IV
The Water That We Drink

Coming from the water, all living creatures contain water in different proportions (up to 99% for jellyfish) of the body mass. Human beings change proportion of water in the body from 95% at birth to 85% with aging. Human blood contains about 90% of water. The average adult person consumes 2-3 quarts of water in different forms every day. Part of this water is taken from veggies and fruits, another part from tea, coffee and other beverages, and the rest in the pure form.

What kind of water shall we use in everyday life?

I was very curious why Shatalova recommended drinking distilled water only. She said that water is very important and helps cancer treatment. This statement puzzled me. Besides, water has been one of my major points of interest since 2000.

In 2010, attracted by the fact that distilled water and water processed with reverse osmosis have low pH, I set up a series of experiments with water distillation. These experiments are described in my manuscript (see Attachment B).

Professor Martin Chaplin, of London South Bank University, read the manuscript and offered helpful remarks, which helped me make this manuscript more logical. I know Professor Chaplin as a leading researcher in the science of water and greatly appreciate his attention.

To simplify publication procedures, I have placed the manuscript on the pages of my website: www.naturelaws.org/observ.pdf

The major conclusion of these experiments is that distilled and waters filtered with reverse osmosis, are considerably enriched with protons because of their high mobility in water. Distillation and filtration, including the underground filtration (which does not saturate water with calcium and other alkaline salts), enrich the water with hydronium ions, making it acidic. Rainwater also has analogous properties because it can be considered distilled.

This happens because some molecules in water are always naturally dissociated and form hydroxide anion HO^- and hydronium cation H_3O^+. This may be due to influence of background radioactive radiation and C-range of UV light. Dissociation of water molecules is also caused by mineral ions in water. Besides, CO_2 dissolved in water, also forms hydronium ions. Excessive proton in the hydronium ion jumps from one water molecule to a neighboring one because of its lower covalent bonding energy (Grotthuss mechanism, known for more than two hundred years).

When the temperature rises, the number of dissociated molecules increases, and in the process of evaporation, excessive protons leave water easier than other molecules due to their relatively small mass and high mobility in water. Excessive protons form hydronium ions (H_3O^+) in vapor make it positively charged, leaving residual water with excessive anions HO^- and HCO_3^-. The same process happens during reverse osmosis filtration.

It is a very wide-spread idea in the scientific world and elsewhere that the influence of CO_2 on water pH level — lowering it and making it acidic — is the

major process in nature that changes water pH level. The experiments described in the publication show that influence of CO_2 is very limited, and the major role belongs to the high mobility of protons in the water.

Remember that content of CO_2 in the air is about 0.03%, and that only 1% of the dissolved CO_2 can form hydronium ions and HCO_3^-. This speculation is supported by the fact that residual water during the distillation and RO filtration processes becomes remarkably alkaline, which means a shortage of protons, and the presence of CO_2 does not prevent this. This should mean that some protons left residual water during the evaporation process and turned into vapor. This conclusion creates many consequences.

First, vapor coming from the Earth surface is positively charged with protons, one of the reasons why clouds bear huge positive charges, making a remarkable potential difference between the Earth and the clouds. One more reason is the protons coming from the Sun and from Outer Space; they also stick in the clouds, while electrons go through all the way to the Earth.

Protons play a remarkably important role in the cellular metabolism processes, forming a potential gradient on the inner membranes of mitochondria. The internal membrane in the mitochondrion is impermeable to most solutes and ions, a property that allows complexes of the ETC to build up the proton gradient required for oxidative phosphorylation. Evidently there are other major sources of protons, but excessive protons in water contribute to this process too, making energy exchange more efficient in the cells.

Healthy human skin maintains a low pH level (5.0–5.5) on its surface. This important feature prevents penetration of pathogenic bacteria, fungi, and vi-

ruses into the body through the skin and is probably achieved by acidic sweat generated in the sweat glands. However, the body excretes a remarkable amount of sweat, especially in the hot summer time. That's why replenishment of hydronium ions is so important to maintain healthy homeostasis of the body. That's why drinking acidic water is crucial for this process.

Moreover, studies of the apoptosis process by biochemists at the University of Berkeley (California) show that protons should contribute to the regulation of apoptosis, which defines the mechanism of the body aging.

In the course of biology development, people recognized such important substances as Reactive Oxygen Species (ROS), which are chemically reactive molecules containing oxygen. They include oxygen ions and peroxides. ROS are formed as a natural byproduct of the normal metabolism of oxygen, and hold important roles in cell signaling and homeostasis.

The major feature of ROS is their high reactivity, which exceeds oxygen reactivity and may damage cells. Normally, cells defend themselves against ROS damage with enzymes such as superoxide dismutase, catalase, lacto-peroxidase, glutathione peroxidase, and peroxiredoxin. Small molecule antioxidants, such as ascorbic acid (vitamin C), tocopherol (vitamin E), uric acid, and glutathione, also play important roles as cellular antioxidants.

