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Influence of the Dipolar Magnetized Water on the Ecological Factors of Freshwater Ostracod *Cypris laevis* (O. F. Müller, 1776)

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Abstract: *Ostracods tolerance to different ecological conditions , therefore consider as indicator to types of water quality to differents water bodies . Thereupon investigation this study to conducted the dipolar magnetized water with different intensities such as: 0.05 , 0.1 and 0.15 Tesla on some environmental factors for one species of ostracod animals, Cypris laevis (O. F. Müller , 1776) . The present study occurrence of significant rise in temprature rates for water which they live freshwater ostracod C. laevis when exposed to the dipole magnetic fields in different intensities compared with untreated water magnetically . As well as, significantly increased the value of PH an increase of magnetic intensity hanging over the water , compared with control water . Also increased significantly dissolved oxygen concentration , an increase of magnetic intensity , especiaally intensity 0.15 Tesla compared to the rest of magnetic intensities and untreated water magnetically . In that experience happened an increase in the electrical conductivity in the dipolar magnetized water , increased it's value of electrical conductivity of water an increase of magnetic intensity compared with the control water . As well as, those in that experience , found the highest increase in water soluble salts (total dissolved solids) , especially in 0.15 Tesla intensity , compared with untreated water . All these experiences were under the level probability of less than o.o5 under the laboratory conditions .*

Kye words:*Dipolar magnetized water , Ecological conditions , Ostracoda , Cypris laevis , Magnetic fields , Magnetic intensity .*

I. Introduction

Ostracoda are a class of crustaceans, characterized by a bivalve carapace which encases their entire body. Their small size and calcified valves mean that they fossilize easily and because of their abundance in most aquatic habitats and their sensitivity to a range of environmental variables, they make excellent subjects for use as palaeo environmental proxies (1). Just as the distributions of some macro invertebrates inhabiting springs are related to concentration of particular chemicals and to physical variables such as temperature, pH, and alkalinity (2). But response of freshwater ostracods to different environmental condition anthropogenic impacts, with a worldwide overview of the anthropogenic impacts, potential use of these micro crustaceans as bio indicators and several examples of applications in different scenarios. The development of either a single species or an ostracod assemblage is influenced by physical–chemical properties of waters (salinity, temperature, pH, and dissolved oxygen), hydraulic conditions, bottom grain sizes or sedimentation rates. In addition to population and community changes, morphological and geochemical changes can also be detected in the ostracod carapace, which serves as a tracer of the water quality (3). While TUNOĞLU&ERTEKİN (4) which detect the ostracods climatic and hydro chemical conditions were also determined in detail in order to provide a picture of the environmental conditions dominating over the fauna (Ostracods) and flora (Bacillariophyceae/diatomeae, Chlorophyceae/green algae, Cyanophyceae/blue-green algae). That spring waters with high carbon-dioxide content support the algale population growth. Ostracods are environmentally sensitive organisms which readily preserve as fossils because of their calcitic shells (5). While the relationships between morphological patterns of ostracod carapace and environmental factors by combining paleontology and biology and applying those to environmental reconstruction (6).Therefore ostracods, they are useful organisms for understanding past and present and estimating future conditions (7). It is well known that a considerable portion of the world population is being supplied with hard water which has different negative domestic, industrial and agricultural effects. Recently, various research efforts have been directed towards the treatment of hard water using magnetic techniques (8). The dipolar magnetized water technique considers as recent and advanced techniques in magnetic water treatment, which application in different; ecological, agricultures, industrial, medical and scientific fields (9). But the dipolar magnetized water also known as anti-scale magnetic treatment or AMT is a controversial method of supposedly reducing the effects of hard water by passing it through a magnetic field, as a non-chemical alternative to water softening (10). While the effect of magnetic treatment depends on properties of the pipe. The magnititude of the effect depends on pipe conductivity and surface roughness (11). A number of species were reported to be sensitive to the dipole magnetic fields, and could potentially be affected by EM fields created by wave energy devices and cables (12). For example on this effect for magnetized water was ostracoda *C. laevis* by demonstrated increased significance the rates of growth by increased the bivalve carapace dimensions (length and width) with increased intensity of magnetotron system comparative with untreated water. Although increase significant observed in fecundity in ostracodean females by increase the number and diameter of eggs with increased intensity compared with untreated females. Also, predominant females upon males in both treated and untreated water with magnetotron system. Then, the magnetotron system does not effect on heterogonous in sexual formation for this species in same ecosystem (9). As *C. laevis* refers to the family Cyprididae. This species living in littoral lakes and spring. It tolerates a wide range of environmental conditions (13). Therefore the aims of the current study to complete the picture on effect efficiency magnetic field energy on ecological and biological aspects for this freshwater ostracods in their ambient ecosystem. Because this species is one of food chain in habitat and can consider as indicate submerged vegetation. In order to investigation the importance of dipolar magnetized water on regulation the ecological factors which influence on numbers of species for population growth in their community and freshwater habitats.

