

A large elephant is partially submerged in water, with its head and front legs visible. The water is a deep blue color, and the elephant's skin is a lighter blue-grey. The elephant is facing left, and its trunk is visible. The overall image has a blue tint.

AQUANTA RESEARCH LAB

"THE ELEPHANT IN THE WATER" HYPOTHESIS

THE ELEPHANT IN THE WATER

AN EXCITING NEW HYPOTHESIS
ABOUT THE ROLE OF WATER
IN LIVING ORGANISMS

AN ONGOING DISCUSSION . . .

"It is inconceivable that liquid water can exist -near room temperature- in more than one structure. Because, after all, it's just water, H₂O!"

STEVEN NOVELLA

PROFESSOR AT YALE UNIVERSITY

"No one really understands water. It's embarrassing to admit it, but the stuff that covers 2/3rd of our planet is still a mystery."

PHILIP BALL

CONSULTANT AT NATURE MAGAZINE

"Water is the driving force of all Nature"
LEONARDO DA VINCI

... WHICH CAN BE SUMMARIZED AS FOLLOWS:

"Water is crucial to life because ..."

MAJORITY OF THE SCIENTIFIC COMMUNITY:

*"... it is a **solvent** in which biochemical processes occur."*

STEADILY GROWING SCIENTIFIC MINORITY:

*"... it is also an **actor**, deeply engaged in creating and steering the vast amount of biochemical processes taking place in every living cell."*

"Water is the principle of all things"
THALES OF MILET

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I. THE UNIVERSE IS WET





WATER IS EVERYWHERE . . .

- Our universe was born 13.7 billion years ago and consists mainly of hydrogen (H) atoms: 75% by mass and >90% by number of atoms.
 - The first water already formed when the universe was less than 500 million years old.
 - Stars are born in "Interstellar Clouds" in which massive amounts of water - even liquid(!) - have been detected (cf. left; "Pillars of Creation").
-

... A LOT OF WATER

"Two teams of astronomers have discovered the largest and farthest reservoir of water ever found in the universe. It is 12 billion light years away, and holds at least 140 trillion times the amount of water in all the Earth's oceans combined."



Next to H₂, H₂O is the 2nd most abundant substance (molecule) in the universe

... EVEN IN OUR SOLAR SYSTEM

"Our Solar System is Awash in Water, enough water to fill Earth's oceans a million times over."



Ganymede's ocean is thought to have more water than all the water on Earth's surface.

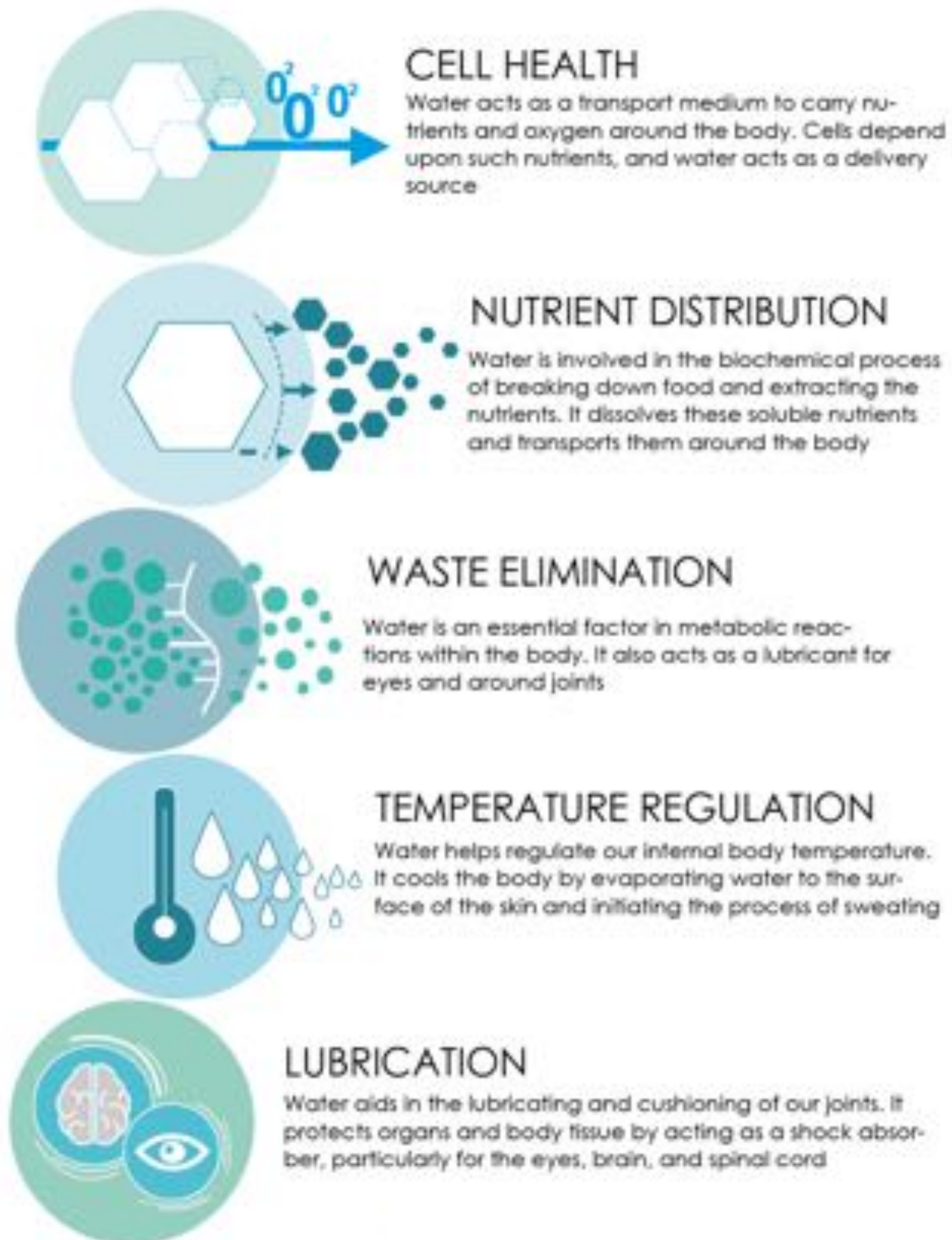
... AND IN OUR PLANET

"Deep beneath the earth, there is more water than in all the oceans combined."



The water on our planet -and in our bodies- is older than our solar system, some water is over 13bio years old ...

WHAT ROLE DOES WATER PLAY IN THE HUMAN BODY



WATER IS CRUCIAL FOR LIFE

- Water is found almost everywhere on earth and is required by all known life.
- While ageing, the water-by-mass percentage in our bodies drops from 75% to 50% ("Dying is Drying"). But even when we grow old, >99% of our body molecules-by-number are still water.
- Water is important to cells because without it they would not be able to remove waste, bring in nutrients or transport oxygen.

Therefore water is called a "**solvent**"



WATER IS STRANGE

- It is generally agreed by many scientists that water is one of the most anomalous substances in the universe.
- Cf. Prof. Martin Chaplin's (University of London) excellent web-site related to the **more than 60 already known anomalous properties of water**.
- Example: Ice has a lower density than water, it floats on the water. Thanks to this "anomaly", fish can survive in stretches of standing water in winter! Without this "anomaly", life would have been impossible.

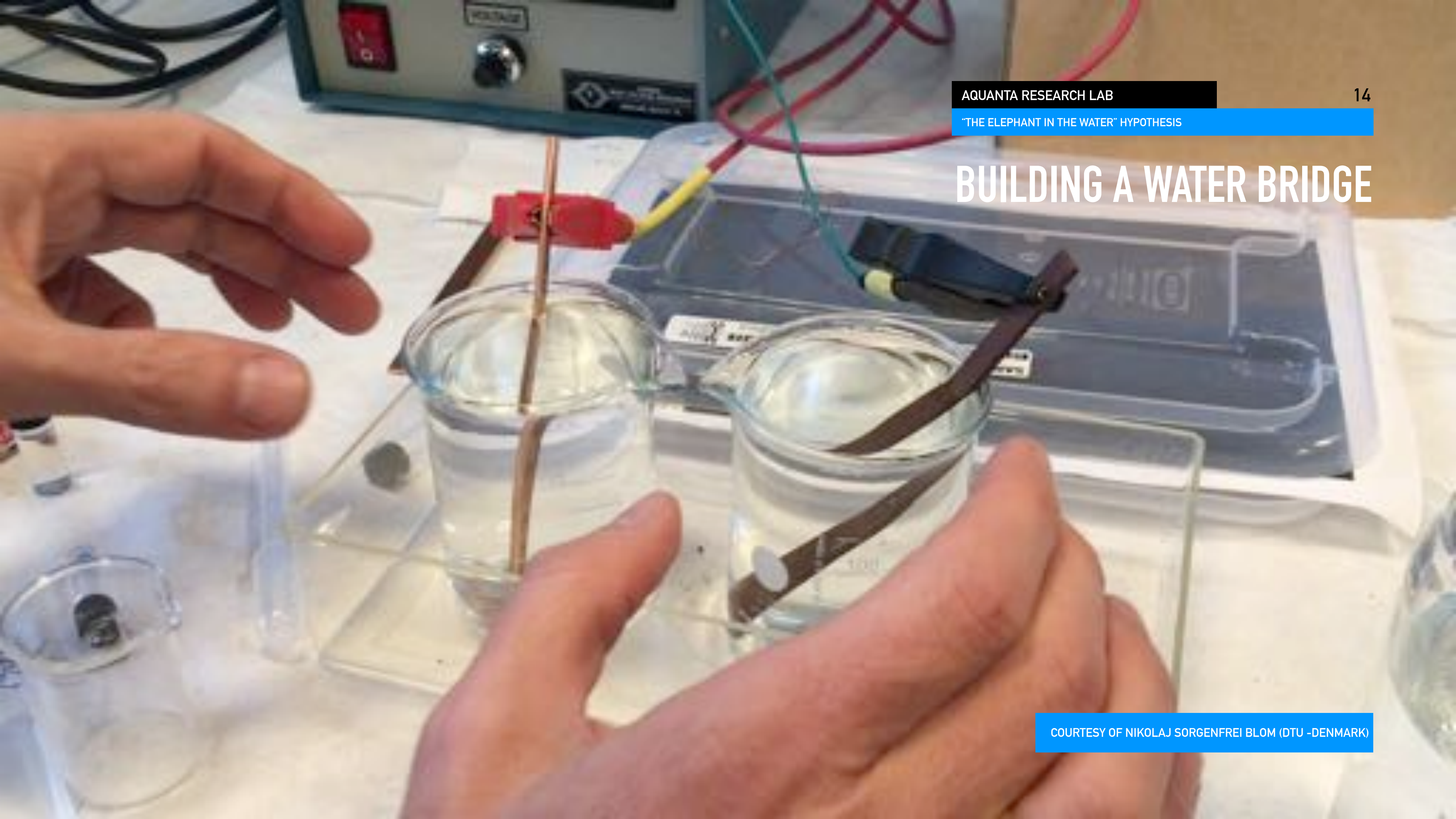
HIGH-SURFACE TENSION OF WATER

"Water has unusually high surface tension"
(Prof. Martin Chaplin)

WATER DROPLETS FLOATING ON WATER

COURTESY OF DR. JERRY POLLACK (UNIVERSITY OF WASHINGTON)

