Water

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Decades ago already an amazingly accurate psychic called Edgar Cayce predicted that in the time we are living in now stunning discoveries would be made regarding the nature of water. Like stargazers, homeopaths are standing in the dark waiting for the phenomenon to reveal itself in the scientific sky. But the happy tiding about a discovery that would bring homeopathy from obscurity into the living light has still not come. Chris Kurz reports.

The Editor

Water and Life

The good news was that the plane had barely but miraculously made it through the ravaging sandstorm and was not completely destroyed in the ensuing crash landing. The bad news: in the middle of the Sahara Desert there was no one to help the surviving crew and passengers. A relentlessly beating sun, baking oven temperatures, and a ridiculously low emergency water supply was what the small group of survivors found themselves up against. The initial exhilaration of having beaten the odds and survived the sandstorm quickly melted away in the light of the realization that there was simply not enough water for everybody to bridge the time until help would arrive. We see their strengths wane; their complexions, their mouths become dry; their skin gradually turns to parchment as dehydration progresses mercilessly. A mouthful of water suddenly becomes something to kill for. Of course, heroic leadership paired with ingenuity (and a little help from the script writer) saved their lives in the end – thank Hollywood. The lines at the refreshment counters afterwards seemed to grow as everybody exiting the theatre felt a bit dry in the mouth.

We can survive a month without food (some reportedly even manage to go weeks without a cell phone) but we all die within a couple of days without water. Dehydration of infants who suffer severe diarrhoea is among the leading contributors to childhood mortality in developing countries. About 70% of our body weight is water. Go much below that fraction and life ends. The answer to the question of why life is so dependent on water lies buried in the origins of life itself.

We find traces of early stages of life that are about 3800 million years old, only a mere 100 million years younger than our planet. These traces can be found buried deep in the bottom of today's oceans. Building upon water as a powerful and universal solvent, the oceans were the womb in which the spark of life set the wheels of biological evolution in motion. A thousand million years ago, some daring bacteria started to leave the womb and inhabit the sandy beaches around the oceans. From that point it took another 600 million years until the first animal, going by the name of Eurypterus (Fig. 1), partially followed suit. Even today the number of species living on land are just a fraction of those inhabiting the liquid element. But have we really outgrown the ocean? Far from leaving it behind, we have taken to carrying our water with us! Each cell is, in essence, a tiny bag of water containing a solution of pretty much everything it needs for short-term survival. It is interesting to note that many properties of the intracellular liquid are similar to those of the primordial ocean. To maintain the precarious balance of chemicals within ourselves we require a constant stream of about 2 litres of water per day. Two litres are lost by urine, sweat, and the vapour contained in our breath. That same amount needs to be replaced each day by what we eat and drink. There is quite literally a constant stream of water running through us, which replaces all the water stored in our cells roughly every three weeks.

The Origins of Water

Now that we have followed history back to the origin of life on earth, we might as well go all the way to the origin of water itself. Where does the water we depend on today come from? To answer this question we have to turn to astrophysics and look to the stars.

The water molecule is the chemical union of two hydrogen atoms with one oxygen atom – hence its chemical formula H_2O. Hydrogen is the most abundant molecule in our universe. It is also the lightest and at the same time the oldest chemical element, which was created a mere 380,000 years after the Big Bang (just for comparison: the Big Bang occurred about 14 billion years ago). Oxygen, on the other hand, did not appear as a direct consequence of the Big Bang. It is being produced through nuclear reactions occurring in the cores of stars and later released into space. In the neighbourhood of regions where stars are still being formed today, the temperature reaches a favourable value to promote the formation of water from its constituents. So the formula is simple: take two parts of hydrogen from the origin of the universe, add one part of oxygen from the core of a star, heat gently, *et voilà,* you have yourself a drop of water!