II. Materials and methods

The ostracods animals were collected by using laboratory sieve type DIA X50mm ASTM Germany Made E11 75 Micron and zooplankton net, which opening diameter about 25 cm, but the diameter per pore about 335 micrometer (mesh size) . The samples were collected from Amanat Baghdad Lake for period from 15/10/2014 to 15/12/2014. The dipole magnetized water devices were manufacture locally. Then were calibrated and give their intensities in laboratory, which 0.05, 0.1and o.15 Tesla by using Gauss Meter type F.W.Bell/Gauss Model 5070, USA. Use four aquarium, each one capacity 15×20×30 cm, put in these aquarium 6 litter of raw water (14). Then brush the ground docks with cow dong. It was fed by leaky of cow dong and equal to the amount of grated vegetables or fruit peels (15). Then identified under the microscope magnefication (40X). Used 4 beckers, these were distribution as followes: 1-Control 2-0.05 T 3-0.1 T 4-0.15 T. The dipole magnetized water treatment device consist of the following magnetic systems:

1-Dipole magnetized water with 0.05 T.
2- Dipole magnetized water with 0.1 T.
3- Dipole magnetized water with 0.15 T.

These magnets contain on North Pole positive and another South Pole negative. This experiment contains 4 dealings, which the following:

1- Put 30 ostracodaen animals with 1 litter of raw water (control).
2- Put 30 ostracodaen animals with 1 litter of dipole magnetized water with 0.05 T.
3- Put 30 ostracodaen animals with 1 litter of dipole magnetized water with 0.1 T.
4- Put 30 ostracodaen animals with 1 litter of dipole magnetized water with 0.15 T.

Repeat the process of magnetization every 12 hour, throughout the duration of the experiment. The environmental measurements were taken a week, for a period of 10 weeks for all beakers which treated and untreated with dipole magnetized energy. The environmental measurements include the following factors:

1-The temperature measurement by degree Celsius (C^0).
2-Acedic water measure (PH).
3-Measuring the concentration of dissolved oxygen in water (mg/L).
4-Measuring the electrical conductivity of the water (µs/cm).
5-Measure the amount of dissolved solids in water (ppm).

These previous measurements were taken to device Yk-2001 PH, Intelligent PH meter, UKAS. After calibration using two calibration solution with PH 4 and 7 in temperature 25 C^0.The results were analyzed using SD±Mean and T-test by SAS (2010) The Statistical Analysis System- SAS (16) was used to effect of different factors in study parameters. Least significant difference (LSD) test was used to significant compare between means in this study, in level of probability of less than 0.05.

