacques Benveniste and his associates was published stating that water is capable of memorizing the structure of dissolved anti-LgE antibody and retaining its biological effectiveness after strong dilution (by factor as great as 10^{120}). However, this phenomenon still cannot be reliably confirmed because it is not always reproducible. This instability is accounted for by another fundamental phenomenon recently discovered. Due to an extremely high sensitivity to changes in solar activity and distribution of solar energy around the Earth as it rotates around the Sun and its own axis, the ability of water molecules to self-organize is highly dynamic and can vary within a very wide range within a year, month, day, hour and even several minutes. An increase in solar influence causes splitting of large clusters with the formation of small clusters, the chemical activity of which is much higher than that of large ones. After the solar influence decreases, small clusters reunite again. For this reason, the rate of hydrolytic processes involving water clusters is very unstable and can vary by up to 200 times during the year and the 11-year solar cycle.

Keywords: Water Memory, Solar Activity, Muons, Water Cluster, Hydrolysis.

1. Introduction

In June 1988 an interesting report by Dr. Jacques Benveniste and his associates devoted to an unbelievable phenomenon was published stating that an aqueous solution of anti-IgE antibody retains high biological activity even after strong dilution (by factor as great as 10120) [1]. This added water, no longer containing the antibody itself, exerts the same biological effect on the degranulation of human basophils as the original undiluted solution. The authors concluded that water molecules in contact with the dissolved antibody are capable of acquiring some fairly stable spatial structure, which, when diluted, is transferred to the molecules of added pure water and is retained in a biologically active form for some time.

This mysterious phenomenon made a sensation, it was discussed for a long time, and the expression “water memory” has become a set phrase. Such incredible results required an experimental verification, and for this purpose, on July 4, 1988, a special commission arrived at the laboratory of Jacque Benveniste in Paris. Seven attempts to replicate his experiments were made. The first four turned out to be successful and showed positive results, but in the three subsequent experiments the phenomenon was not confirmed. Since the experiments were statistically ill-controlled and not always reproducible, and there were no serious studies of the reasons of such instability, the conclusion of the commission about this “discovery” was negative. A detailed report was published in July 1988 [2]. This decision, in the commission’s opinion, was also confirmed by the fact that during the original studies French scientists had noticed periods of time when no experiments had worked. In subsequent years other attempts were made to confirm this phenomenon. However, the result remained uncertain – sometimes the effect was confirmed, but it was not regularly reproduced. The conclusion of the commission was logically correct. With the conditions being constant, the same experiments should always give the same results. On the other hand, if the “water memory” phenomenon was sometimes reproduced experimentally, there should also be an explanation for this.

However, no one could have imagined that the reason for such experimental instability can lie outside the Earth and that solar energy and its distribution around the Earth can exert a strong influence on self-organization of water molecules, on the stability of water clusters and their properties in chemical and biological processes.

The extraterrestrial cause of the unstable reproducibility of “water memory” phenomenon is in good agreement with another fundamental phenomenon recently discovered [3]. It has been found that the variations of solar activity and distribution of solar energy due to the rotation of the Earth around its axis and around the Sun exert a strong influence on the self-organization of water molecules and on the stability of water clusters. Water clusters of different size are formed on mixing water with organic solvents [4]. An increase in solar activity causes splitting of large clusters with the formation of small clusters, which, after a decrease in solar activity, reunite.

The chemical reactivity of water clusters strongly depends on their size. Small clusters are much more reactive than large ones, since they are unable to form three-dimensional structures and their hydroxyl groups (-OH) are not involved in the network of hydrogen bonds [5-9]. Therefore, under constantly changing extraterrestrial influence clusters decompose and reunite, and the hydrolytic activity of the same solution of water in acetonitrile can vary in a very wide range since it can consist of small number of large passive clusters or large number of small active clusters.

This was shown by regular measurements of the rate of hydrolysis of triethyl phosphite in acetonitrile (Fig. 1) for 6 years 2015-2020. This period includes 5 years of the second half of the 24-th solar cycle 2015-2019 and the first year 2020 of the 25-th cycle (Fig. 2).

The obtained results showed that the reaction accelerates from winter to summer and then it slows down again. (Fig. 2) Such annual changes, which are associated with the rotation of the Earth around the Sun, indicate that the rate of this hydrolytic reaction as well as the stability of water clusters depend on geographic latitude and should be opposite in winter and summer in the Northern and Southern hemispheres away from the equator.