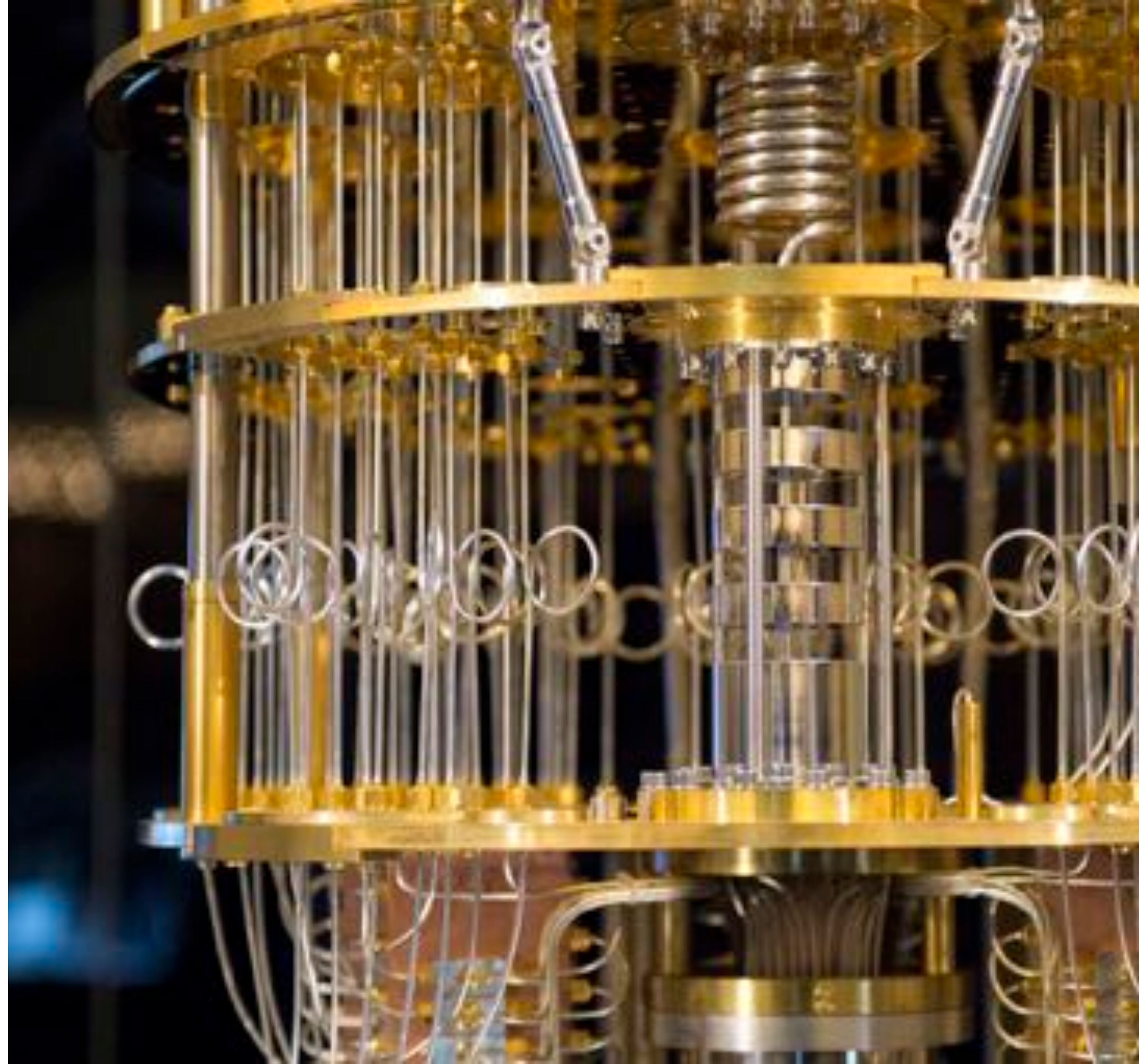
BUILDING A WATER BRIDGE



WATER IS SMALL ... VERY SMALL

- One drop of water weighs 0.05 gram and consists of 1.67×10^{21} H₂O water molecules.
- If we would replace 1 water molecule by 1 byte of information, we are talking about 1.67 Zettabytes of data.
- **This is approximately the same amount of data as all global internet IP traffic in 2018!**
- A glass of water could easily store all the information humanity has ever produced ...

II. QUANTUM COMPUTING & MATERIAL SCIENCES



WHAT IS A QUANTUM COMPUTER?

1/ What "Quantum Computing"?

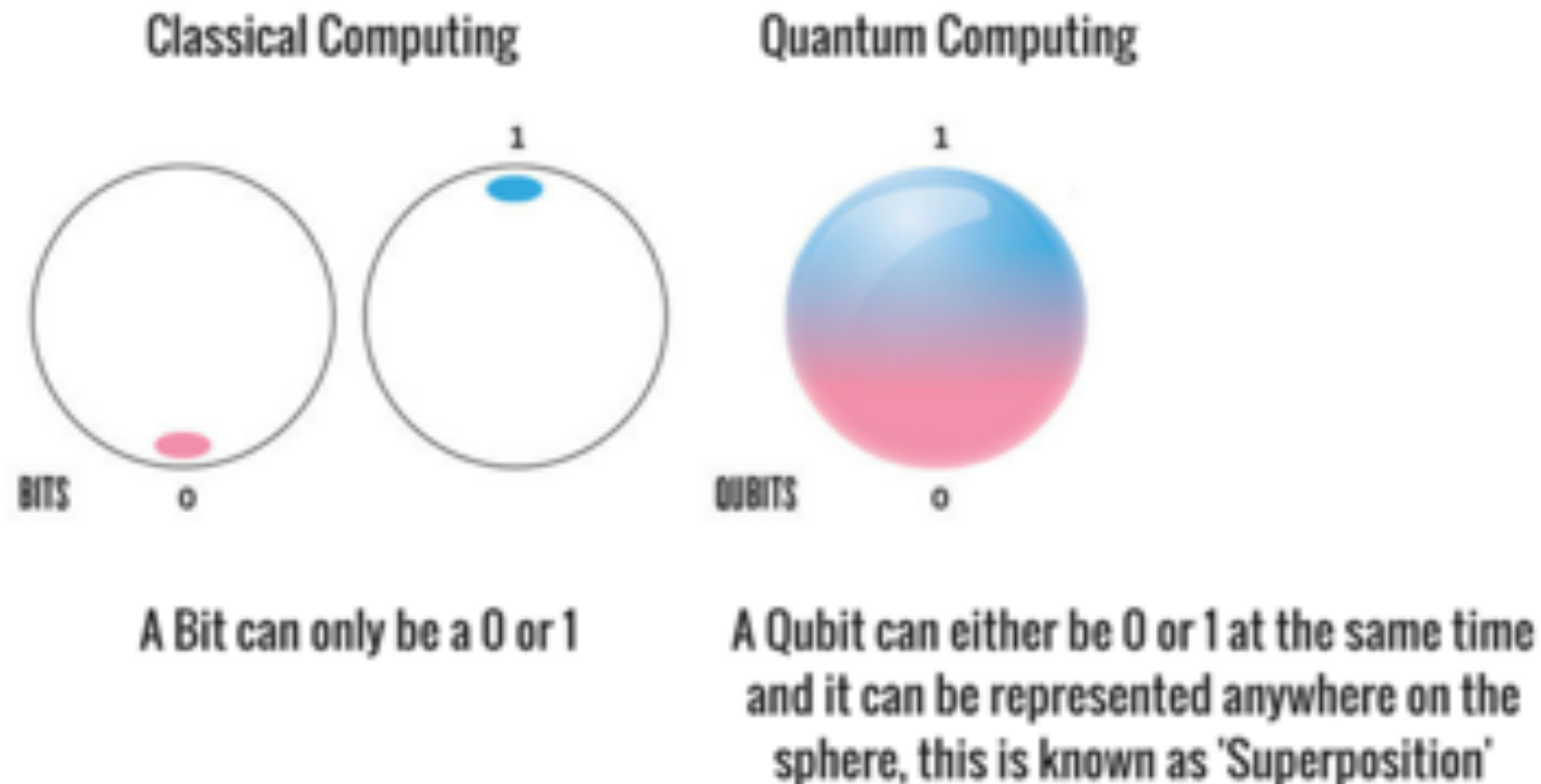
There is a rapidly emerging technology that harnesses the laws of quantum mechanics to solve problems too complex for classical computers.

2/ What are "Qubits"?

Where a classical processor uses bits to perform its operations, a quantum computer uses qubits to run multidimensional quantum algorithms.

3/ Why is a Quantum Computer Cold & Shielded?

For qubits to perform their calculations, they must be brought in quantum coherent states of "superposition" and "entanglement". To realize this "quantum coherence", **quantum computers must be electronically shielded and cooled down to almost absolute zero temperatures (-273°C).**



WHY DO WE NEED QUANTUM COMPUTING?

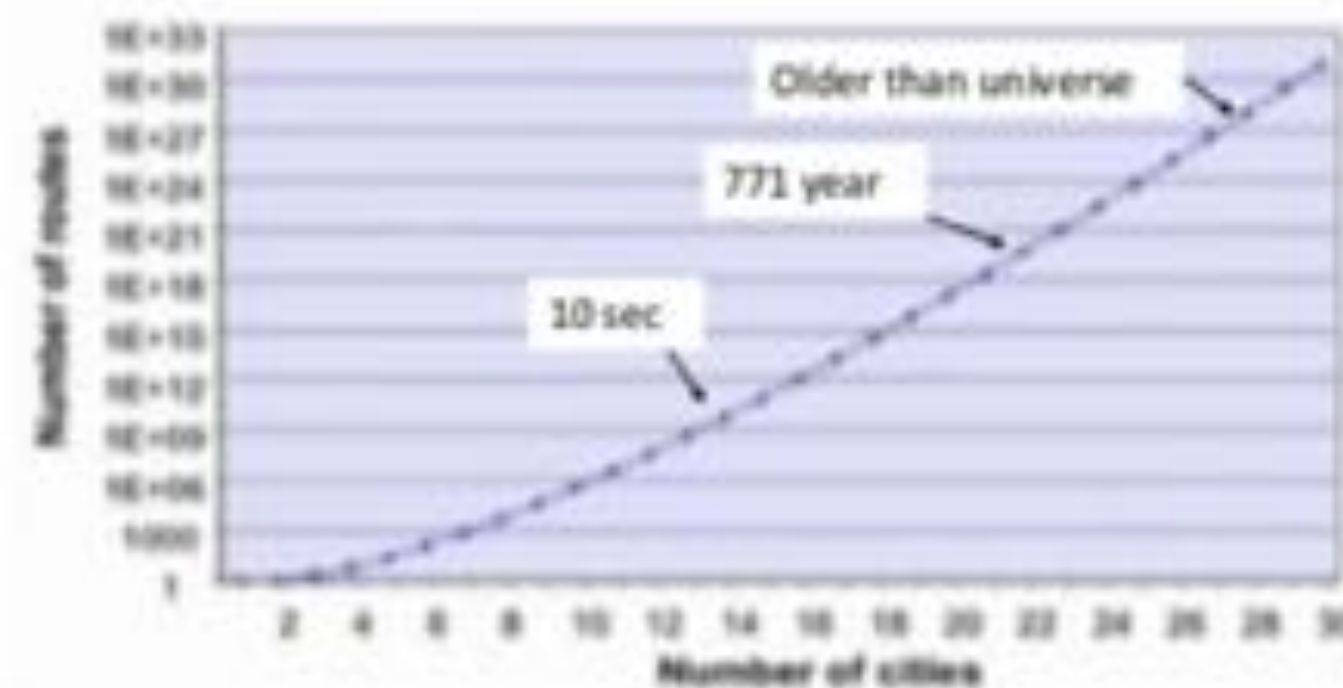
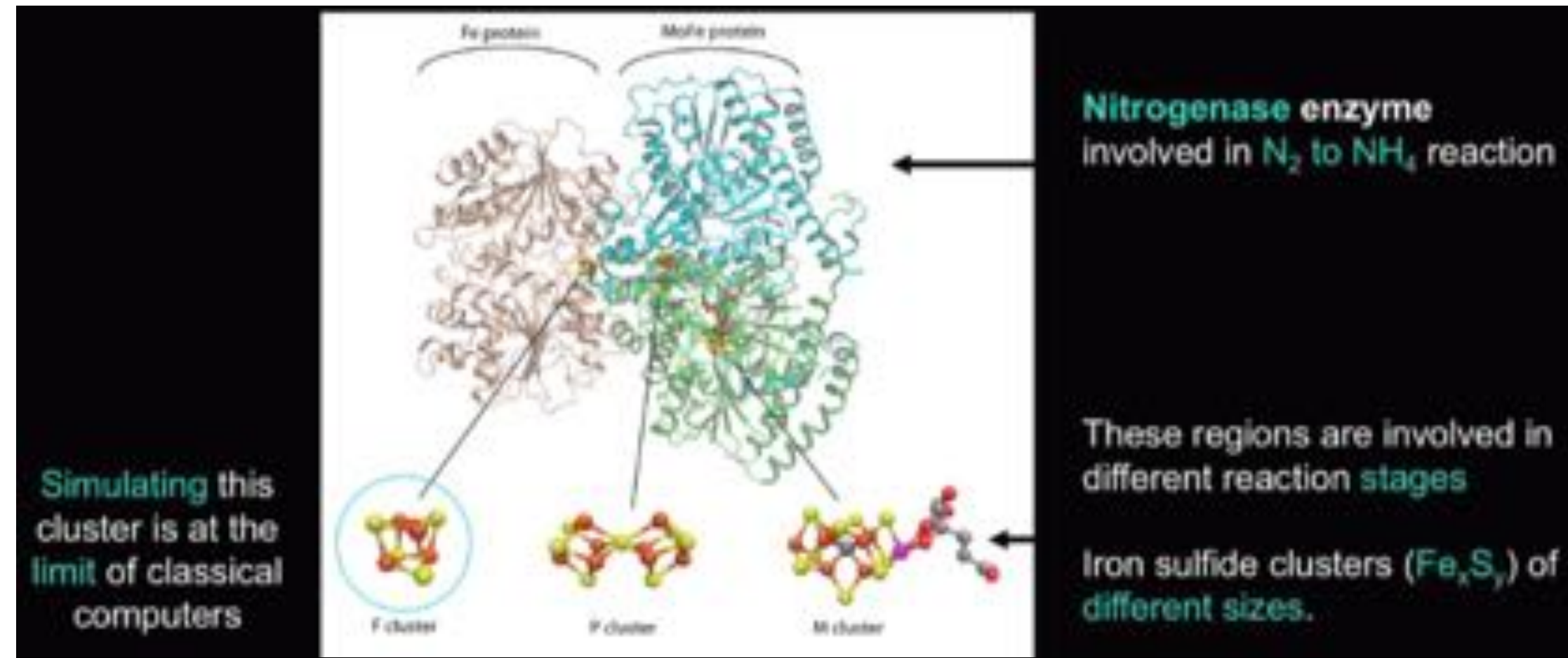
1/ Computing power is reaching its limits.