III. The Result

The current study showed no significant differences between control water and magnetically water with three types of intensities, 0.05, 0.1 and 0.15T respectively. For first seven weeks from life span of ostracods, about the temperature factor. But this study showed significant differences between control water and the dipole magnetic water treatment with different intensities. Because occurs increase in rates of temperature degrees in every 8, 9 and 10 weeks. The high values which recorded in this study were 22.5C^0 and 22.4C^0in magnetized water with 0.1T and 0.15T intensities in respectively. But the less value was 17.3C^0 in control water. Generally, it gets a slight increase in the water temperature when increasing the magnetic intensity (fig.1). But the acidic water (PH) it was significant increasingly in the dipole magnetic water treatment compared with untreated water magnetically. Because the average of PH in magnetized water were 9.1, 8.97 and 8.9 respectively. But in control water was 7.9. While the highest values of PH which recorded in this study were 9.81, 9.4 and 9.52 in 0.05T, 0.1T and 0.15T respectively compared with no magnetized water, which were 8.25 as highest value (fig.2). The study also shows significant differences for the dissolve of oxygen in dipole magnetized water compared with control water. The highest concentration of dissolved oxygen was 11.9mg/l, 12.0mg/l and 12.0mg/l in dipole magnetized water with 0.05T, 0.1T and 0.15T respectively, compared with no dipole magnetized water, which was 9.0mg/l (fig.3). Also, got a significant increase in electrical conductivity increase magnetization. Therefore, the highest values recorded in magnetically water, which respectively 790µs/cm, 790µs/cm and 795µs/cm compared with untreated water, which 760µs/cm (fig.4). On the other hand got a significant increase in the amount of total dissolved solids in dipole magnetization water. So the highest values were 537 ppm, 537 ppm and 538 ppm in intensities 0.05T, 0.1T and 0.15T respectively, compared with non dipole magnetized water, which the highest value 507ppm (fig.5).

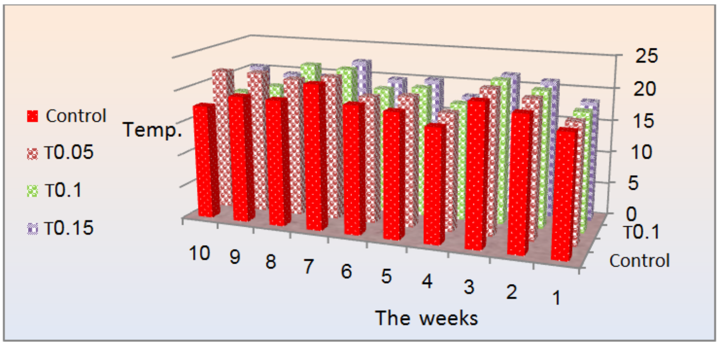

Figure (1): The effect of dipole magnetic field on the temperature (C^0) of water

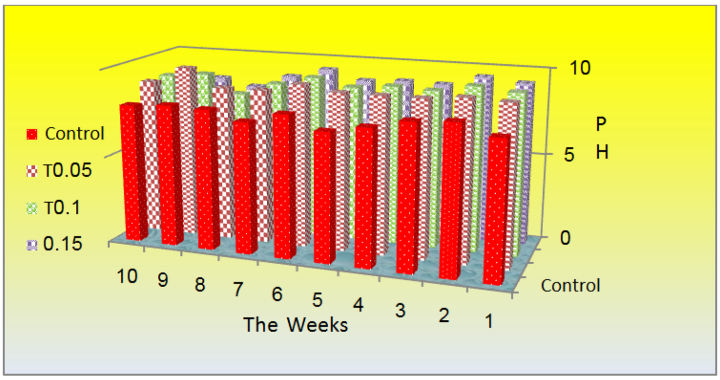

Figure (2): The effect of dipole magnetic field on the PH of water

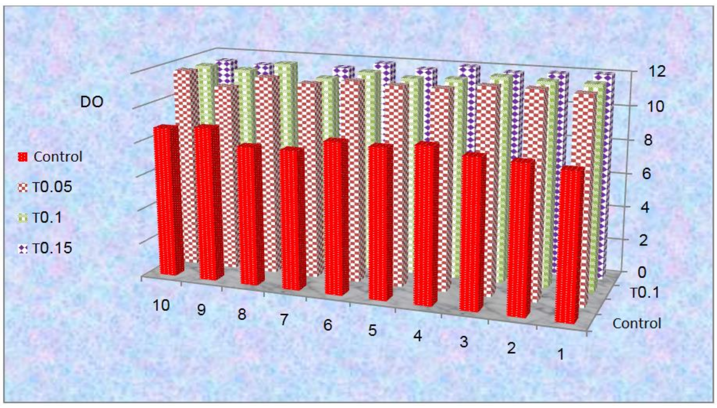

Figure (3): The effect of dipole magnetic field on the dissolved oxygen (mg/l)of water

