ACTION OF HOMOEOPATHIC MEDICINES: A PHYSICISTS VIEW*

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It is more than one and a half century since homoeopathy was discovered. And yet, the question as to how these medicines can work at such dilutions where the presence of material other than the solvent cannot be imagined, always haunts the inquisitive minds. This brief article is aimed at giving a plausible explanation to this question in the light of existing experimental evidence and some postures to bridge the gap where the experimental evidence is wanting.

Homoeopathic medicines are prepared by successive reduction (1:100) of the material quantities of the medicine (we will call it a solute) in a solution, with vigourous shaking at each stage. This process is called potentization.[1] The solvents generally used are water, ethyl alcohol (liquids), sucrose and lactose (solids). Beyond 12th potency(n), the presence of solute is 10^{-24} parts in 1 part of the solution. According to Avogadro's hypothesis, there are 6.03×10^{23} molecules in a gram mole of any substance. Thus, it is physically not possible to have any solute in a solution beyond this potency. And yet homoeopathic preparations are active even for n>>1000. This fact can be translated into the language of physics as follows:

1. These solvents (namely water, ethyl alcohol, sucrose and lactose) can exist in a large number of states at normal temperature and pressure. (A medicine can be prepared with a large number of starting materials.).
2. Any of these states can be obtained in a controlled way by starting with a known inducing agent called the medicine (solute).
3. The states are long lived unless influenced by some external agency like temperature, pressure or interaction with other materials (the shelf life of homoeopathic medicines is very long, excepting in case of those prepared in water, which is a highly vulnerable fluid).
4. They store the information which is imparted to them by starting materials (the properties of different medicines are different).
5. The solvent can communicate this information to a system which comes in contact with it and which is capable of interpreting this information (the medicines "act").
6. In human beings, the sphere of action of a medicine, that is the centres it is capable of activating, is first mapped during the process of its proving.[2] This suggests that these liquids can store a matrix of signals which are capable of activating many centres of a system simultaneously.

Sucrose and lactose are solids and therefore one can imagine that such stable states, if created, can be maintained since the relaxation times in these systems will be very long. But how this could be possible in water and ethyl alcohol? These liquids are known to have anomalous properties because of the interlinking of their molecules by hydrogen bonds. Hydrogen bonding can be explained in a very simplified manner. For example, in a water molecule, an oxygen atom is covalently bonded to two hydrogen atoms resulting in the partial exposure of the hydrogen nuclei (protons). The exposed positive charge forms a predominantly electostatic weak bond with an oxygen atom (since it is electro-negative) belonging to another water molecule. This is the hydrogen bond (fig. 1 a and b). In liquid water, every oxygen molecule can form two

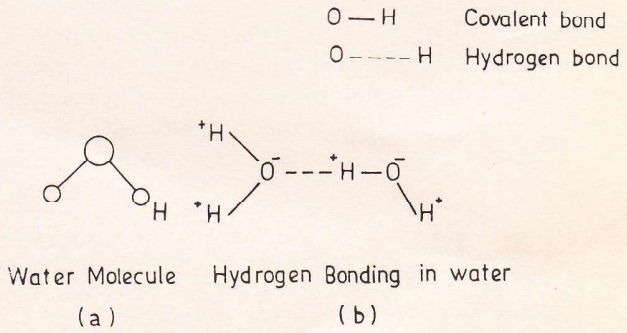

Figure 1.

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covalent (O — H) bonds and two hydrogen bonds (O — H) thus leading to a tetrahedrally bonded network.

Extensive literature[3] is available on water as it is so dear to scientists in diverse fields such as in physics and in biology. The gist of the available experimental evidence and theories which attempt to explain the water anomalies is the following:

(a) In liquid water, molecules are linked together forming multimers, with clusters of hundreds of molecules being possible.[4] It is possible to have infinite structural variations of water resonating between each other.[5]

(b) The structure of water is strongly affected by the presence of small amounts of solutes.[6] In biological systems, where water exists as a vicinal fluid, its structure depends upon its site.[7] In these systems, water plays an active role in transmission of signals.

(c) Frank and Wen[6] have postulated that formation of bonds in liquid water is predominantly a cooperative phenomenon so that in most cases, when one bond forms, several others will form and when one bond breaks, typically a whole cluster will dissolve.

In addition, we also know of the varied role played by hydrogen bonds in proteins. DNA and many other molecules of vital importance.