Orion is a nearby astro-nebula only 1500 light-years (that's 15 000 000 billion kilometres) away and among the most studied star-forming places in the universe. On the basis of spectral measurements from the European Infrared Space Observatory we can deduce that the Orion nebula is producing water at a rate to fill the Earth's oceans 60 times a day. Once produced, interstellar water then freezes to tiny ice crystals, which stick to intergalactic dust particles, thus forming something like a

SUMMARY

Essential to life, stimulating to scientific research, and ubiquitous in homeopathy – water is all that and more. This article retraces the history of life and the history of the water molecule itself. From there it discusses some of the scientific properties of water and hints at possible scientific explanations of how homeopathy works. The role of water in homeopathy itself is viewed from a critical standpoint and some areas for homeopathic research are suggested.

KEYWORDS Water, Water clusters, Scientific explanation of homeopathy, Water remedies

Fig. 1 Fossilized species of the Eurypterid family, of which some species were able to leave the water and breathe air.

dirty cosmic snowball. This ice-and-mud matter will then participate with other matter in the formation of a new stellar system, complete with new planets like ours. In fact, this interstellar dust is still raining down on us as our planet travels through space. It has been calculated that the influx of interstellar water on the planet Saturn is of the order of 50 litres per second. Comets, as another group of interstellar travellers, can also deposit large amounts of water when they impact with a planet. An example of such an event is provided by the comet Shoemaker-Levy 9, which released two million tons of water when it impacted in Jupiter's atmosphere in July of 1994. Apparently, it is not difficult for a planet to start off with a generous supply of water. The problem is retaining it long enough to give life a chance to develop. From where we stand now, earth does seem to be the only life-carrying planet in our solar system, although the final judgment is not yet out.

The water allotted to our planet Earth during its formation is pretty much still the water that is with us today. When you quench your thirst with a glass of it, this will be the same water molecules that the dinosaurs drank many millions of years ago. There is bound to be a large number of water molecules in your glass that came from Genghis Khan and even some that Elvis Presley drank.

Properties of Water

A liquid that is at the centre of life itself is bound to attract a lot of attention, scientific and otherwise. Therefore it shouldn't come as a big surprise that water has been measured, probed, and investigated in every conceivable way. There are hundreds of physical and chemical properties that one can measure, and most of them probably have been. It is common high-school knowledge that water has a so-called density anomaly. Most liquids get heavier (or, more correctly, denser) when you cool them. With water it is a slightly different matter: on cooling it first gets heavier until, at 4 °C, it starts to grow lighter again. And that's lucky for us! If water didn't exhibit this anomaly, all lakes would freeze from the bottom up, thereby killing all water life. It is the fact that heavier water at 4 °C sinks to the bottom and colder water at 0 °C, being lighter, starts to form ice at the top that we can enjoy skating and still go fishing next spring. What is less known is that apart from this so-called density anomaly, water exhibits another 62 anomalies! Don't be afraid, I am not going to wade through all of them in gory detail, but let me mention my favourite one: the Mpemba effect. It says that hot water will freeze faster than colder water under certain conditions. Sometimes hot water at, say 90 °C, will freeze noticeably faster under otherwise identical conditions than water at room temperature. This has been recognised as far back as Aristotle in the 4th century but was brought to the attention of the scientific community by the perseverance of Erasto Mpemba, a schoolboy at Iringa School in Tanzania, who refused to reject his own evidence and bow to disbelieving mockery. While making ice cream, he observed that the ice cream would freeze faster when first heated.[1] All these anomalies are more or less understood scientifically and can be traced to the unique way in which hydrogen and oxygen bind together.

Water, Homeopathy and Science

Water's central role in virtually every life process has attracted more than scientists. All sorts of healers and therapies draw on water and its reputed powers. And water has also been called upon to explain the scientific basis of homeopathy. As a scientist and homeopath I take great personal interest in those areas of research where physics and homeopathy overlap. The sheer number of publications which claim to have a scientific explanation for homeopathy seems to indicate that this is an active area of research. However, if one looks closer, it turns out that the overwhelming majority of books and articles are simply wishful thinking on the part of enthusiastic yet scientifically untrained authors. To date we have come nowhere near to answering the question of how homeopathy works. Many self-proclaimed scientists have put forth their own theories which do not hold up to even a cursory scientific examination. The liberal use of words like "quantum dynamics", "chaos theory", "electromagnetic field", and the like demonstrates more ignorance than it conveys knowledge. Even worse, it drives away serious scientists to whom it becomes quickly apparent that the field is full of people who do not know what they are talking about. To be thought of as professionally associated with one of those is the worst nightmare of a physicist. Thus, the understandable urge to achieve the official stamp of scientific approval has dangerously backfired.