We are reaching the physical limits of making computer switches (transistors) smaller. Because they are now entering the "Quantum World" (<1 nanometer), electrons start to behave weirdly resulting in switches which do not longer function perfectly.

2/ More computing power is required.

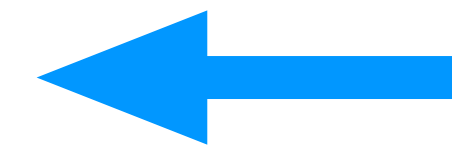
In order to e.g. develop new medicines, we need computers that can simulate hundreds or even thousands of clusters of molecules. This is difficult and slow to process on classical computers.

Another example of where a quantum computer could help us is in **solving "Travelling Salesman" problems**. Calculating the shortest route could take many years on a classical computer whereby a quantum computer could solve this problem in a much shorter time frame.



Lets assume our classical computer speed is 4.4 GHz (intel i-7) (10^{10} operation/sec)

Cities	routes	time taken
14	10^{11}	10 sec
22	10^{19}	771 year
28	10^{30}	-----



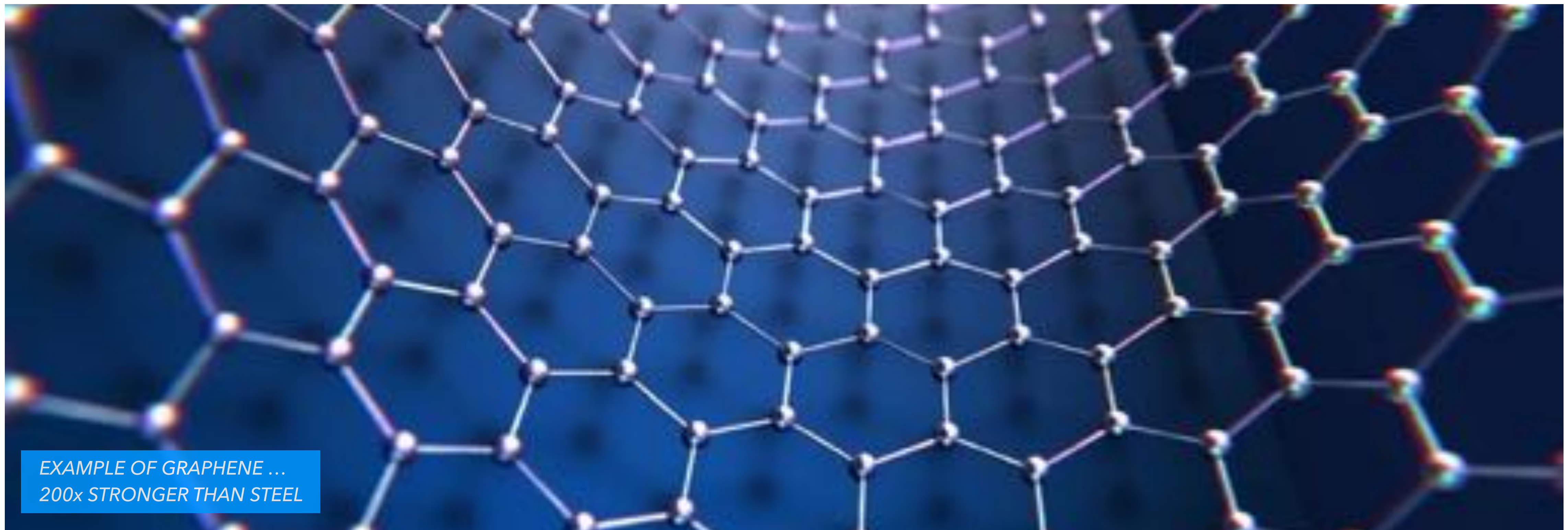
MATERIAL SCIENCES & GRAPHENE

- In 2010, the Nobel Prize for Physics went to Andre Geim and Kostya Novoselov "for ground-breaking experiments regarding the two-dimensional material graphene".
- Graphene is a material composed of carbon atoms grouping that are hexagonally positioned. This arrangement results in carbon monolayers of an atom thick.
- Due to this **structure**; graphene has very unique chemical, physical & electrical properties and is **totally different from regular carbon**.

How the sticky "Scotch Tape Method" led to the "accidental" Nobel Prize.

STRUCTURE DETERMINES PROPERTIES ...

*"New 2D Materials Breakthrough Signals
Revolution in Electronics Production"*



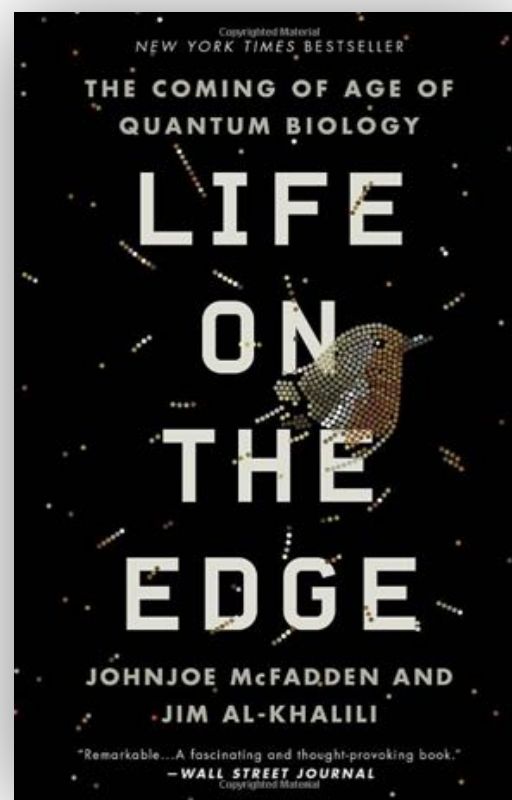
2D MATERIALS & QUANTUM COMPUTING

*"Physicists from the University of Vienna and the Institute of Photonic Sciences in Barcelona have shown that tailored graphene structures enable single photons to interact with each other. This leads to a proposed new architecture for quantum computing ... **which could operate at room temperatures(!).**"*

CONCEPTUAL DESIGN OF HOW A GRAPHENE-BASED QUANTUM COMPUTER COULD LOOK LIKE.

III. QUANTUM BIOLOGY & COHERENT WATER



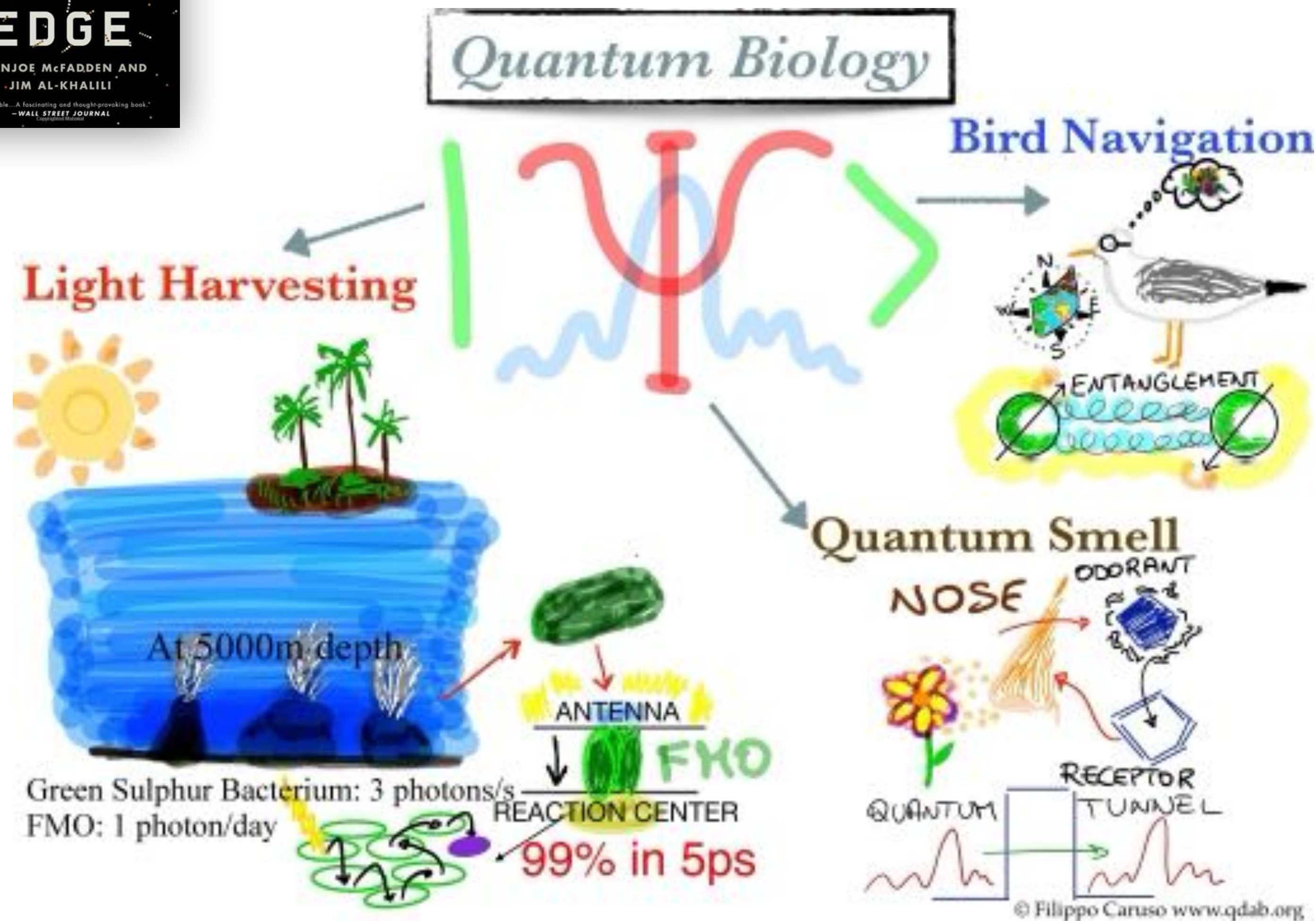


WHAT IS QUANTUM BIOLOGY?

Quantum biology is the application of quantum theory to aspects of biology that cannot be accurately described by the classical laws of physics.

Good examples of biological processes in which quantum effects are visible are the transport of electrons and protons in photosynthesis, respiration, vision, catalysis, olfaction, and in basically every other biological transport process.

Further examples include the transfer of electronic and/or vibrational energy, and magnetic field effects in electron transfer and bird migration.