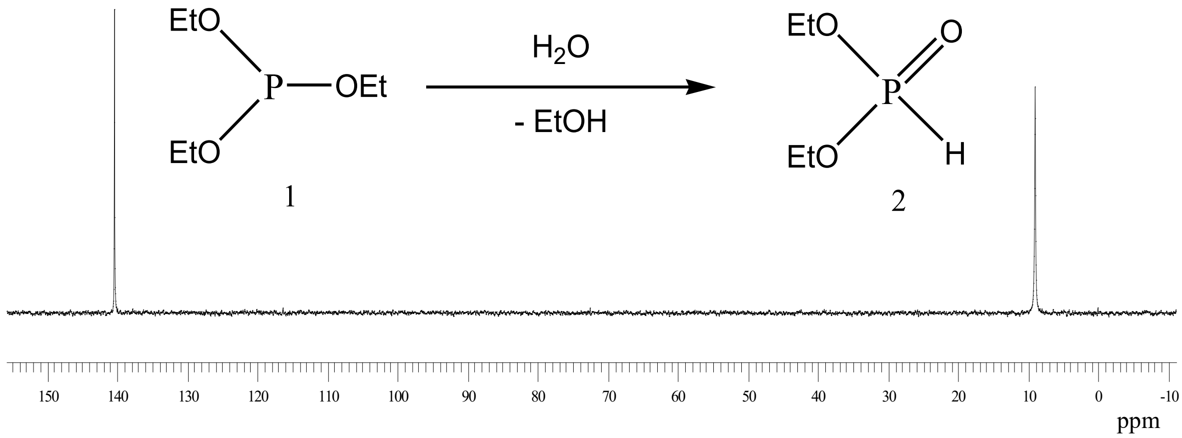
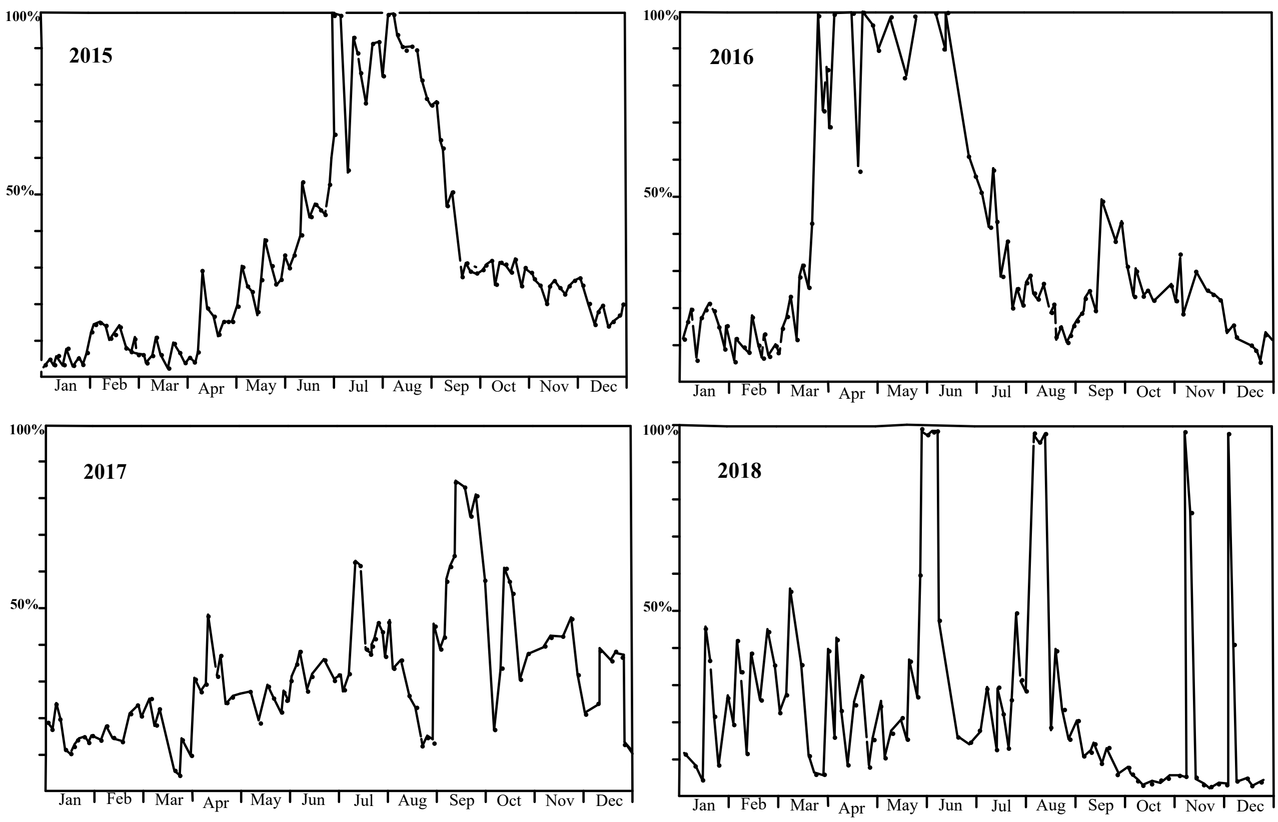