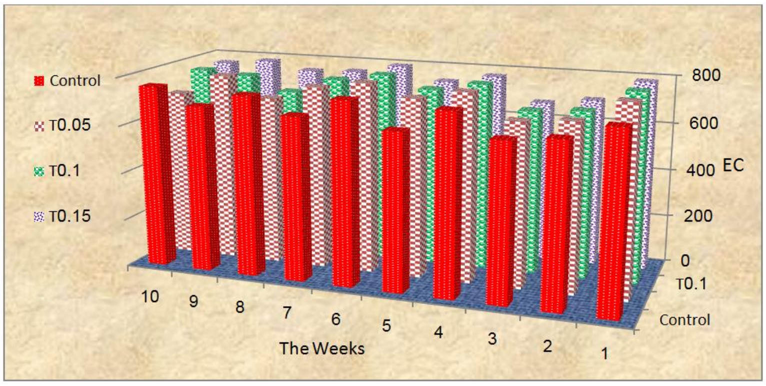

Figure (4): The effect of dipole magnetic field on the electrical conductivity (µs/cm) of water

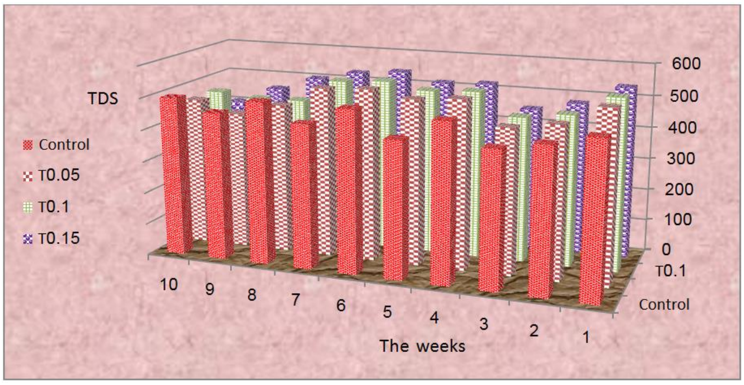

Figure (5): The effect of dipole magnetic field on the total dissolved solids (ppm) of water