In the light of the above facts, we can suggest the following picture for the potentized solvent:

1. When the medicinal substance is present in material quantity, the effect of first few potentizations is to homogeneously disperse the solute.

2. At sufficiently low dilution one can assume that the solute particles are far apart from each other. The solvent around these monodispersed solute units gets structured through the hydrogen bonded network[6]

3. The solvent which is in between two such units also links so as to form a replica of the structured regions.

4. Further potentization decreases the material quantity of the medicine. While potentizing, the energy supplied by the strokes stimulates the solvent system to acquire the structure compatible with that of a drop of the previous potency. Qualitatively one may say that if water molecule and preserving it, thus forming its replica, it should be possible for them to form the *replica of these replicate* units thus imitating the original solute molecules. This implies two hypothesis. Firstly, the action of homoeo potencies will alternate in two opposite directions (inhibitory or stimulating in bio-systems) depending upon whether the potency imitates the solute or represents the replica of it. This type of oscillatory behaviour is commonly observed in many quantitative measurements on homoeo potencies (see (i) and (ii) in ref. 8). Secondly, in clinical practice the action can be either homoeopathic or antipathic. When the potency corresponds to the disease picture, an initial aggravation is expected. When it is complimentary to the disease picture (representing the replica of the solute) amelioration can be immediate.

5. The physical properties of the solvent like melting and boiling points, IR, UV, absorption spectra, NMR spectra, remain unaltered[8] for a potency, $n>12$. This suggests that for $n>12$ the hydrogen bond energy distribution of the potentized solvent is not different from that of the starting solvent. Then, the information imparted by the starting solute during potentization is within the error bars of the hydrogen bond energies. In other words, the information might be stored as the difference in the hydrogen bond energies, that is, by "differential hydrogen bonding". In liquid water, hydrogen bond energies are about 2 to 8Kcal/mole. The stored information may then be in the range of about $<.5$Kcal/mole.

6. Like any other liquid, water is a fluid. Hence, the hydrogen bonds will be continuously making and breaking. However, the properties of a potency remain unchanged, thus suggesting that the mechanism of cooperative making and breaking of hydrogen bonds[6] may be extended to imply the preservation of the embedded liquid structures.

If differential hydrogen bonding in liquid water is responsible for storing information, any material having hydrogen bonded intermolecular networks should be a candidate for such a storage system. Ethyl alcohol is one such example as this is used as a vehicle for the preservation of most homoeo medicines. However, for purposes other than medicinal (such as in experiments to test the validity of these principles), other materials and associated liquids should also be considered.

Now let us visualise how the potencies act. When this potentized solvent comes in contact with any other system, its states will equiliberate with the states of the interacting systems. The host system can be living or non-living. For instance, a drop of n^{th} potency of a medicine when put in pure distilled alcohol, can transfer the information to the later, thus creating $(n+1)^{th}$ potency. In a biological system, the potentized solvent equiliberates with the fluids in the bio-system. If the signals imposed by the potentized solvent are comparable to the excitation energies of the host system centres, it will be absorbed. Consider the case of liquid water. If the energy difference between various hydrogen bonded networks is assumed to be $\sim.5$Kcal/mole or less, this is about a few mev. This appears to be of the right order of magnitude to excite the nerve centres in higher animals.[9]

In higher forms of life, the action of the medicines can be thought of as analogous to the action of an infecting bacteria or a virus. As soon as the signals

are absorbed by the organism, the defence mechanism, taking it as an external invasion, starts fighting against it thus initiating the curing process with or without perceptible aggravation.

We have attempted to give a plausible explanation for the action of homoeo medicines. There are many aspect which are not touched upon in this article (like the question of the differences between different potencies of the same medicine). As suggested above, if the energies stored in the solvent are within the error bars of the normal hydrogen bond energies of the solvent (signals embedded within the noise level), it will be difficult to probe them with physical techniques in order to decode them. Furthor, the physical probes themselves may disturb the stored signals in a diffraction experiment). Fortunately, as envisaged from the action of the homoeo medicines, biological systems offer themselves as tools to detect these signals as here they are selectively absorbed and amplified, thus leading to possible experimentation for the detection and differentiation amongst them. We hope that this article will stimulate the interest of medical practitioners, common people and scientists and lot more evidence will turn out in future, apart from that in homoeo journals, as the properties are applicable to a whole class of materials, and the perceptible interactions are possible with properly matching living systems.

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and ninety nine per cent perspiration"...

Edison