Figure 1: Hydrolysis of triethyl phosphite 1 into diethyl phosphonate 2. 31P-NMR spectrum displays two signals at +140 ppm and +9 ppm respectively. Measuring the integral intensities of these signals allows determining the conversion rate.



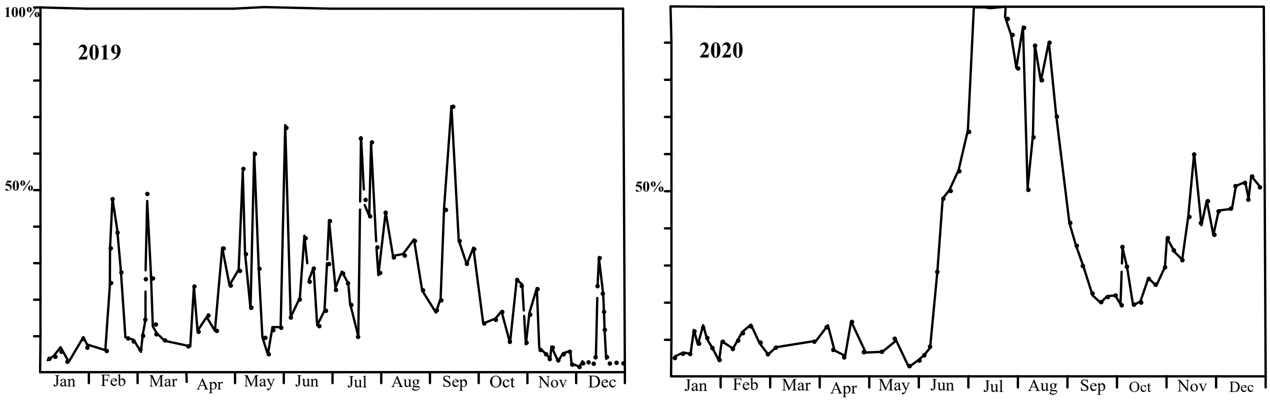


Figure 2: Variations of the rate of hydrolysis of triethyl phosphite in acetonitrile in 2015-2020 (conversion after 25 minutes of heating at 80°C). This period includes the second half of the 24-th solar cycle 2015-2019 and the first year 2020 of the 25-th cycle.

The annual changes in the reaction rate are very dynamic and different every year. In 2015-2016 the reaction rate was very high. In 2017-2019 the reaction continued to be very dynamic, but there was a noticeable decrease in its rate. The difference between "winter" and "summer" rates became considerably less pronounced. Against the background of a very low reaction rate, four times in 2018 (June 2, July 29, November 8, and December 3) extremely sharp (more than 20 times) short-term accelerations took place, which could be caused by the destruction of water clusters due to solar coronal mass ejections.

As can be seen in Figure 2, from 2015 to 2019 a general deceleration of the reaction took place. This slowdown correlates with the decrease in solar activity in the second half of the 24th 11-year cycle. In 2020 a new 25-th solar cycle began. In the first 5 months of the new cycle the rate of this reaction remained very low and then it began to increase very intensively. This coincides with long-term observations which show that the rise in solar activity at the beginning of the cycle is noticeably faster than the decline in activity at the end of the cycle.

