



ALL ORGANISMS ARE MADE UP OF ABOUT 70% WATER!
 AS YOU SAID: THIS WATER NEEDS TO FLOW OUT OF US...
 IT TRANSITS THROUGH MOST OF OUR TISSUES, MOST OF OUR ORGANS... OUR EYES, OUR BRAIN, OUR INTESTINE, OUR LUNGS!
 THE FLOW IS REGULATED BY PROTEINS: **AQUAPORINS**
 BUT ALSO INSIDE US
 YOUR KIDNEYS ARE THE CHAMPIONS! ONE HUNDRED LITRES OF WATER PASS THROUGH THEM EVERY DAY
 AH YES, AQUAPORINS OBVIOUSLY



LIQUID STATES

SUCH A LARGE AMOUNT OF WATER CANNOT SIMPLY DIFFUSE ACROSS CELL MEMBRANES

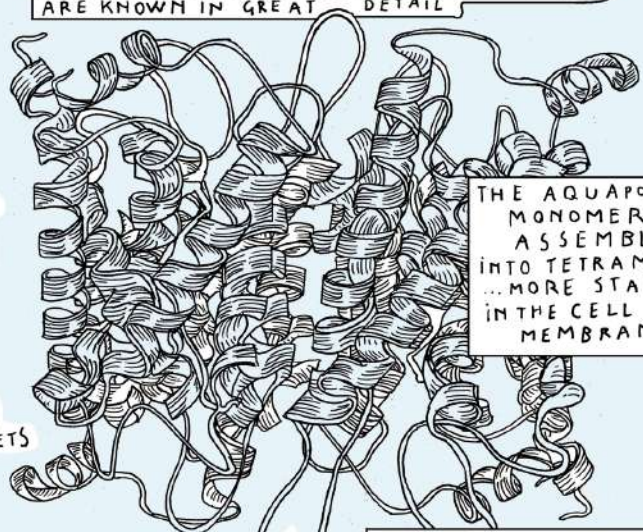
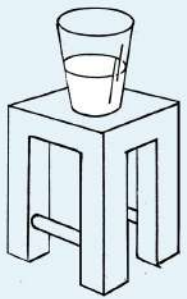
EVEN TODAY, AQUAPORINS ARE ONE OF THE RARE PROTEINS WHOSE STRUCTURE AND FUNCTION ARE KNOWN IN GREAT DETAIL

SCIENTISTS FOUND OUT QUITE BY CHANCE

PETER AGRE AND HIS TEAM HAD BEEN RUMMAGING AROUND BLOOD CELLS

WHEN THEY FOUND AN ODD PROTEIN LODGED IN THE CELL MEMBRANE WHICH LETS WATER PASS THROUGH IT

THE AQUAPORIN MONOMERS ASSEMBLE INTO TETRAMERS... MORE STABLE IN THE CELL MEMBRANE



A PORE: AQUAPORIN!

EACH MONOMER MEASURES ABOUT 30Å IN DIAMETRE AND 60Å IN HEIGHT

EACH TETRAMER FORMS FOUR PORES THROUGH WHICH WATER FLOWS

IN ONLY ONE DIRECTION AT A TIME

TETRAMER SEEN FROM ABOVE

NOT VERY PRACTICAL TO DRAW

A MOLECULE OF WATER, H₂O

BILLIONS OF WATER MOLECULES PASS THROUGH AQUAPORINS, ONE AT A TIME

HALFWAY THROUGH THE PORE, AMINO ACIDS...

...REACH OUT LIKE SMALL HANDS AND TURN THE WATER MOLECULES AROUND...

SO THEY COME OUT THE OTHER SIDE

OXYGEN FIRST...

IT'S REALLY VERY NICE AND A COOL DRAWING... BUT...

WHAT'S THE POINT OF REORIENTATING EACH MOLECULE OF WATER?

IN AN ORGANISM, THE RATIO OF POSITIVE CHARGES, OR PROTONS, MUST REMAIN THE SAME ON EACH SIDE OF A CELL MEMBRANE

THE PROBLEM IS PROTONS LIKE TO HITCH A RIDE ON THE BACKS OF WATER MOLECULES

WHEN THEY ARE RE-ORIENTATED, THE PROTON WIRE BREAKS AND ONLY THE WATER MOLECULES CROSS TO THE OTHER SIDE OF THE PORE

PROTON WIRE

BREAK CAUSED BY THE PIROUETTE

THE PROTONS GO BACK WHERE THEY CAME FROM

IT'S MAINLY WATER MOLECULES THAT TRANSIT THROUGH AQUAPORIN

NO, NOT YOU, GANG OF IONS!

WATER IS LIFE!

THANKS TO AQUAPORIN, WATER PASSES FROM CELL TO CELL

NOT ONLY IN HUMANS... BUT ALSO IN...

BACTERIA
SLUGS
MAGNOLIAS
LICHEN

BANANAS
MOSQUITOES, JELLYFISH
LICE
BAOBABS
CACTUSES

PTERODACTYLES

BEELES

FERNS

AND OYSTERS OF COURSE!

MY GIANT GROUPER

ELEPHANTS

SHAGGY INK CAPS

SALAMANDERS

HONEY FUNGUS

ALOYS'S DUCK

FOR KIDS (& OLDER KIDS) : FIND THE 22 FAMILIES OF LIVING BEINGS THAT ARE SHOWN... AND THEN COLOUR THEM IN!
VIVIANNE BAILLIE GERRITSEN & ALOYS LALO, 1 MAY 2022