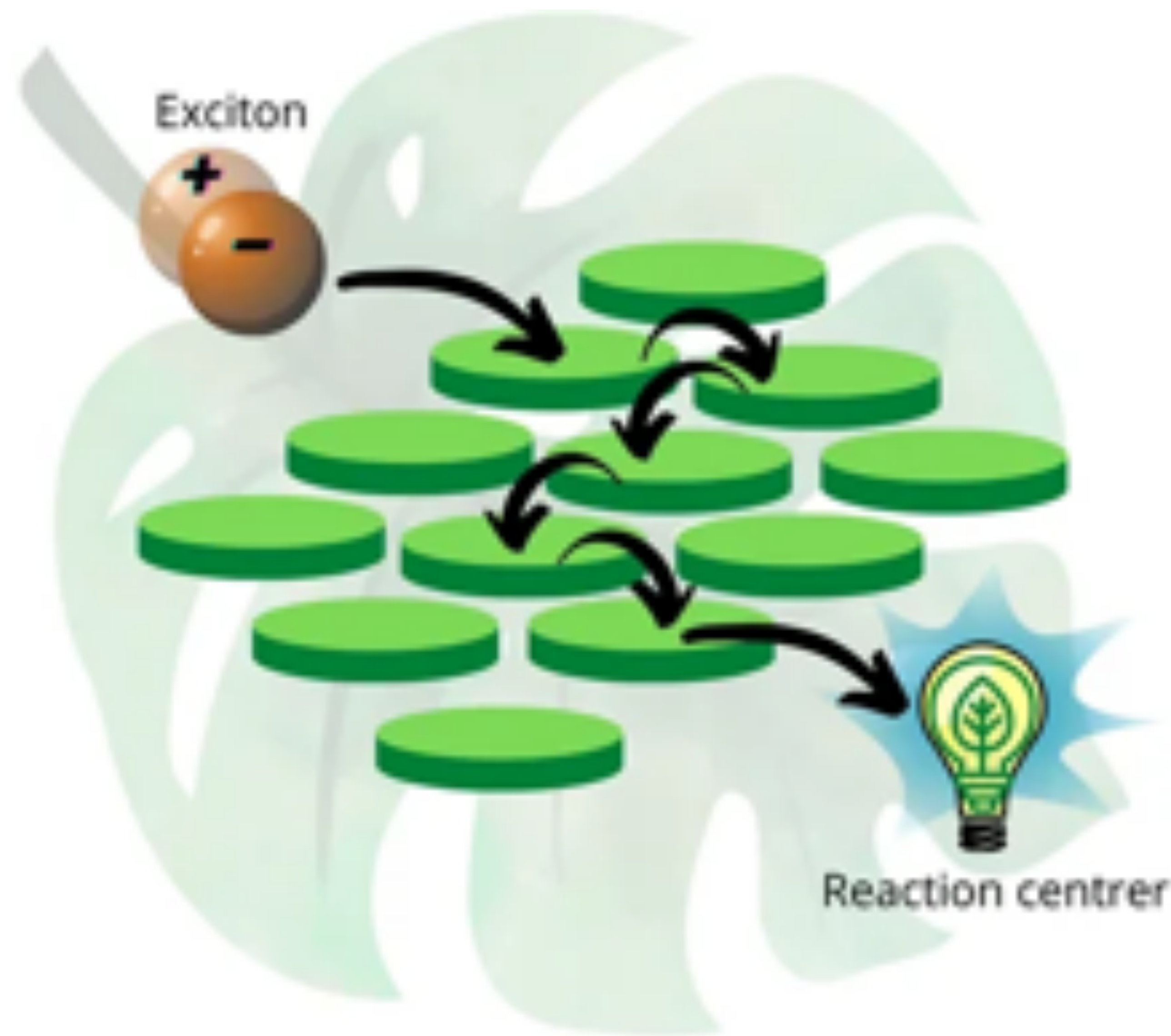


EXAMPLE: PHOTOSYNTHESIS

There is extremely efficient energy transport during the process of photosynthesis.

During this transport, the excited energy of an incoming photon is always following the shortest path to the reaction centre of a cell. To solve such **"travelling salesman routes"**, enormous "classical computing" power is required.

Here scientists are proposing that the noisy, warm and wet interior of a living cell could be the **"quantum computer"** which drives this quantum dynamics and maintains **"quantum coherence"** in the process of photosynthesis, rather than destroy it.

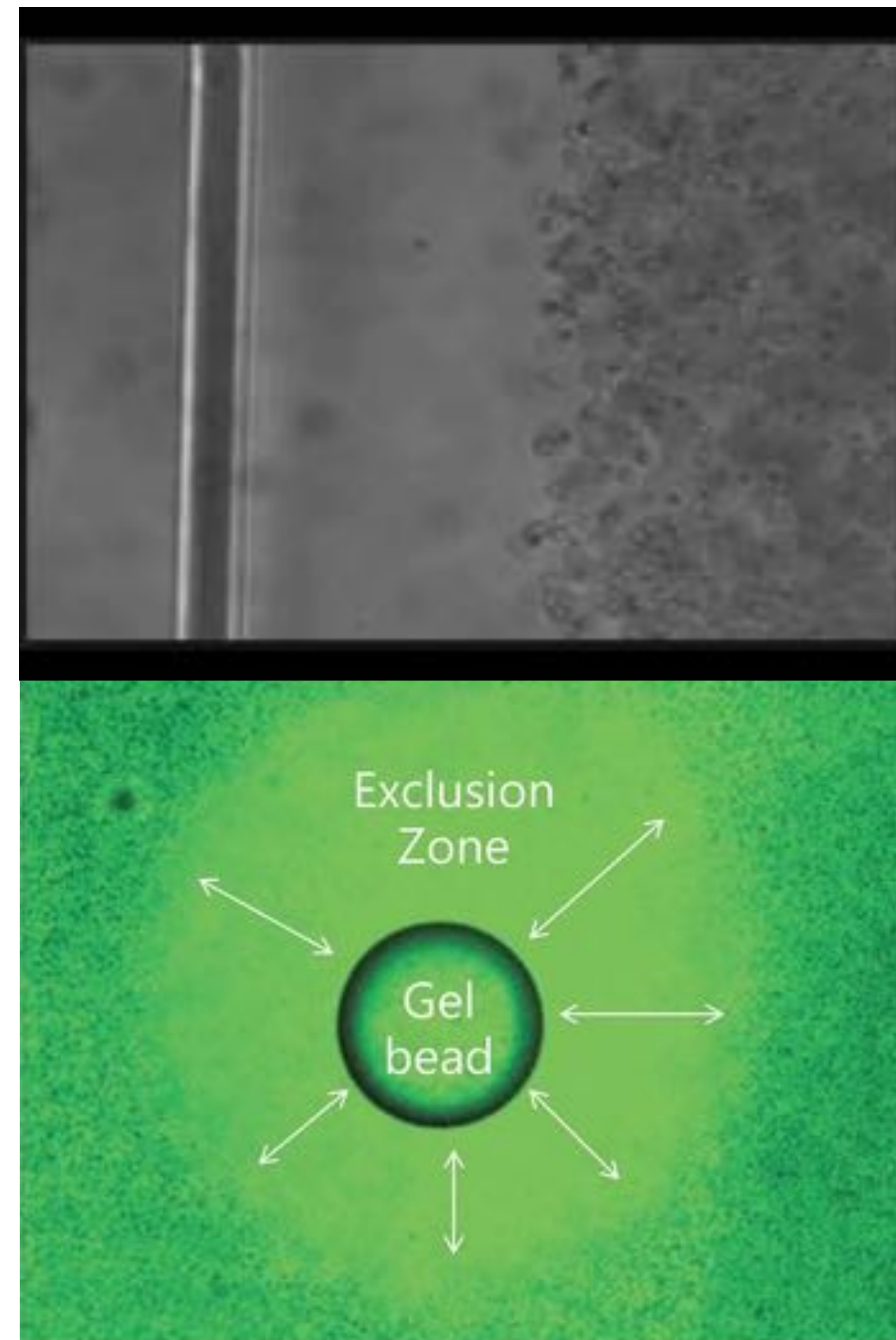
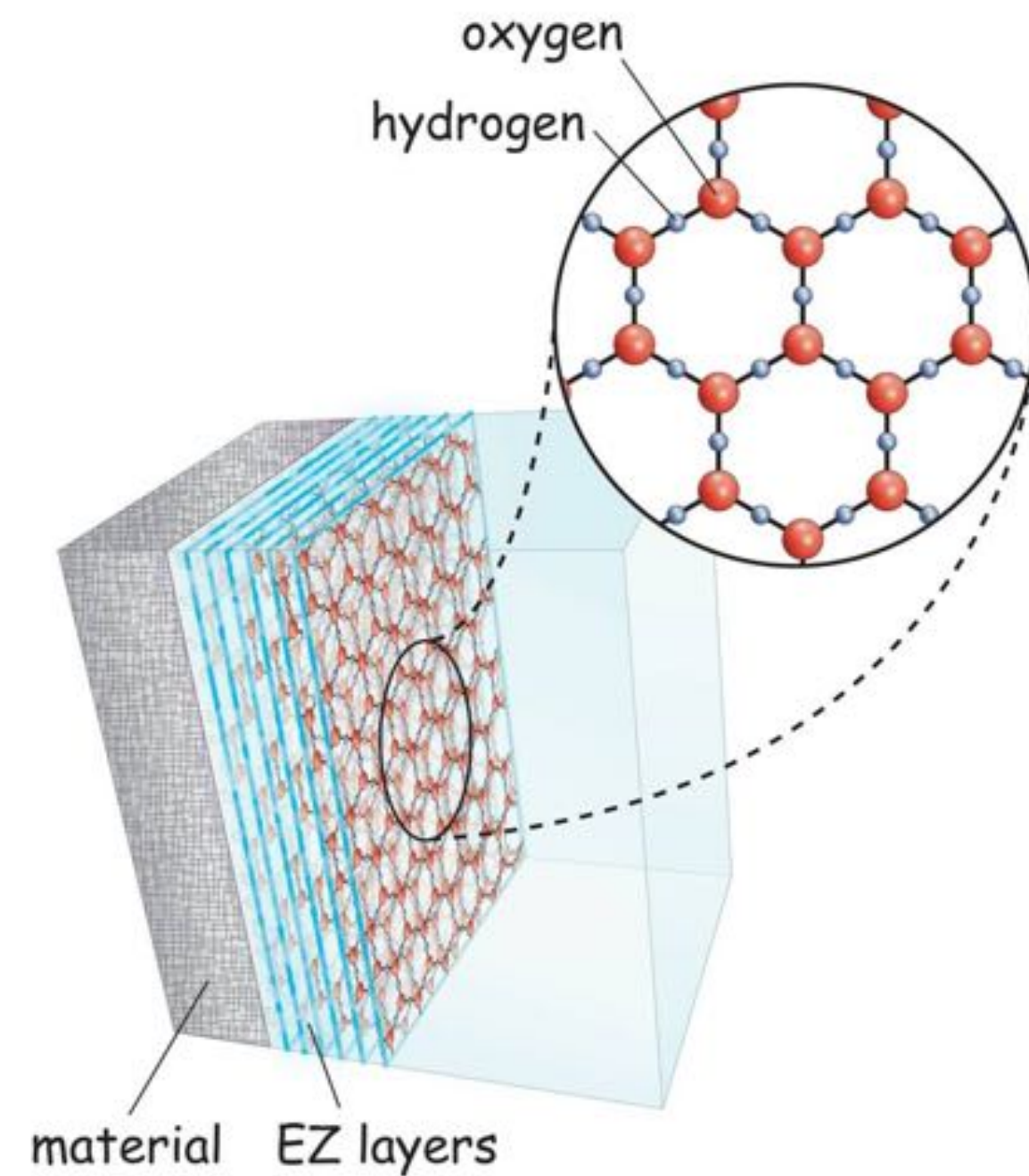


THIS LEADS TO THE OBVIOUS QUESTION . . .

“COULD WATER BE A QUANTUM COMPUTER?”