Let us start by admitting clearly what we do know and what we don't. Clinical evidence gathered over many decades by well designed clinical studies, meta-analyses thereof and well documented case histories clearly proves that homeopathy is a viable therapy in its own right. Hence, the question of whether homeopathy "works" or not has been settled. There will always be people who cannot accept this fact but this is something we will have to live with. On the other hand, science has not yet discovered an explanation of how homeopathy works. There may be some promising theories, none of which, however, have been experimentally verified.

The main point of contention, which most critics of homeopathy raise, has to do with the high dilution of homeopathic remedies. Beyond a C12, there is not even a single molecule of the original substance left in the solvent. Whenever I am confronted with this argument, I reply by offering a little thought experiment.[2] Imagine two old-fashioned cassette tapes. One is empty and on the other one you recorded Beethoven's ninth symphony. No chemical analysis will be able to tell them apart since nothing has been added or taken away. Chemically they are absolutely identical. The only differ-

[1] For the scientifically interested, the explanation of the Mpemba effect has to do with the properties of super-cooled water created during the freezing process.

[2] For further reading – about all of homeopathy, not only on the scientific side – I recommend my book "Imagine Homeopath – a book of experiments, images, and metaphors", Thieme Publishers, New York, 2005.

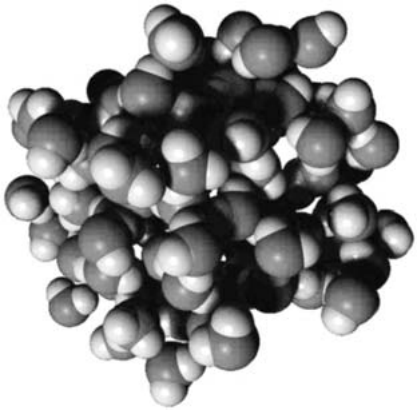

Fig. 2 Model of a water cluster. Easily recognizable are the red-coloured oxygen atoms and the white hydrogen atoms. Individual water molecules are held together by hydrogen bonds.

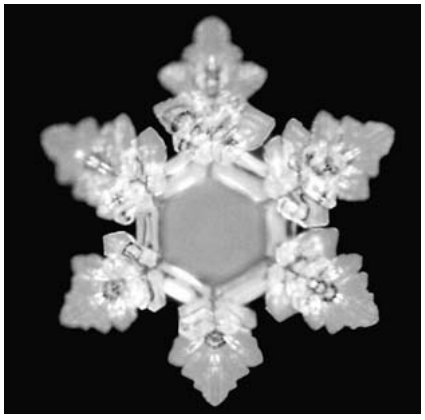

Fig. 3 Ice Crystal made from the homeopathic remedy PC1, a genus epidemicus remedy for HIV/AIDS. Photo by Rasmus Gaup-Berghausen (HADO Life Europe).

ence is the way in which the little iron magnets embedded in the tape are ordered. But this goes entirely undetected by chemistry. The lesson learned is that information is transferred by encoding the message in a specific way, by changing the arrangement of elements, not necessarily by adding or removing them.

The preparation of a homeopathic remedy is akin to the recording of a tape. It is a process in which the information of the original substance is transcribed onto the carrier medium, i.e., water. Finally we have come to the point where water and homeopathy meet. In homeopathy we view water as a pliable and readily impregnable recording medium which has the capability to store the remedy message in a way that a living organism can decode. The question now is: how does our knowledge of the structure of water compare to this notion.