Thus, 6-year investigations from 2015 to 2020 show that self-organization of water molecules, the stability of water clusters and their chemical reactivity are extremely sensitive to the variations in solar influence over the 11-year solar cycle. The observed acceleration of the hydrolysis can be well explained by the decomposition of water clusters under the influence of muons. These particles are constantly generated in the upper atmosphere by the solar wind and cosmic rays. In contrast to the solar wind particles, muons reach the surface of the Earth and can penetrate to some depth underground. The direction and intensity of the muon flux depends on the position of the Sun in the sky and displays diurnal and annual variation, the same as the rate of hydrolysis of triethyl phosphite [10]. During the day the muon flux reaches its maximum at noon, when the Sun is at its zenith, and the annual increase occurs in summer. It has been recently discovered that the formation of muons can sharply increase at the end of June [11, 12]. Exactly at that time the sharp acceleration of the rate of hydrolysis of triethyl phosphite in 2015, 2016 and 2020 was observed. The influence of muons is also confirmed by the fact that underground this reaction is greatly slowed down [3].

Thus, self-organization of water molecules and the stability of water clusters are extremely sensitive to extraterrestrial influence associated with the variations in solar activity and distribution of solar energy around the Earth. For this reason, at 20°C the rate of hydrolysis of triethyl phosphite in July 2016 was approximately 200 times higher than in December 2018.

The detected dependence of the rate of hydrolysis of triethyl phosphite on the degree of degradation of water clusters due to variations in the solar influence allows us to draw important conclusions regarding the "water memory" phenomenon. There is no doubt that if water molecules in contact with dissolved proteins can form clusters preserving the biological activity of the proteins, then the stability of these clusters should also greatly depend on the variations of solar influence and distribution of solar energy around the Earth. The antibody (IgE) molecule used in Benvenist's experiments is large, therefore water clusters reflecting its structure should accordingly consist of a very large number of water molecules. Any damage to such a cluster should lead to the disappearance of biological activity. Therefore, the sensitivity of the water memory effect to the space weather influence should be very high, probably even higher than the sensitivity of the rate of triethyl phosphite hydrolysis. This circumstance makes a stable experimental reproduction of the "water memory" phenomenon at different times of the year and the solar cycle impossible. It explains, why there were period of times in the Benvenist's study when no experiments worked [2].

The experimental verification of the "water memory" effect was carried out on July 4, 1988, during the period of maximum solar activity of the 22-nd solar cycle, which began in September 1986. It is important to note that this cycle was one of the shortest in the history of observations since 1755. The growth time of solar activity from minimum to maximum was only 3.2 years. Therefore, in July 1988 the solar activity reached its maximum, and was intensified by the summer period. This is also confirmed by the fact that at the very end of June the formation of muons can sharply increase [11, 12]. And the original experiments which were to be verified, had been conducted at the beginning of the cycle, when the solar influence was low. As a result, on July 4, 1988, water clusters were subjected to greater external influences, and their properties could not be stable, especially considering the daily deviations of the solar influence. Therefore, it was erroneous to use these results for the evaluation of the existence of the "water memory" as a whole.

The "water memory" phenomenon should give reproducible experimental results only in periods of low solar influence when water clusters stability increases. Since the degree of solar influence on the Earth depends on geographic latitude, such periods regularly occur in the Northern and Southern Hemispheres in winter at sufficiently large distances from the Equator. There, the solar influence becomes especially weak between two 11-year solar cycles. For example, in Kiev at 50o North latitude in December 2018 and 2019 (at the end of the 24-th 11-year cycle) the rate of hydrolysis of triethyl phosphite was approximately 200 times lower than in July 2015 (in the middle of the cycle) when the solar activity was at its maximum. (Fig. 2) In contrast, near the Equator, where there are no seasonal variations, the solar influence is consistently high throughout the year and can only change due to changes in solar activity. Therefore, large water clusters are less stable there and the "water memory" phenomenon should have a minimal manifestation.

2. Conclusion

The Sun has a very strong influence on the self-organization of water molecules and on the stability of water clusters, which can vary within very large limits during the year and the 11-year cycle. Under strong solar influence, water clusters are rapidly destroyed. Therefore, the ability of bulk water of memorizing the structure of dissolved anti-LgE antibody and retaining its biological effectiveness after strong dilution, described in the original publication, should only be reproduced well during the periods of low solar influence when water clusters are stable [1]. Such conditions occur at a sufficient distance from the equator in winter, especially between two 11-year solar cycles. An experimental verification of this should be carried out with the simultaneous determination of the solar influence, as it can increase sharply for a short time, for example, as in December 2018. This can be easily and accurately done by measuring the rate of hydrolysis of triethyl phosphite in acetonitrile.

Declaration of competing interest

The author declares no competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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