IV. The Discussion

It observed through results, the bipolar magnetized water affect some physical properties of water. Because of the improvement of some water properties, by the dipole magnetic fields which exposed on the water. And then influence in some of the environmental and biological aspects of crustaceans that live in the water. Because it contributes to distribution and spread the organisms. In this study obtained on the elevation temperature with exposure to the dipole magnetic fields in different intensities. This result agreement with Musa and Hamoshi (17), when they found a proportional relationship between the solubility of sodium chloride and calcium chloride dehydrates and the number of water exposure to the dipole magnetic field. There was also a proportional relationship between the electrical conductivity records and the increasing in temperature and pH values. It was found that the increasing in pH value is more effective as compared with the elevation in temperature degree. But this result disagreement with Hasaani *et al.* (18), because he found that the thermal conductivity was decreased by 16%. So, he found that some properties of water were changed a lot of new and strange phenomena were discovered after magnetization by using the magnetic field of 6500G over the region through which the water was allowed to flow. The elevation of tempearature in this study may be refers to water is an unusual substance, mostly due to it 3D network of hydrogen bond in the molecule. Its properties allow it to act as a solvent, reactant, a molecule with cohesive properties and as a temperature stabilizer. Also liquid water is affected by the dipole magnetic fields (19). The electrical current can flow through a solution of an electrolyte, and is carried by electrons. The characteristics of current flow in electrolyte in these respects are different. The current is carried by ions; chemical changes occur in the solution and an increase in temperature decrease the resistance. The electrical conductivity is a measure of the ability of water to conduct an electric current and depended on concentration of ions, specific nature of the ions and on the temperature of solution (high temperature, high E.C.)(17). Also, in this study increases the acidic of water (PH), especially in 0.1T and 0.15T intensities. This result agreement with study of Kotb (20), when investigating the effect of using the dipole magnetic water conditioner on the prop- erties of water. The water flows through a closed loop, while the pH, TDS, and hardness represent its properties. For the dipole magnetic water conditioner with flux density of 170 mT, his results showed that pH increased by 15.65% for 820 minutes of non-stop circulation. The increase in pH is divided to 93.5% for the first 360 minutes, and 6.5% for the last 460 minutes. Also, this result agreement withAlkhazan&Saddiq (21), when optioned on the results of pH value showed significant increase with increasing the dipole magnetic intensity in static and shaking treatments. However, it was observed that pH value was lower in shaking samples than static ones, as it recorded 6.3 and 7.3, respectively at dipole magnetic density 390 µT after 30 days.The current findings are also consistent with Musa and Hamoshi (17), where they found when use a dipole magnetic funnel with a magnetic field power of 450 gauss was used to prepare the dipole magnetic water by passing the later 1, 5 and 10 times with flow rate of 41.66 mL/sec, before dissolving the sodium chloride and calcium chloride dihydrate salts. There was a proportional relationship between the solubility of sodium chloride and calcium chloride dihydrate and the number of water exposure to the dipole magnetic field. There was also a proportional relationship between the electrical conductivity records and the increasing in temperature and pH values. It was found that the increasing in pH value is more effective as compared with the elevation in temperature degree. In general, the magnetic solutions of sodium chloride and calcium chloride dihydrate showed highly electrical conductivity values as compared with non-magnetic solutions. So the reason for this a direct proportional relationship with the increasing in pH values, because more hydroxyl (OH-) groups are created. It is these molecules that help reduce the acidity in the dipole magnetized water (17). In addition to the breakage of hydrogen bonds electromagnetic fields may perturb the gas/liquid interface and produce reactive oxygen species (22). Changes in hydrogen bonding may affect carbon dioxide hydration (21). When water is magnetically treated; more hydroxyl (OH-) ions are created to form alkaline molecules, and reduce acidity. Normal water has a pH level of about 7, whereas the magnetized water can reach a pH of up to 9.2 following the exposure to a 7000 gauss strength magnet for a long period of time (23). The third changing which occurred on the chemical properties of water after magnetization process was increasing the dissolved oxygen. This result agreement with study of Yang *et al.* (24), when they found that Chlorella will be affected by the dipole magnetic field during its growth. Magnetic treatment of chlorella indicates that chlorella is affected by the dipole magnetic field with weaker strength to some extent, for example, protein content of chlorella increases as well as, oxygen dissolution in chlorella solution. With increasing of the dipole magnetic field strength, the effect decreases. During the treatment if the strength is 0.24T, protein and oxygen are produced properly; if it is 0-0.18T, protein content in chlorella trends to increase. Also, this result agreement with study of Liu *et al.* (25), when they use the magnetic air stone (MAS) was prepared by coating air stone (AS) with ferrofluid nanoparticles. Characterization by X-ray diffraction, scanning electron microscope, and vibrating sample magnetometer reveals that Fe3O4 nanoparticles embedded in air stone were paramagnetic with saturation magnetization of 21 emu/g. Moreover, an analysis of biofilm formation on MAS was run. The results show that dissolved oxygen increased 50%.The reason of increase the dissolved oxygen refers to the water molecule bi-polar, it is a small magnets, have water molecules in a magnetic field partially.These molecules have South Pole a positive and a negative North Pole, the north pole is highly effective. The external magnetic field works to reduce the angle between the two atoms of hydrogen and oxygen withen the water molecule from 103 to 104. As well as at least in the water from 6-7 instead of 10-12 or more. Thus increasing the dissolved water molecules, and increases its surface and at least a surface tension. On the other hand, got a significant increase in electrecal conductivity, then this result agreement with study of Musa and Hamoshi (17), when they are founding the higher electrical conductivities associated with higher pH values. The proportional relationship also has been found between the temperature elevation and the electrical conductivity for both magnetic and non-magnetic salt solutions. The pH factor affected the electrical conductivity (the solubility) of the both salt solutions more than the temperature factor. But the results of this study disagreement with Alkhazan and Saddiq (21), when they remarkable decrease in electric conductivity (EC). In addition, it was observed that lead ions and bacterial content decreased. The reason in rise the electrical conductivity refers to the dipole magnetized field transform the molecular structure of water from large particles to small molecules. Also, this dipole magnetized force transforms ordinary water quintet installation to effective water installation hexagon, which has a high permeability to cells and tissue in the body, and then gets increased electrical conductivity. Also, the water content of the metal ions, for example Fe, Cu, Ca, Na, Zn, these have huge electrical charges and small density, lead to strengthening the health ionized water installation hexagon. While ions of other metals, for example Al, Mg, Cl, K, these have a small electric charges and large density, lead to the formation of water quintet installation and potable. Among the results that were obtained from this experience is increasing the total dissolved solids in the dipole magnetized water. This result disagreement with results of Kotb (20), when has been found TDS and Hardness of water are not affected by the dipole magnetic water conditioner. Water remembers and keeps the impact of passing through the magnetic field for several hours, and pH decreased by 0.642 in 24 hours. While the results lead to introduce and create the dipole magnetized water saturation curve and water memory meter. While the results of this study are consistent with Musa& Hamoshi (17), when they found the dipole magnetic funnel with a magnetic field power of 450 gauss was used to prepare the dipole magnetic water by passing the later 1, 5 and 10 times with flow rate of 41.66 mL/sec, before dissolving the sodium chloride and calcium chloride dihydrate salts. There was a proportional relationship between the solubility of sodium chloride and calcium chloride dihydrate and the number of water exposure to the dipole magnetic field. Also, all results in current study agreement with Mosin & Ignatov (26) , when they implementation of magnetic water treatment to eliminate scaling salts (carbonate, chloride and sulfate salts of