One single water molecule is not enough to encode such detailed remedy messages. We have to look for some kind of interaction, a collective effect among many water molecules. It turns out that water molecules have the ability to "stick" together and form larger conglomerates. These conglomerates, so-called water clusters (Fig. 2), have been a subject of study since 1884 and can have very specific shapes, almost like tiny crystals. Known cluster sizes involve anywhere from ten to thousands of water molecules, possibly even more. The particular shape of clusters prevalent in water depends crucially on dissolved impurities. From this point it is not too difficult to imagine a way in which the original remedy substance is gradually diluted out of the water while leaving behind characteristically shaped water clusters. In this respect a homeopathic remedy is like the tracks left behind by an animal on snow covered ground. Even though the animal is long gone, the hunter can visualise its presence by reading the tracks it has left behind. Several mechanisms proposed to explain the transfer of information in water point to the aforementioned water clusters as specific "animal tracks" left behind by the original substance. The vital organism would then be akin to the hunter reading and deciphering the message announced by the tracks.

This kind of cluster theory has much appeal, as it is easy to understand, is based on current research data and offers a way to explain how the transfer of information might work in homeopathy. Therefore several authors have attempted to produce images of such clusters. One such author, Shui-Yin Lo, in particular, has gained some fame within the homeopathic community by claiming to have discovered a new form of "ice" which purportedly is stable at room temperature [1,2]. Unfortunately, these claims have not been borne out, and their scientific value seems questionable at best.

A much easier, albeit indirect, way to observe the structure of water is by freezing it. Ice crystals, in particular snow flakes, exhibit the six-fold symmetry of a hexagonal arrangement of water molecules. The resulting pictures have been captured in many books and are often aesthetically pleasing and downright beautiful. A Japanese author, Masaru Emoto, has endeavoured to study the shape of ice crystals produced by water from different sources and subject to different treatments. In his books such as "Messages from Water" or "Water Tells Us Precious Things" Emoto tries to convince the reader that his photographs prove that water can store all kinds of information, even encode different kinds of music (Fig. 3). Unfortunately, as anybody who has made such pictures himself can attest, the shapes and forms of ice crystals are extremely variable even if one tries to maintain constant conditions. In no way are these pictures actual proof of Emoto's lofty claims. Beautiful as they are, they seem to belong more to the realm of art, and I am afraid that they are another stone in the wall dividing homeopathy and science.

A much more crucial question to my mind is whether we are at all focusing our attention on the right spot by studying water as the sole conveyor of homeopathic information. There are, in fact, strong reasons that should make us question this. First, if we manufacture homeopathic remedies according to Hahnemann's instructions laid down in the 6th edition of the Organon we have to triturate the substance with lactose and then dilute it further in 43% ethanol. Nowhere in this process does the remedy encounter pure water. A mixture of water and ethanol is a totally different beast from pure water, calling into question all the results derived from studying water by itself. And secondly, once the little lactose globules are impregnated, they are left to dry. There is no free water and certainly no water clusters in dry remedy globules. This observation should push us to reassess our fixation on water. Maybe what we should be looking for is a much more basic mechanism which water shares with other substances as well, such as lactose and ethanol.

To this end I would suggest a series of experimental provings, where water and alcohol are triturated in different proportions to produce a series of different remedies. The first remedy would be 100% alcohol and 0% water triturated in lactose, the next one 25% alcohol and 75% water, followed by 50% vs. 50%, 75% vs. 25%, and lastly 100% distilled water. In these cases one needs lactose as a carrier medium distinct from water and alcohol. The drug pictures of these five remedies can then be compared with the goal of identifying the individual symptoms belonging to water and alcohol: in the order presented, the fading one is alcohol, the emerging one be-