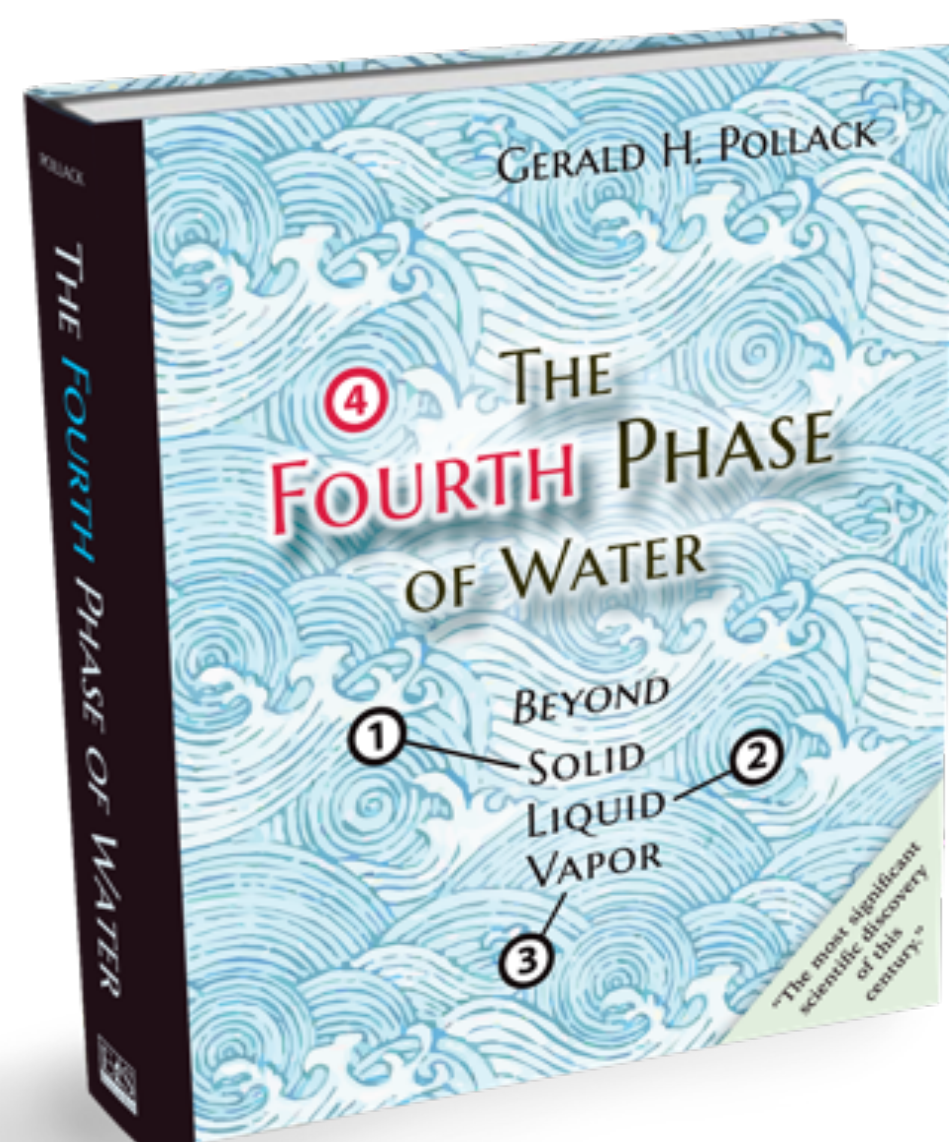


COHERENT WATER

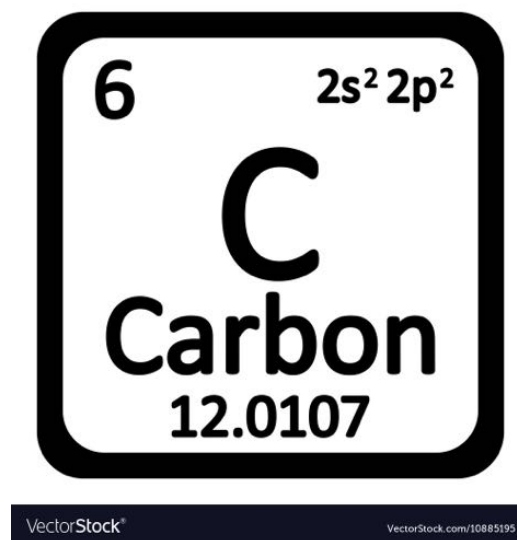


Researchers discovered that water ("aqua") close to hydrophilic surfaces begins to **organise itself**, dividing itself into two layers, one of which begins to transform into an entirely new form of structured or coherent water, **different to any bulk water with which we are familiar. We call this water "aquanta".**

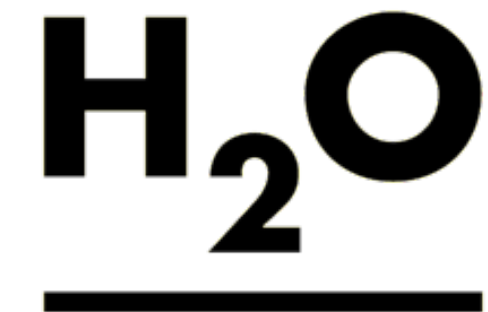
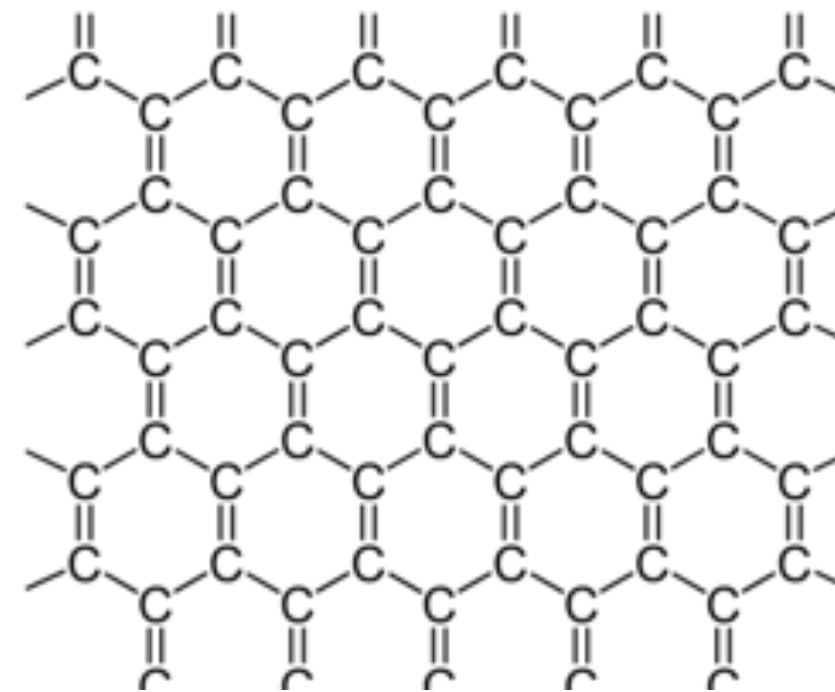
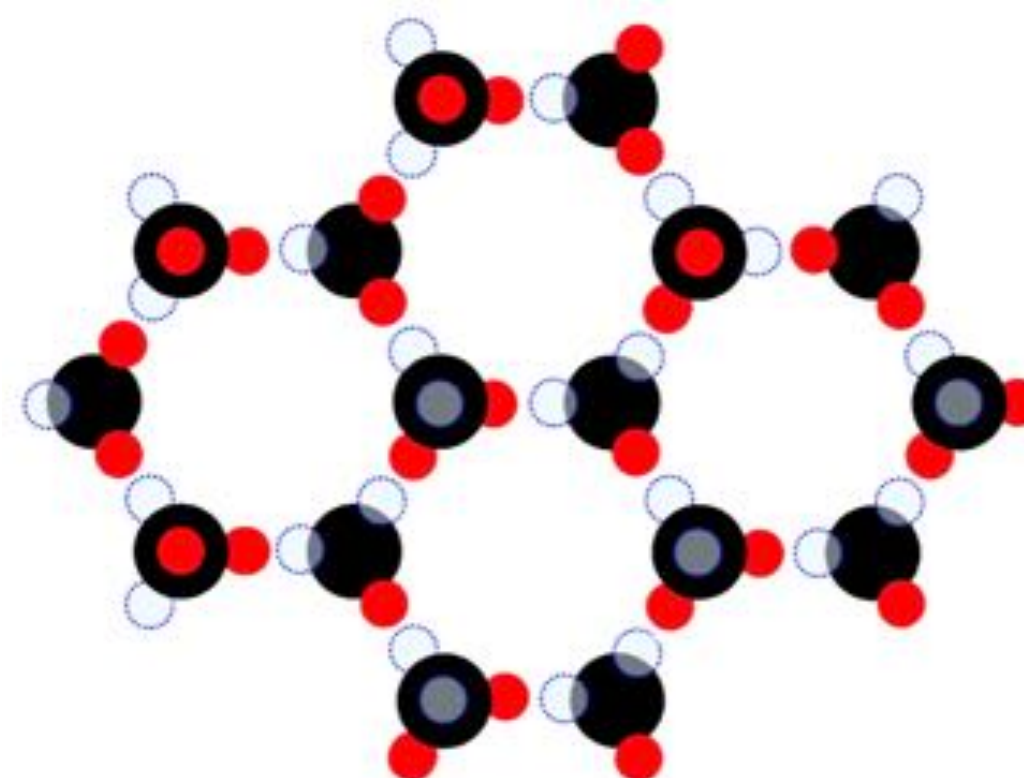
"A team of scientists discovered that water adopts a new state of water in which so-called coherent water -under the influence of EM radiation (e.g. IR light)- **organises itself** into a **hexagonal crystalline** form."



Carbon

 \neq

Graphene

 \neq 

Aqua

Aquanta

STRUCTURE DETERMINES PROPERTIES ...

"2D materials have distinct chemical, physical and electrical properties including layered structure, high-surface area, layer-dependent optical bandgap, ..."

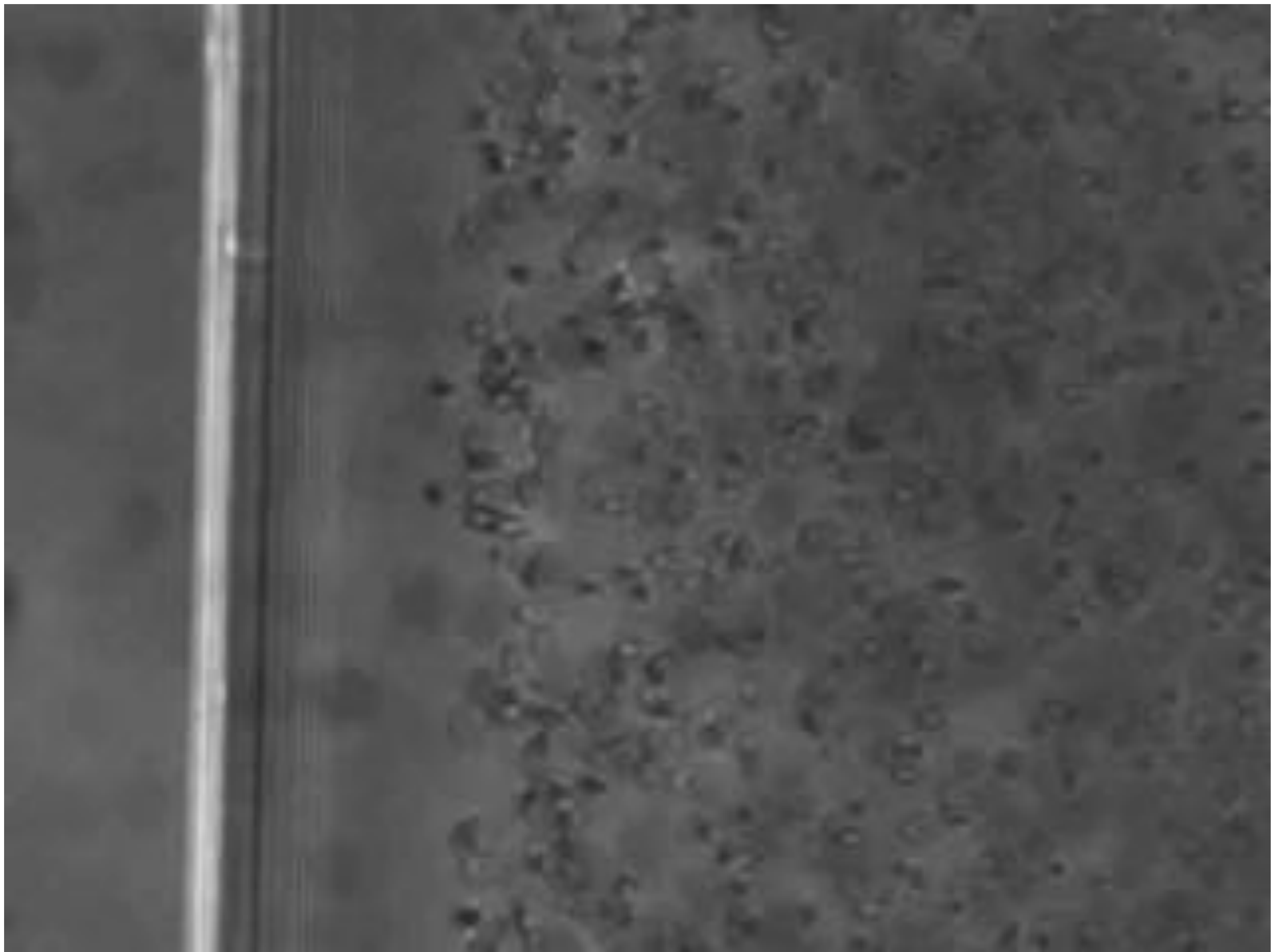
"SELF-STRUCTURING" PROPERTIES OF WATER

What we see here:

The "pyramid" structure on the left is a piece of Nafion. The black "border" around this piece of Nafion is "pure water". Under the influence of IR light, this zone of "pure water" starts to grow and expels all impurities (represented by the microspheres).