Ca2+, Mg2+, Fe2+ and Fe3+ cations) in power heat-exchanger devices and pipe lines.And they found the anti-scale effect under the magnetic water treatment depends on the composition of the treated water, the magnetic field strength, rate of water movement, the duration of its stay in the magnetic field and other factors. In general, anti-scale effect of the dipole magnetic treatment of water increases with increasing temperature of the treated water; with increasing content of Ca2+ and Mg2+ cations; with an increase in the pH value of the treated water, as well as, with the reducing the total salinity of water. The reason for the increased solubility of the salts, when exposed to the dipole magnetic fields, refers to the dipole magnetic field that modifies some of the chemical and physical properties of water. Also, it makes the water retains with dipole magnetic properties through dissolve minerals and vitamins. As the water molecule bi-polar, consisting of oxygen atom linked to a hydrogen atom at an angle 105 degrees. Given the high tendency shown by oxygen atom to pull electrons, it leads to localized shipped negatively charged $õ^-$ and shipping positively charged hydrogen atom localized $õ^+$. As the water molecule neutral charge, then the number of positive charges equals the number of negative charges. However, the positive and negative charges are far apart from each, which makes the water molecule bi-polar, similar to magnets. Be responsible for the forces of attraction in the water molecules. After that water molecules tend to cluster around the polar molecules which dissolved in water does not belong to the attraction between them again, because the dielectric constant of water became high. Then the water molecules act to weaken the bonds between the charged ions and then increase the break. The water treatment magnetically very important to modify the environment, because electrical conductivity and dissolved oxygen were the two most influential factors on species occurrence in each spring. When dissolved oxygen showed significant negative correlations to electrical conductivity, water and air temperature in Usta spring, such correlation was only negatively significant ($P < 0.05$, $r = -0.46$) between electrical conductivity and dissolved oxygen in Çetin Bey Spring (27). Most of the ostracod species appearing in Lake Sunnet were tolerant to the large water level fluctuation. The occurrence of these activities appears to have produced seasonal differences in the lake's water quality and species composition (28).

V. Conclusions

Concluded from this study that dipole magnetic technology of modern technologies and mission for the environment and living organisms. Objects observed from the current study, that dipole magnetic forces have been affected in some physical and chemical properties of water. As observed simple elevation in temperature for different intensities of the dipole magnetic fields. As well as, the significant increase in the acidic function (PH) values to increase the values of dipole magnetic intensity. Also, increasing significantly the values of dissolved oxygen in dipole magnetized water. On the other hand, increased significantly each of electrical conductivity and total dissolved solids in the dipole magnetically water compared with untreated water. So good in environmental factors affecting the growth of a type which refers to crustacean (9), which contributes to the formation of the food chain to ecosystem in which they live.

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