Table 1 Water Remedies

Abbreviation	Full Name	Remarks
aq-dest.	Aqua destillata	(Distilled water)
adel.	Adelheid aqua	Baden-Württemberg, Germany
aq-mar.	Aqua marina	(Seawater)
aq-pet.	Aqua petra	Chase and Brittingham, UK
bart.	Bartfelder aqua	Bartfelder Acid Spring, Hungary
bond.	Bondonneau aqua	Saintes-Fontaines, France
carl.	Carlsbad aqua	Karlovy Vary, Czechia
eaux	Eaux bonnes aqua	Eaux Bonnes, France
franz.	Franzensbad aqua	Eger, Bohemia
fried.	Friedrichhaller aqua	Bad Friedrichshall, Bavaria
gast.	Gastein aqua	Hot springs of Bad Gastein, Austria
get.	Gettysburg aqua	Gettysburg, Pennsylvania
Hall.	Hall aqua	Bad Hall, Austria
hoch.	Aqua fontis Hochstein	Hochstein, Bavaria
jatz.	Jatzfeld aqua	Baden-Württemberg, Germany
kiss.	Kissingen aqua	Kissingen, Bavaria
kron.	Kronthal aqua	Hessen, Germany
land.	Landeck aqua	Landeck, Austria
lang.	Langebrunnen aqua	
lev.	Levico aqua	South Tyrol, Italy
lipp.	Lippspringe aqua	Lippspringe, Westphalia
marien.	Marienbad aqua	Czechia
mein.	Meinberg pyrmont aqua	Bad Meinberg, Germany
miss.	Mississquoi aqua	Mississquio River, Vermont
narz.	Narzan aqua	Kiszlawodsk, Caucasus
rein.	Reinerz aqua	Duszniki Zdrój, Poland
sanic.	Sanicula aqua	Ottawa, Illinois
skook.	Skookum chuck aqua	Medical Lake near Spokane, Washington
tein.	Teinach aqua	Baden-Württemberg, Germany
tep.	Teplitz aqua	Teplitz, Bohemia
tip.	Tipida aqua	
vichy-g.	Vichy aqua grande grille	Vichy, France
vichy-h.	Vichy aqua hospital	Vichy, France
voes.	Voeslau aqua	Vöslau, Austria
weil.	Weilbach aqua	Weilbach, Bavaria
wies.	Wiesbaden aqua	Hessen, Germany
wild.	Wildbad aqua	Baden-Württemberg, Germany

longs to water. Someone might claim that alcohol (i.e., ethanol) has already been proved, although I strongly suspect it was not chemically pure ethanol since one has to work very hard to remove the last traces of water from it.

Water Remedies

Water as a healing agent probably has as long a history as humanity itself. Hot springs, mineral waters and spas have had a medical reputation reaching far back into the mists of time. Many natural religions worship springs as the abode of nymphs and water spirits, thus seeking to explain their healing powers. Therefore it should come as no surprise that homeopathy has absorbed many of the famous healing waters into its materia medica. There are more than thirty "water" remedies recorded in our books. Table 1 summarises those found in the Complete Repertory together with their geographical origin.

Unfortunately, the sources for several of these healing waters have dried up since their respective inceptions into homeopathy. You will be looking unsuccessfully for Lake Skookum Chuck, for example. On the other hand, several newcomers have been added which haven't made it into the regular reference books yet. One example is water from the healing springs in Bath, England, the proving of which I conducted in 2001 [3].

The temptation to treat the water remedies as a homeopathic remedy family of its own is big. However, the symptom pictures of the water remedies are influenced most markedly by their main mineralogical constituents. Sanicula aqua, for example, is rich in silicates and potassium salts. Hence, its drug picture comes close to Silicea and falls decidedly on the Kali side of it. I have cured several cases with Sanicula that I would otherwise have confused with Silica, had I not known of the water remedy beforehand. Other waters are rich in Sulphur, yet others feature Magnesium, and so on. Therefore, they are best categorised and grouped according to their chemical constituents along the periodic table of the elements. This is unless, of course, there truly exists a unique drug picture for water itself that is manifest throughout all the water remedies. As you might surmise, this field is wide open for systematic homeopathic research.

Concluding this article, I want yet again to draw the reader's attention to the substance of water itself, the third most common molecule in the universe, the most abundant substance on earth, the only naturally occurring inorganic liquid, of which a billion cubic kilometres reside in our oceans, and of which 75 tons (seventy-five thousand litres) pass through our bodies in our lifetimes – give or take a few drops.

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