Nafion

Microspheres



"SELF-STRUCTURING" PROPERTIES OF WATER

IV. MEET THE ELEPHANT IN THE WATER



“THE ELEPHANT IN THE WATER”

“*Elephant in the Room*” is an expression used to acknowledge that there is a serious issue that is being ignored in the discussion. The statement might be made by a person who feels responsible for getting to the “real” issue.

Elephants are the largest land animals on Earth, so using them as a metaphor means that a very large— perhaps the largest— issue is being ignored.



MEET THE ELEPHANT IN THE WATER

The "Elephant in the Water" hypothesis states that once water -"aqua"- becomes coherent, it forms graphene-like hexagonal crystalline sheets -"aquanta"-.

Because of this structure, water is now able to receive, process and transmit information based upon exactly the same principles which drive quantum computing.

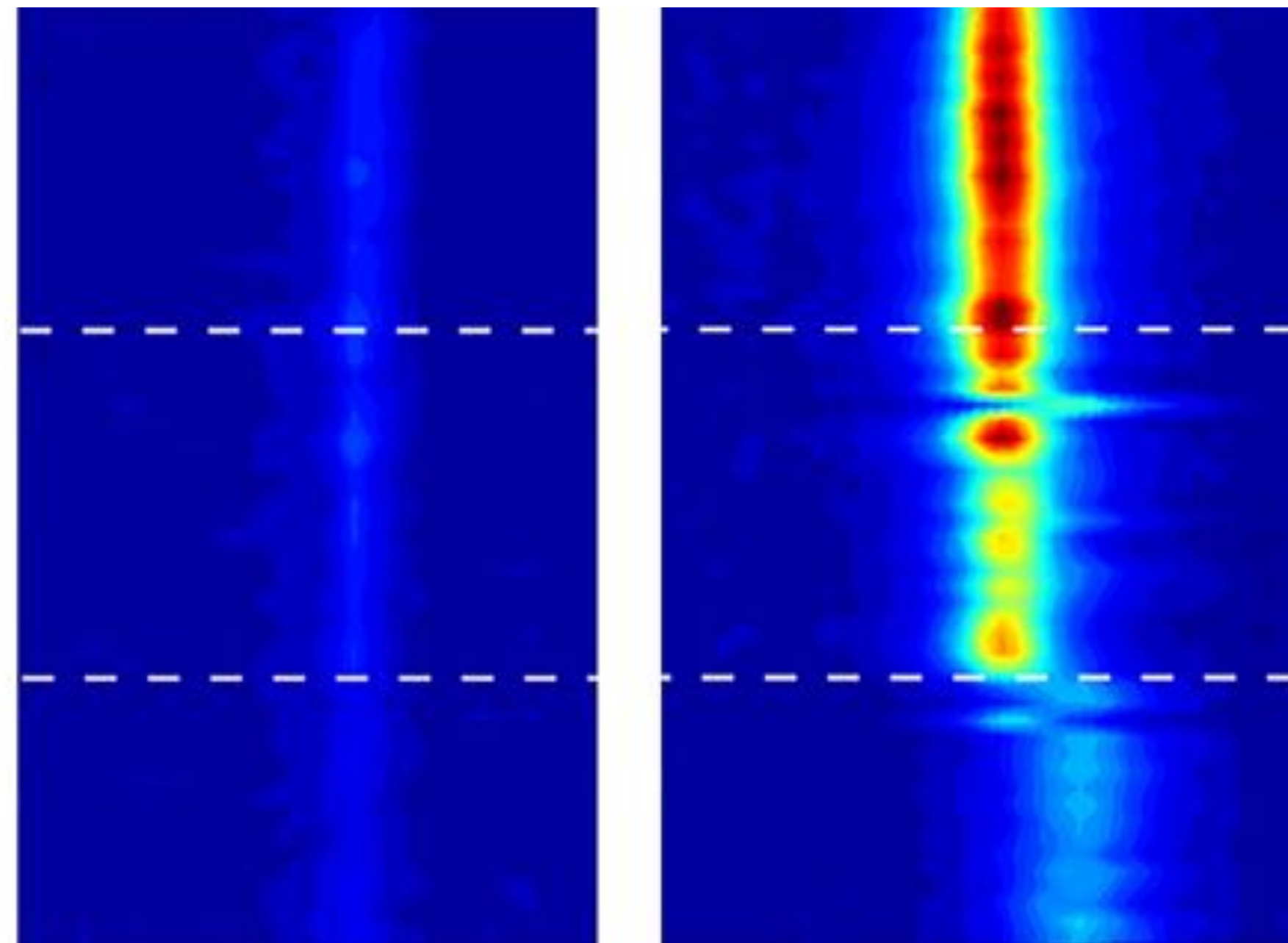
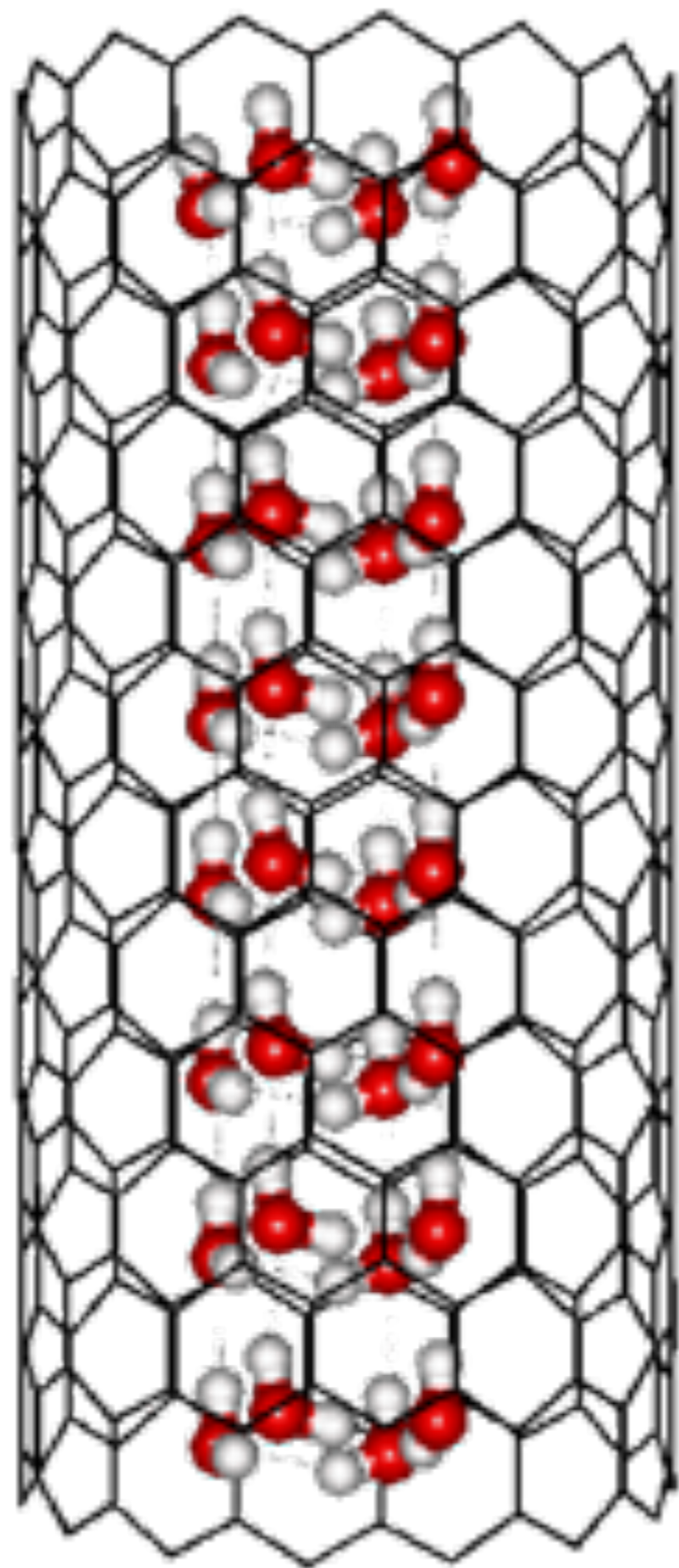
This hypothesis is based upon the facts that certain biological processes are too complex to explain in any other way, while we also see more and more evidence that quantum computing -unshielded and at room temperature- is at work in Nature.

"IS THERE A SMOKING GUN?"



The meaning of SMOKING GUN is something that serves as conclusive evidence or proof.
(as of a crime or scientific theory)





COHERENT WATER IN CARBON NANOTUBES

MIT - November 2016

*"Inside the tiniest of spaces—in carbon nanotubes whose inner dimensions are not much bigger than a few water molecules—**water can freeze solid** even at high temperatures that would normally set it boiling."*

A.K. Geim et al - May 2018

*"The researchers have found that the electric response of the confined water is not only suppressed but completely absent. In other words, the water inside nanochannels was 'electrically dead' with its dipoles immobilised and unable to screen an external field. **One can probably claim that interfacial water shapes life as we know it, both literally and figuratively.**"*

(Prof. Geim was awarded the 2010 Nobel Prize in Physics for his work on graphene)

LIFE AND MICROTUBULES

Every eukaryotic cell -which is the basis for every multicellular organism, including animals, plants, and humans- contains microtubules.

These are straight hollow cylinders **filled with uniquely arranged water molecules and with dimensions similar to carbon nanotubes.**

These microtubules are involved in cellular movement, intracellular transport, maintenance of cell shape and cell division.

