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In Memoriam

Professor Marc Henry (1958-2024)

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Professor Marc Henry passed away on November 2024 aged 66 after a long fight against cardio-vascular disease. He was born in Avignon in an educated but unconventional family. His father was an engineer at the French atomic energy agency and his mother a pharmacist interested in homeopathy.

He was as young as ten years old when he decided that he had to learn chemistry, and he soon began to study in his father's pharmaceutical courses. At school, he always wanted to go into the unexplained details of what he was taught, and as the deep understanding always came after the exams, his marks were pretty low ! So when he finished the secondary school, the math teacher advised him not to go to university. A new university had just opened in Avignon lacking students and he was accepted. The class was small (four students) and he was the best, very far above the others. Then he passed the entrance exam of Ecole Supérieure de Physique et de Chimie in Paris, where he was one of the best students. His thesis, under the direction of Professor Livage was about condensation and hydrolysis in inorganic chemistry and involved the knowledge of quantum physics. During his work he understood the key role of hydration of the chemical reactions (1). His thesis earned him multiple prizes and quotations. It was the beginning of his lifelong interest on water.

In 1992, Marc Henry decided to become professor at the University of Strasbourg. However, he had to pass an examination called "Habilitation à Diriger les Recherches" to be allowed to compete. This exam consisted of a second, self-directed thesis. However, the university's director of theses refused to register him, as his doctoral thesis was too recent - four years instead of five. Marc got approval and the authorization to register arrived three days before the deadline for submission of the manuscript. The work Marc had accumulated over the past four years was enough and in three days he wrote his three-hundred page dissertation and submitted it before the deadline. He brilliantly obtained his habilitation in 1993, and the job in Strasbourg a couple of months later.

Marc Henry, aged 35, moved to teach chemistry at the university of Strasbourg which was under the direction of Professor Ourisson. Although Marc received a warm verbal welcome from the director of the laboratory, Marc Drillon. The work conditions were in total contradiction with the promises. He was given a desk in the hallway. The office he had been promised belonged to an older colleague, who was over eighty years old and who visited the laboratory, two or three times a term. No one felt able to ask this great man to share this place with a younger one.

A fellow professor and colleague, Waïs Osséini, who was working in Strasbourg under the direction of Jean-Marie Lehn, winner of shared Nobel Prize for Chemistry in 1987, was looking to become independent and set up his own unit. He invited Marc to come and stay with him, promising him an office, a lab and the scientific independence that Marc Henry needed!

Marc Henry only working with young students developed a high level of academic research. Because of administrative hurdles, he was mostly recognized abroad. He achieved the feat of publishing 192 articles, with 10,340 citations and a very high readership index

(2). Marc dedicated his life to research. He was very affable with colleagues and students and was well liked. At the same time, he was extremely bad at public relations, as he never payed allegiance. His life was his fundamental research that he performed on a shoestring. At the Institut Le Bel, he was most of the time alone at his desk with limited contact with his immediate colleagues. At the end of his academic career, the prolongation of his emeritus status was denied which hurted him.

His academic career focused on the physical nature of water. This is of particular importance in the chemistry of gel-sol compounds, and quantum physics was essential to his understanding of this phenomenon. In the later part of life he focused on the role of water in life.

With his collaborators, the conversations were never futile but deeply rooted in the key problems of life. He could share and explain, in simple terms, chemistry or physics for hours on end. As his interest on the chemical complexity of water was not shared by his colleagues, he reached to the public with short and concise books or conferences on topics as varied as life, water, homeopathy and quantum physics.

For him the very reason of life was the laws of physics. Entropy was the driving force for the origin and complexity of life. He demonstrated that the characteristic property of any living entity was that its energy balance can be expressed by a very simple and elegant formula: Food = Biomass + Heat + Waste. In other terms, life is a steady, non-equilibrium process feeding on energy rich nutrients and resulting in the synthesis of biomass, the release of infrared photons and the release of material waste. This seemingly trivial equation leads to a new understanding of diseases. In every disease, from cancer to inflammation, there is a decreased mitochondrial activity and decreased release of heat resulting in the synthesis of macromolecules like membranes and DNA in cancer cells, amyloid plaques in Alzheimer's disease or cytokines and lymphokines in inflammation. In other words diseases as diverse as cancer, Alzheimer's or inflammation have a common root, the decrease of entropy release in the form of heat and a corresponding increase in the release of entropy carried away by molecules.

