

You are drinking the “strangest liquid” in the world

The Hydration Code · Chapter 1

BOOK

The Hydration Code

CHAPTER

1 of 10

AUDIO IN GERMAN

10 minutes

To awaken in you a true fascination for the element of water right at the start of this book, it is probably most effective to acquaint you first with some of its most remarkable paradoxes. At the molecular level, the element of water opens up a virtually boundless universe of unfathomable smallness. It is astonishing even to be able to imagine that a single water molecule is so small, so tiny, that more than three million of them would have to be lined up one after another merely to span the distance of a single millimetre.

If one could picture a drop of water the size of a pinhead, truly picture it in three dimensions, then this pinhead-sized drop of water would consist of sextillions of water molecules. And all of these molecules in constant and highly dynamic motion.

Between these water molecules act forces of such complex nature that we can only begin to sense their true uniqueness in the deepest levels of quantum physics. Science quite rightly calls water the strangest liquid in the world. Water often behaves in an entirely contradictory way and at times even gives the impression that it could simply set itself above the prevailing laws of nature.

Scientists at Stockholm University found, for example, that water is not just a single liquid but consists of two at the same time. For better understanding, this paradox can be described as a dance floor on which one and

the same person dances an orderly waltz while simultaneously dancing a completely chaotic pogo.

Merely imagining this picture is something of a challenge. According to the classical laws of thermodynamics, it is in fact impossible. Yet, as mentioned, it has been demonstrated empirically. You can even test another example of the strangeness of water yourself. To do so, place two glasses of water in your freezer. Fill one glass with cold water. Fill the other glass with water at around 80 degrees. Now the question. Which of the two glasses do you think will freeze into ice faster? You will surely have guessed already. Inexplicably, the glass with the hot water. This paradox is known as the Mpemba effect and continues to astonish experts to this day.

And while we are at it, have you ever heard of the density anomaly of water? When matter cools, it contracts according to the laws of thermodynamics, becoming heavier and more compact. Water, however, obeys this law only in part, more precisely up to a limit of exactly 4 degrees Celsius. That is the point at which water reaches its greatest molecular density.

If the temperature falls further towards zero, the next paradox appears. Contrary to physical logic, the water suddenly begins to expand again and to become lighter. It is hard to explain, and yet we owe all life on our planet to this obstinacy.

Since water at freezing point is lighter than water at 4 degrees, it does not sink as ice to the bottom of a lake but floats on its own surface. This forms an insulating layer beneath which warmth is preserved in the depths. Without this density anomaly, all waters would freeze from the bottom upwards, which would destroy all life in the water. It almost seems as though water wished to protect life deliberately.

The surface tension of this element is also a mystery. It not only allows insects to glide effortlessly across its surface; it is also the driving force behind the capillary effect. This is a process that could, without exaggeration, be called the most impressive lift in nature. For water possesses the astonishing ability to move against gravity.

A sequoia 100 metres tall, for instance, has no mechanical pump to carry nutrients from the soil up into its crown. It is the water itself that remarkably succeeds in travelling from the earth all the way up to the topmost tips of the leaves. In defiance of gravity. This is called cohesion.

Joined to this remarkable force is the ability of water to combine with almost all other substances. No other liquid is able to dissolve so great a number of substances within itself as water. The ability of water as a solvent rests primarily on its dipole property. This means that every single water molecule acts like a tiny magnet. A magnet that attracts other particles, encloses them and breaks open their solid structures.

This property of water, however, has a serious reverse side. Water does not distinguish between valuable minerals and harmful toxins. Willingly, water also takes up all those substances which, dissolved in drinking water, can be a burden to us.

And we are no longer speaking only of lime or traces of chlorine in tap water. Today we are speaking of substances that are considered eternal. Eternal because they can no longer be broken down biologically within us and remain permanently in our bodies.

A Switzerland-wide campaign by the cantonal chemists revealed in 2023 that PFAS were detected in almost every second sample of drinking water. PFAS are those forever chemicals that accumulate in human tissue and never disappear of their own accord.

Studies by Switzerland's National Groundwater Monitoring, NAQUA, show that residues of medicines such as antibiotics, blood pressure reducers or anti-epileptics can already be found at every seventh measuring point in Swiss groundwater. In Germany, residues of more than 150 different pharmaceuticals have been detected in tap water.

Hand in hand with this burden, the spread of microplastics and highly complex residues from the chemical and pharmaceutical industries advances. We are speaking of substances that can affect our human organism even in the tiniest quantities of nanograms.

Our drinking water is rightly regarded as one of the most strictly controlled foodstuffs, yet conventional monitoring simply reaches systemic limits in the face of such complex substances. A look at the bare figures makes the enormous challenge clear. More than 100,000 chemical substances are now registered in the EU. Statutory regulations such as the EU Drinking Water Directive or the Swiss drinking water ordinance TBDV, however, concentrate in routine testing on a mere 60 to 80 indicator parameters.

The reassuring news is that everyone is doing their best. Yet, regrettably, although these controls protect reliably against acute dangers and classic pollutants, a decisive gap remains. For substances that are not specifically sought in testing appear in no report either. Not even if they were actually present in the water. One finds only what one measures for.

It is obvious that our sewage treatment plants can no longer cope with the enormous chemical burdens of our consumer society. In Switzerland alone, more than 100 plants are currently being upgraded at a cost of billions in order to intercept at least part of the complex micropollutants.

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At the same time, statutory limit values for pollutants are constantly being renegotiated. It is crucial to understand that such limit values do not define a biological optimum for your health. They are rather a political and technical compromise between what would be desirable and what is economically and technically feasible at all for the waterworks.

Your cells, however, know nothing of economic viability. Your body simply has to work with what it is offered, regardless of how heavily the water is actually burdened. Our organism continually makes the best of the resources made available to it. Ingenious. Incredible. Real.

We may count ourselves fortunate that our biology is endowed with an adaptability that no technology in the world has yet been able to imitate. If our petrol and diesel had been contaminated for decades as massively with exotic and novel substances as our drinking water, a large part of our vehicles would long since have come to a standstill.

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