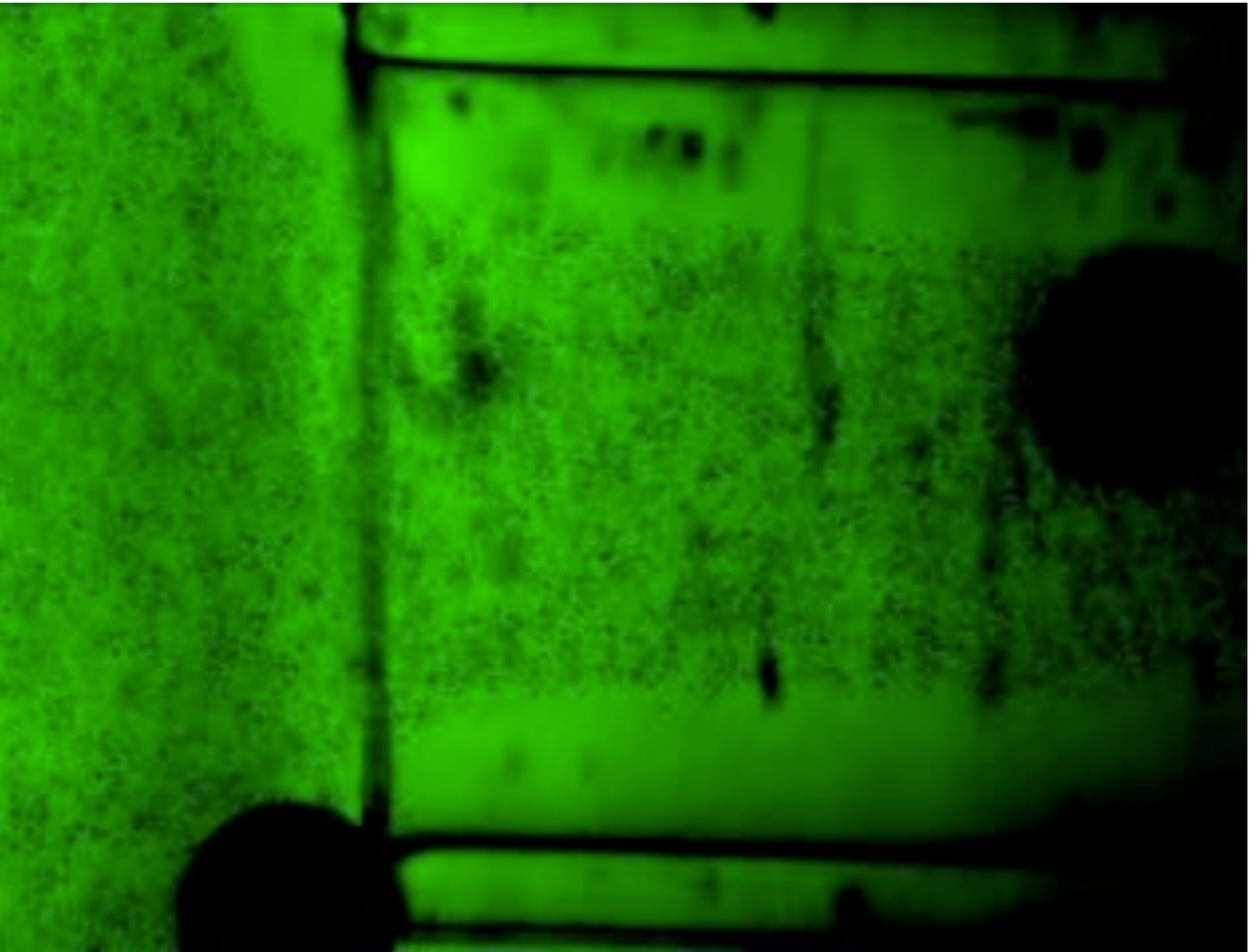
COHERENT WATER, ALSO A QUANTUM "MACHINE"?

What we see here:

"Impure" water in the middle of a hollow tube. The water at the inner-surface of the tube is "coherent water"; the impure water stays at the center of the hollow tube. Under the influence of IR light, the impure water starts to flow. The "coherent" water pushes the "impure" water inside the tube.

"Microtubules are involved in cellular movement"

COURTESY OF DR. JERRY POLLACK (UNIVERSITY OF WASHINGTON)



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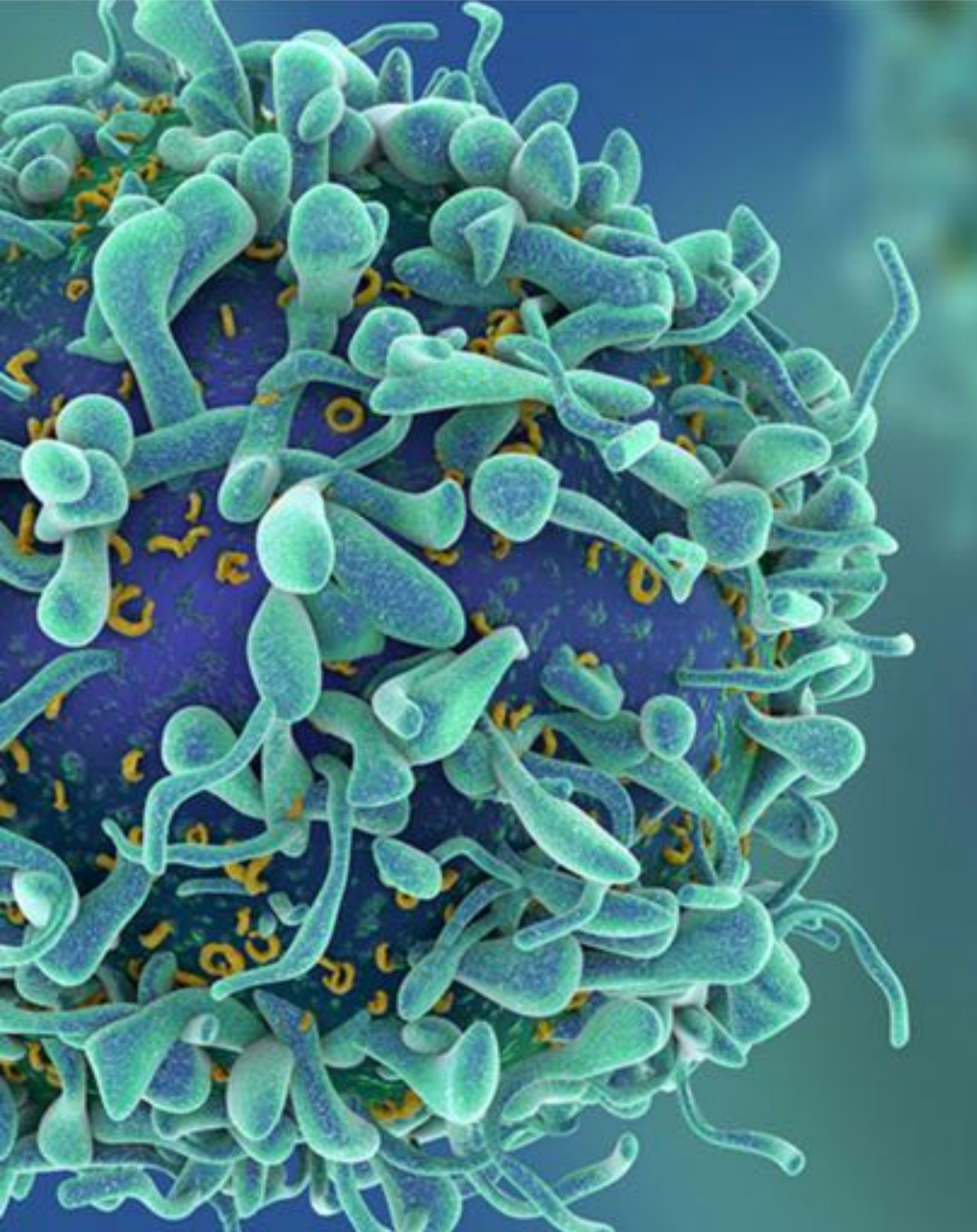
FINGERS OF WATER WEAVING LIFE

"Microtubules are the basic structural elements for cell division. The centromere is a key structure holding chromosomes together. It connects with the kinetochore where microtubule based spindle fibers attach to the chromosomes. Centrioles produce microtubules that orchestrate the rearrangement and sorting of the DNA during the extremely elaborate process of cell division. Complex arrangements of microtubules direct and pull all the elements of the division process through multiple phases.

The structure for this process is considered the most complex machine ever discovered in nature and is based on microtubule actions. "

"THE MOST COMPLEX MACHINE EVER DISCOVERED IN NATURE": THOUSANDS OF HOLLOW TUBES FILLED WITH ONLY WATER ORCHESTRATING IN PERFECT HARMONY THE COPY-AND-PASTE OF DNA ...





ON A SIDE NOTE . . .

At any given moment, cell division takes place in ca. 200 billion cells of the human body using microtubules "only filled with water".

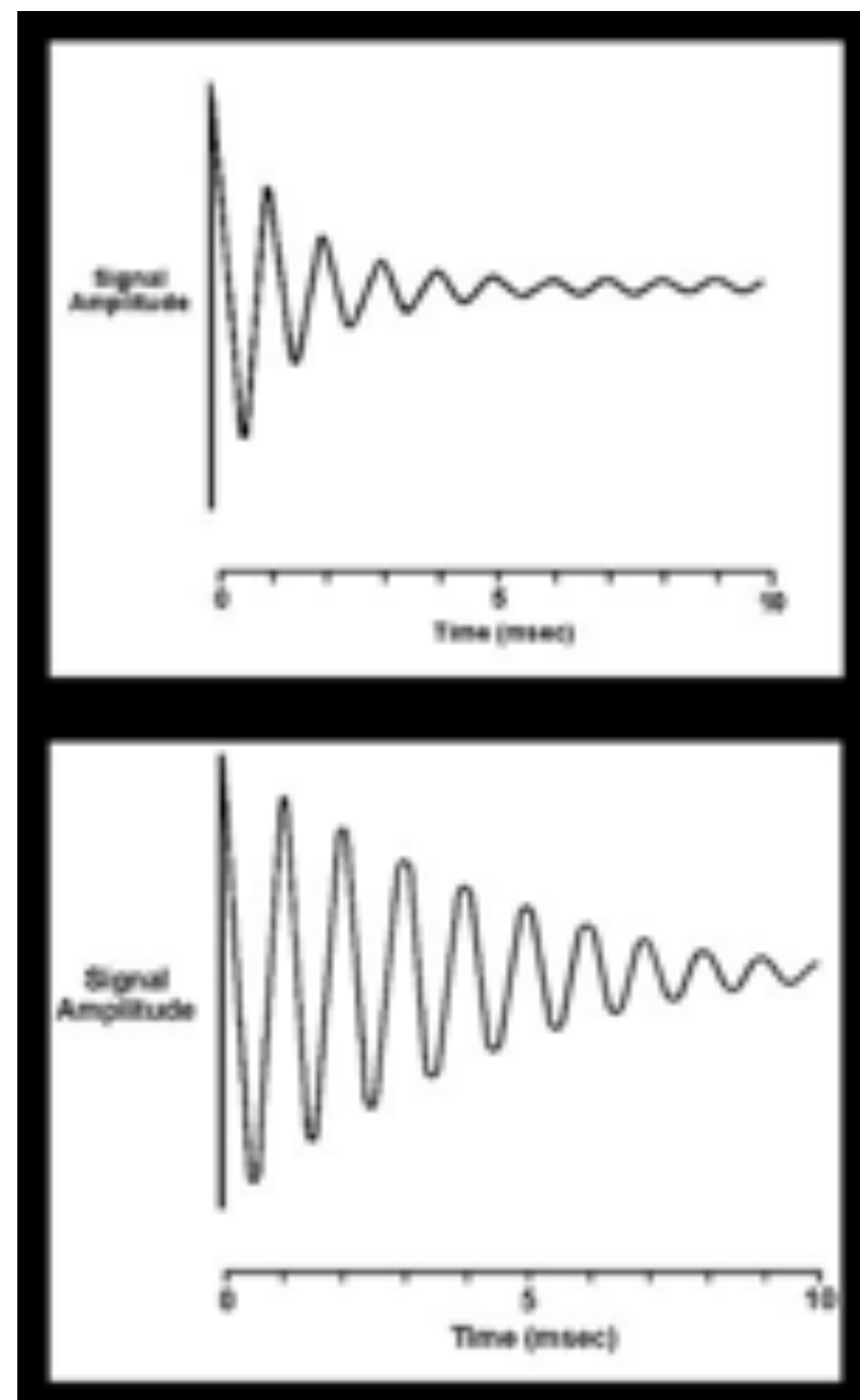
Cancer happens when cells start to divide in an uncontrolled way.

While a lot of ongoing cancer research already has its focus on the role of microtubules, we are absolutely convinced that ...