Molecules effective in the treatment of diseases had to increase the mitochondrial efficacy and the release of entropy in the form of heat. This was a novel way to classify and understand both the pathogenesis and the treatment (6).

Marc and his collaborators were convinced of the simplicity of life. He thought that the energy flux released by the sun was enough to synthesize the precursors of life. The rest was the straightforward consequences of the laws of thermodynamics.

Marc was also looking for practical applications of his knowledge. At the beginning of the Covid-19 epidemics, he became aware of the protective value of an old drug: Methylene Blue. He was able to retrace its history and the fact that it is a precursor of Chloroquine. With the help of his co-workers, he wrote a paper in 48 hours (7).

Marc had been working on chemotherapy at the Faculté de Chimie de Strasbourg but had limited interest in the discovery of new molecules. He was more interested in the repurposing of old drugs. He participated in the rewriting of cancer as an electronic disease, where the proliferation of cells is viewed as the direct consequence of an electronic short circuit. The electrons do not target oxygen like in catabolism but NAD or NADP which result in the activation of anabolism. Marc was at the crux of this key discovery: the electronic flux is the very reason not only for cancer but for every disease.

Shortly before his death, he expanded his vision to new pathologies such as macular degeneration. Here again there is an interplay between water and electronics (8). The leakage of choroidal vessels increase osmotic pressure which in turn shuts down the mitochondria and the electrons are rerouted toward synthesis. Anabolism results in Drüsen and alteration of the retina (9). When he worked with his colleagues, all felt secure that he had and will have an answer for every difficult question, especially those that lie between biology, chemistry, and physics. What a scientist!

In 2005, Marc experienced a near death experience while undergoing cardiac surgery. Since then, he knows that conscience survive death. And as usual with Marc, water was at the center of his understanding of life and death. He was convinced that a novel reading of life should be drawn. 99% of our molecules are water. The rest being mostly ions and some lipids and proteins. On all surfaces, water molecules interact with virtual photons in the vacuum, oscillating together to form a new entity: the water coherence domains.

These coherence domains carry bits of information. He claimed that on the surface of all the body's cell membranes, the entire life of a human being could be encoded. For him, all the books ever written could be encoded in a few hundred liters of morphogenic water. In a far reaching hypothesis, he claimed that the information encoded in water originated in the quantum vacuum. Marc was convinced of the key role of water in consciousness, memory and homeopathy.

Most scientist consider that first and most important is matter. First the organism, then consciousness. For

these scientists, information and the consciousness are a consequence of brain activity. Marc claimed the opposite: information predates the organism and the brain. The brain is simply capable of retrieving the information. Time will tell (10).

Like all visionaries in science, Marc was often misunderstood by his peers but he left us with a surprisingly simple and universal message: IN AQUA VERITAS ! His leitmotiv was that the most modest and ubiquitous molecule of our own body conceals the deep secrets of life and death. The collective properties of water *in vivo* are amazingly complex at all length scales and should be explored further if we really want to understand the origin of life and the intimate functioning of any living being.

Marc was one of the few academic researchers capable of understanding and collaborating scientifically with colleagues from seemingly disjointed disciplines: physicists, doctors, biologists, botanists, agronomists, musicians... Marc was so eclectic that specialists in his field found it difficult to keep up with him. Thanks to his rare teaching skills, he found an enthusiastic audience among the general public. He restored the reputation of scientific research, dented by the many frauds associated with the management of COVID, and awakened new vocations. In the last year of his life, he gave half a dozen talks in schools to children aged 7 to 10, explaining the importance of water for life and good health. The person who organized these meetings has fond memories of his simplicity, kindness and clarity, as his talk was incredibly rich.

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