Superoxide O_2^- is one of the ROS, which can be neutralized by superoxide dismutase, the enzyme that catalyzes reaction:

$$SOD + O_2^- + 2H^+ \rightarrow SOD + H_2O_2$$

As we can see, protons are involved in this reaction and thus play a remarkable role in antioxidant

defense. Incidentally, antioxidants, such as ascorbic acid (vitamin C), tocopherol (vitamin E), uric acid, and glutathione, also neutralize free radicals involving protons, thus making the stable molecules of radicals.

This just supports the idea that highly protonated water (rich of hydronium ions) remarkably contributes to healthy longevity.

Chemist Nikolay Druzyak (Ukraine) devoted a remarkable amount of time to his research, attempting to find the reasons for longevity of human life in some regions of the former USSR. After fourteen years of analysis of different factors, he reached a conclusion that the major factor that influences longevity is the content of the water that people drink and use for cooking. He writes in his book *How to Prolong Transient Life* that in Abkhazia, Dagestan, Nagorny Karabakh (and later up in Yakutia) and in the parts of the Northern Caucasus and the Nakhichevan Republic — generally wherever there were a lot of long-lived people, natural water had one common sign: it was soft.

This means that the content of calcium ions in the water fits into a very narrow range — from 8 to 20 mg/l. In places where the calcium content was less or more of the interval cited above, the number of long-living residents declined dramatically, although the component of long life shows up everywhere. Thus natural water with very little calcium contributes to the longevity in the above-mentioned geographical areas.

Further Druziak attacks the norms of calcium intake adopted in some developed countries, saying that in Europe and North America, the calcium intake norm is adopted as 1,200 mg per day for children and 800 mg for adults, where the population receives 70-90% of the calcium with dairy products. In Italy and Argentina, the norm is considered at 650 mg of calcium per

day for adults. And there too, 50-70% of the calcium comes from dairy products. In Japan, India, Chile, South Africa, and Turkey, the norm is of 300-350 mg of calcium per day, and they have few dairy products; the entire calcium content comes with cereals, vegetables, fruits, and meat. Druziak points out the case of Japan, where the average life expectancy is 81.4 years for women and 75.6 years for men, indicating that calcium counts for many long lives.

He writes further that most of the body's calcium is concentrated in the bones (99%) and only about 1% of it in the blood and tissues. Usually the calcium content in the blood serum reaches 8.5-12 mg per 100 g of blood, except in areas of longevity, where it does not exceed 5 mg. He explains that lowering the content of calcium in the blood is accompanied by a decrease of irritability of the central nervous system. Conversely, one of reasons for hyperexcitability and bad temper in some people may be high levels of calcium in their blood.

How does it happen that the high content of calcium might contribute to development of an unhealthy balance in the body? Druzyak describes the mechanism as invasion of calcium ions into a carbonate buffering system of the blood. As we know, presence of CO_2 in the blood forms H_2CO_3. The carbon dioxide-carbonic acid equilibrium is catalyzed by the enzyme carbonic anhydrase: $H_2O + CO_2 \Leftrightarrow H_2CO_3$; the carbonic acid-bicarbonate equilibrium is simple proton dissociation/association and needs no catalyst: $H_2CO_3 \Leftrightarrow H^+ + HCO_3^-$.

When calcium is present in the blood, it forms poorly soluble calcium carbonate ($CaCO_3$) in blood vessels. It is known that arteriosclerosis occurs through calcification of the media. The lumen of the vessel may

be obliterated or markedly narrowed. Medial calcific sclerosis is seen mostly in the elderly, commonly in arteries of the extremities — not a very good investment into our health.

The major sources of calcium for our body are water with high calcium content and dairy products. But besides contamination of arteries, calcium also remarkably reduces content of hydronium ions in the blood.

The skin pH is maintained at 5.0–5.5 in order to protect it from invasion of pathogens, which is most likely done using the same hydronium ions in sweat. Therefore, consumption is great because of the very large area of the skin. To maintain a healthy working skin, humans should drink water rich in hydronium ions and eat food with a high content of organic acids, that is, fruits and veggies. Water rich in hydronium ions include distilled water, reverse osmosis water, and rain-snow water.

Also to be considered, some vegan food requires cooking at high temperatures, such as boiling. The water boiling process always increases its pH, because the protons leave water with vapor, forming residual water alkaline.

That's why use of steam-cookers makes the process of cooking healthier by enriching the food with hydronium ions, coming from the steam. This simple steam-cooker is a widely used inexpensive cookware that makes cooking process healthier and tastier.

That's the water story. It is all a mystery to me how intuition provided this information to Shatalova. But somehow she instinctively chose distilled water

and, I believe, she did it using the experience accumulated by people throughout all of history.