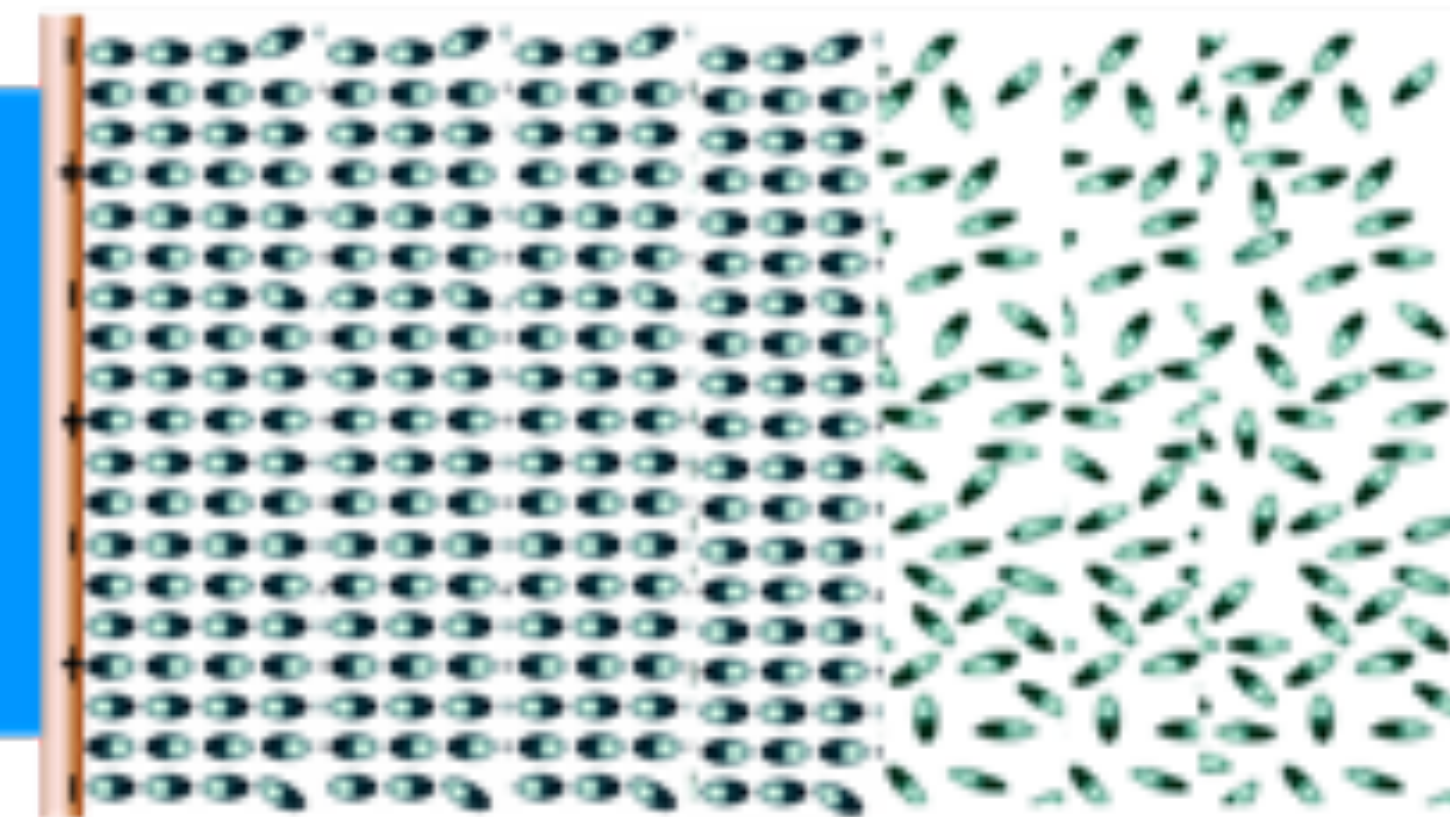
***"If we ever want to cure cancer,
we have to bring water into the equation".***

... TUMOR DETECTION BY MRI

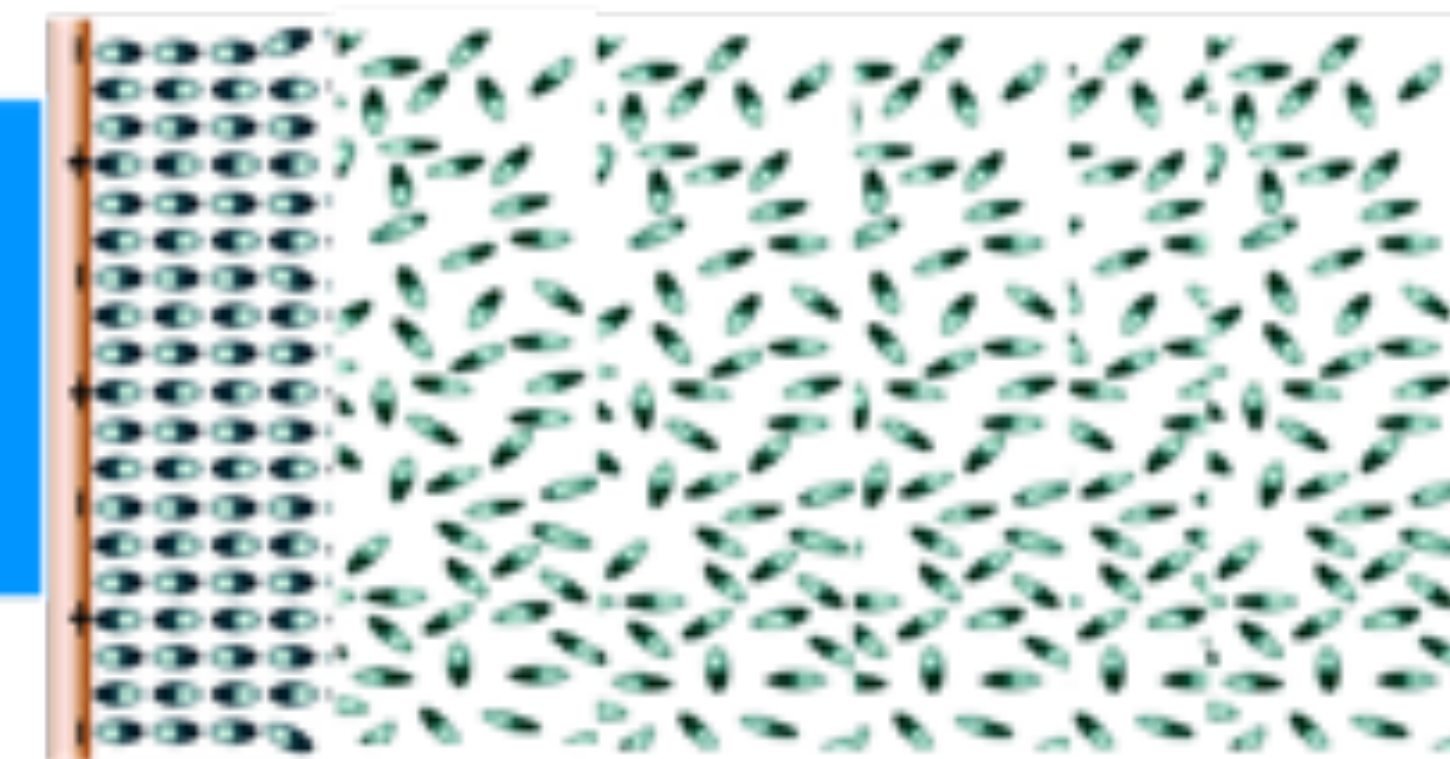
NMR=MRI estimates the degree of protons confinement in a sample of a tested substance. Over 99% of protons in cells and tissues belong to water. The more confined is water the darker is the image of the particular field.

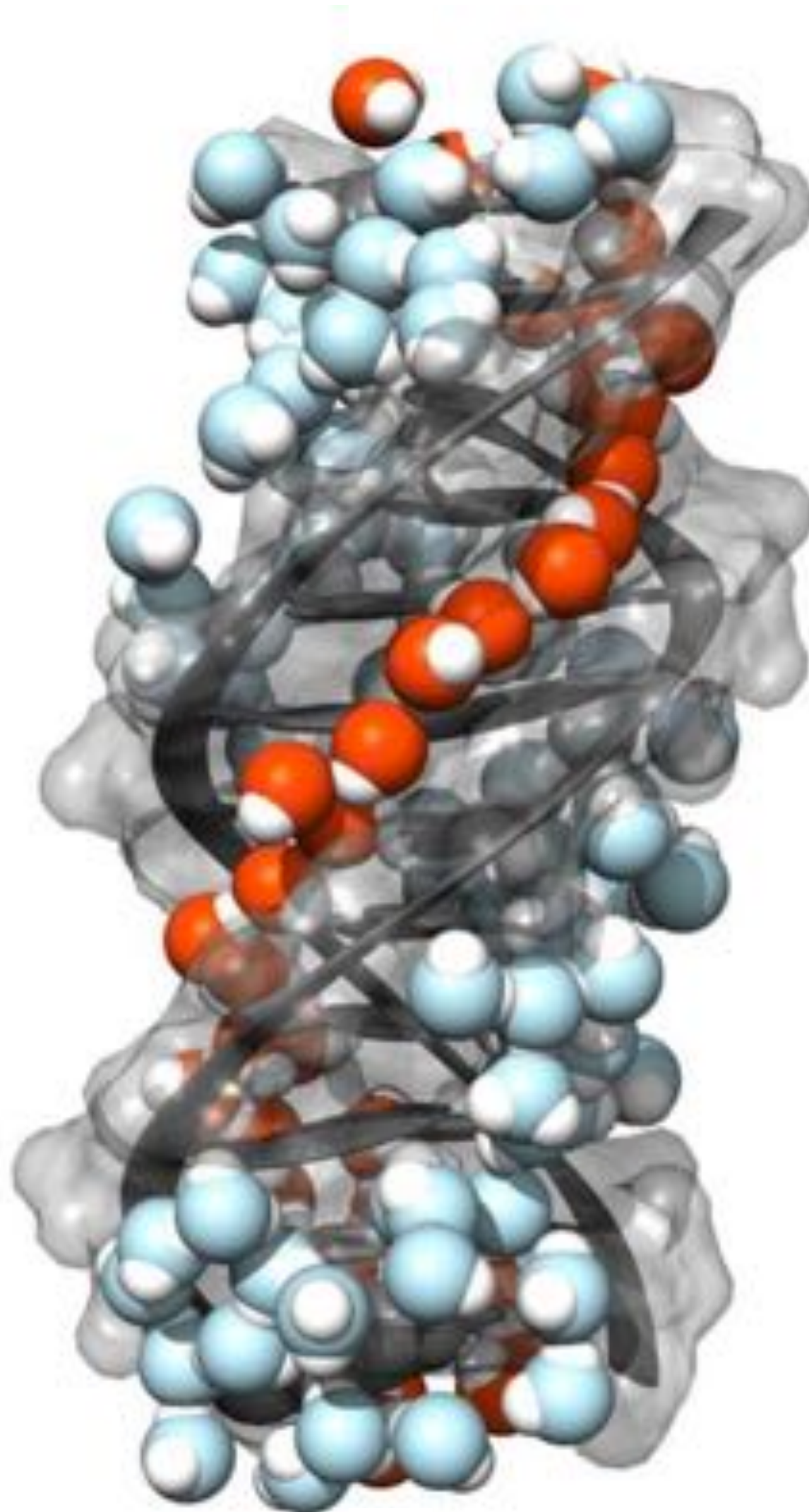


*Signal from normal
tissue:
Water is more
constrained*



*Signal from cancer
tissue: water is
more chaotic*





"Scientists have discovered that water molecules not only characterise the structure of DNA genetic material, they actually influence the structure of the genetic substance itself."

THE ELEPHANT IN THE WATER: SUMMARY

- Structure Determines Properties:
**Bulk Water ("Solvent") ≠ Coherent Water ("Actor");
Aqua ≠ Aquanta**
- The "Elephant in the Water" hypothesis states that a massive property of water -namely its ability to "receive, process and transmit information"- has been overlooked.
- "Coherent water" is able to (steer) move(ment); *"Aquanta = Builders of Nature"*
- "Coherent water" is everywhere, even in deep space.

***"Where there is water, there will be life
- because water drives life, and is a-live"***

LET'S TAKE ANOTHER LOOK . . .

Could we be looking here at the most "pristine" form of life, the driving form behind the extraordinary creative process in Nature?

COURTESY OF DR. JERRY POLLACK (UNIVERSITY OF WASHINGTON)



Nafion

Microspheres

"TO BE CONTINUED . . .

"After a hypothesis has been formed, scientists conduct experiments to test its validity. Experiments are systematic observations or measurements, preferably made under controlled conditions—that is—under conditions in which a single variable changes."

AQUANTA RESEARCH LAB

"THE ELEPHANT IN THE WATER" HYPOTHESIS

"Once you eliminate the impossible, whatever remains, no matter how improbable, must be the truth."

SIR ARTHUR CONAN DOYLE



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