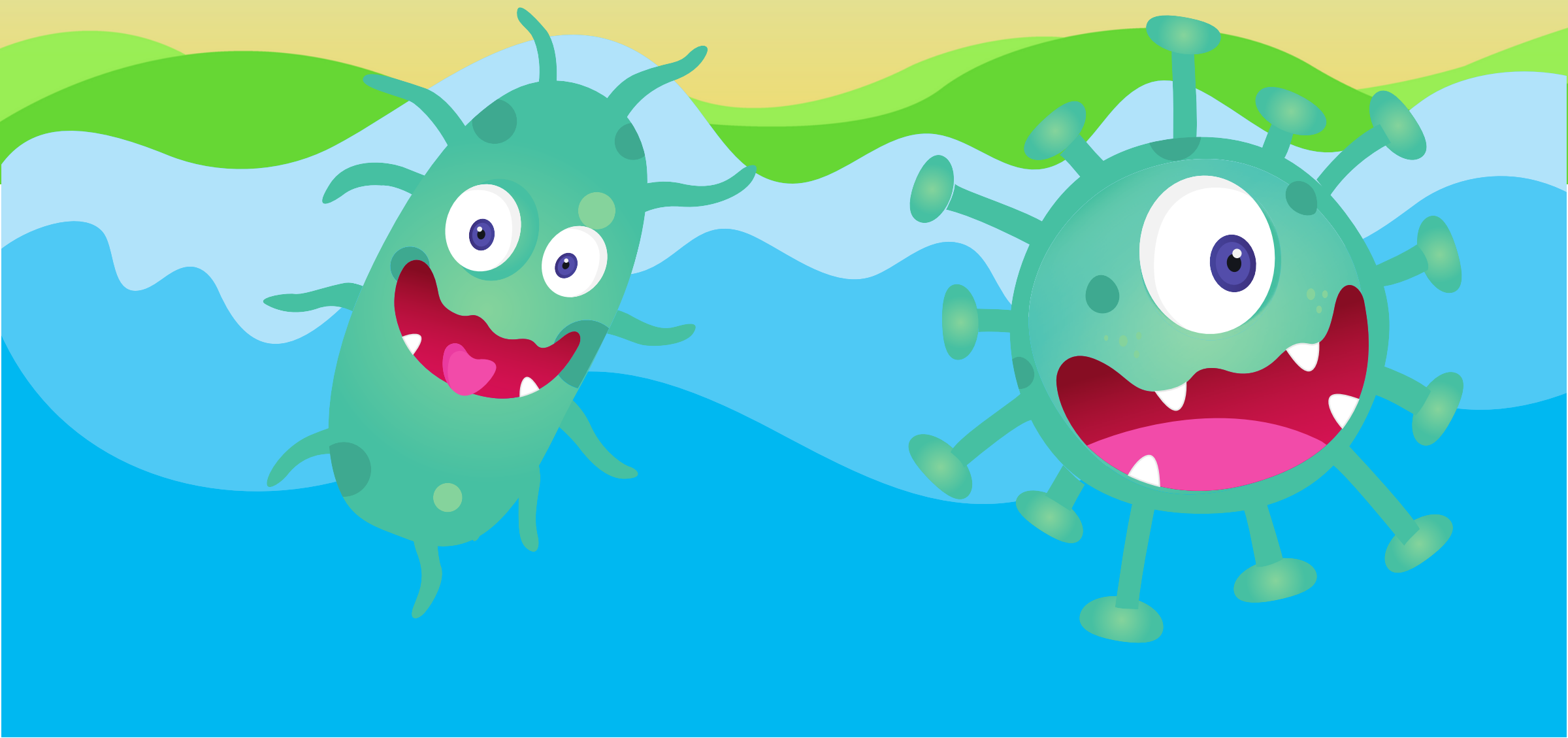
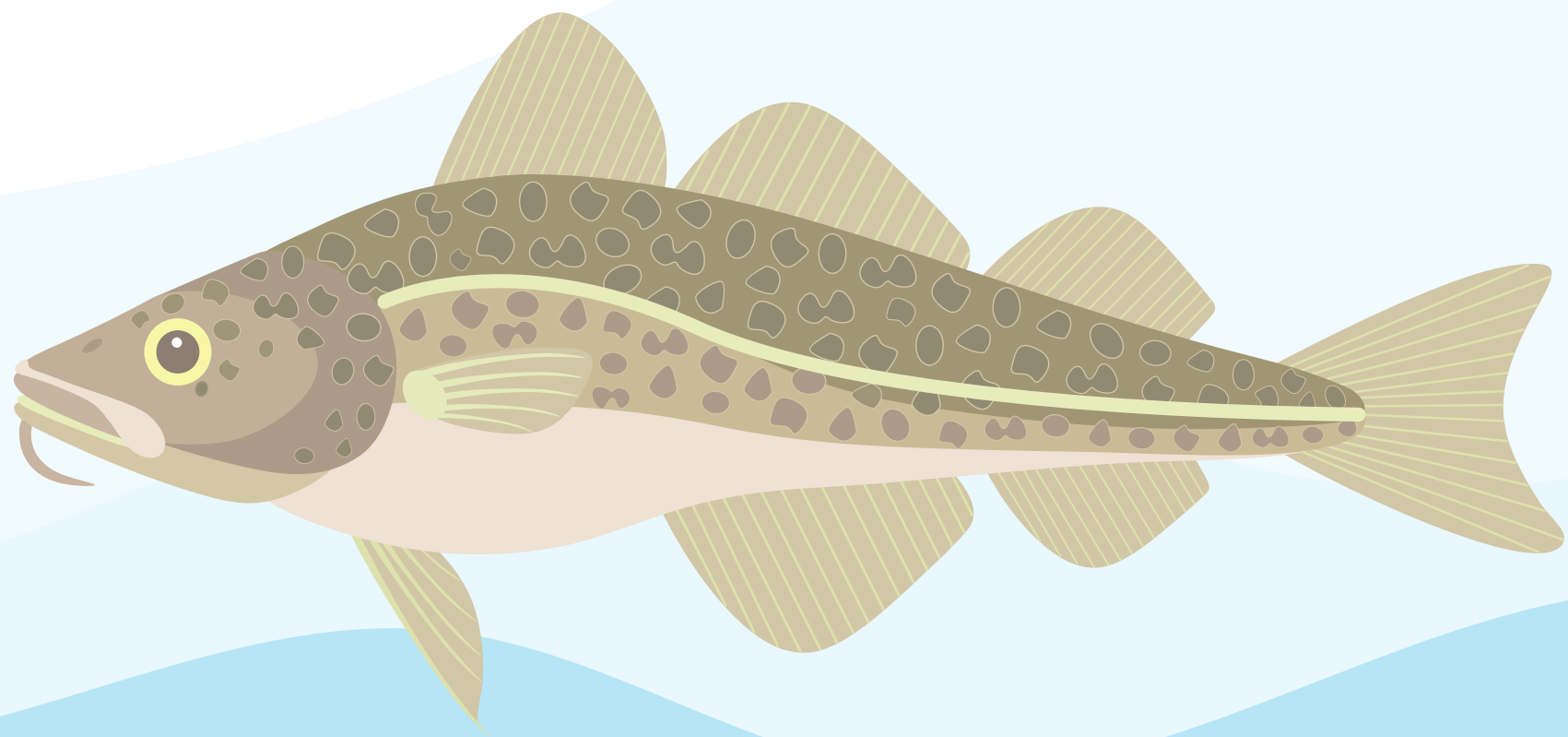


EXPLAINED FOR KIDS
BY TOBIAS STEUBE

CHEMICAL OXYGEN DEMAND





**MAYBE YOU HAVE HEARD OF COD BUT MOST
LIKELY YOU ARE THINKING ABOUT THE FISH.
HOWEVER, WHEN YOU THINK ABOUT FISH,
YOU MIGHT ALSO THINK ABOUT SMELLY
WATER. THAT'S WHERE WE START!**



**WHEN WATER IS SMELLY, WE TYPICALLY
FIND LOTS OF NATURALLY OCCURRING
ORGANIC SUBSTANCES IN IT.**

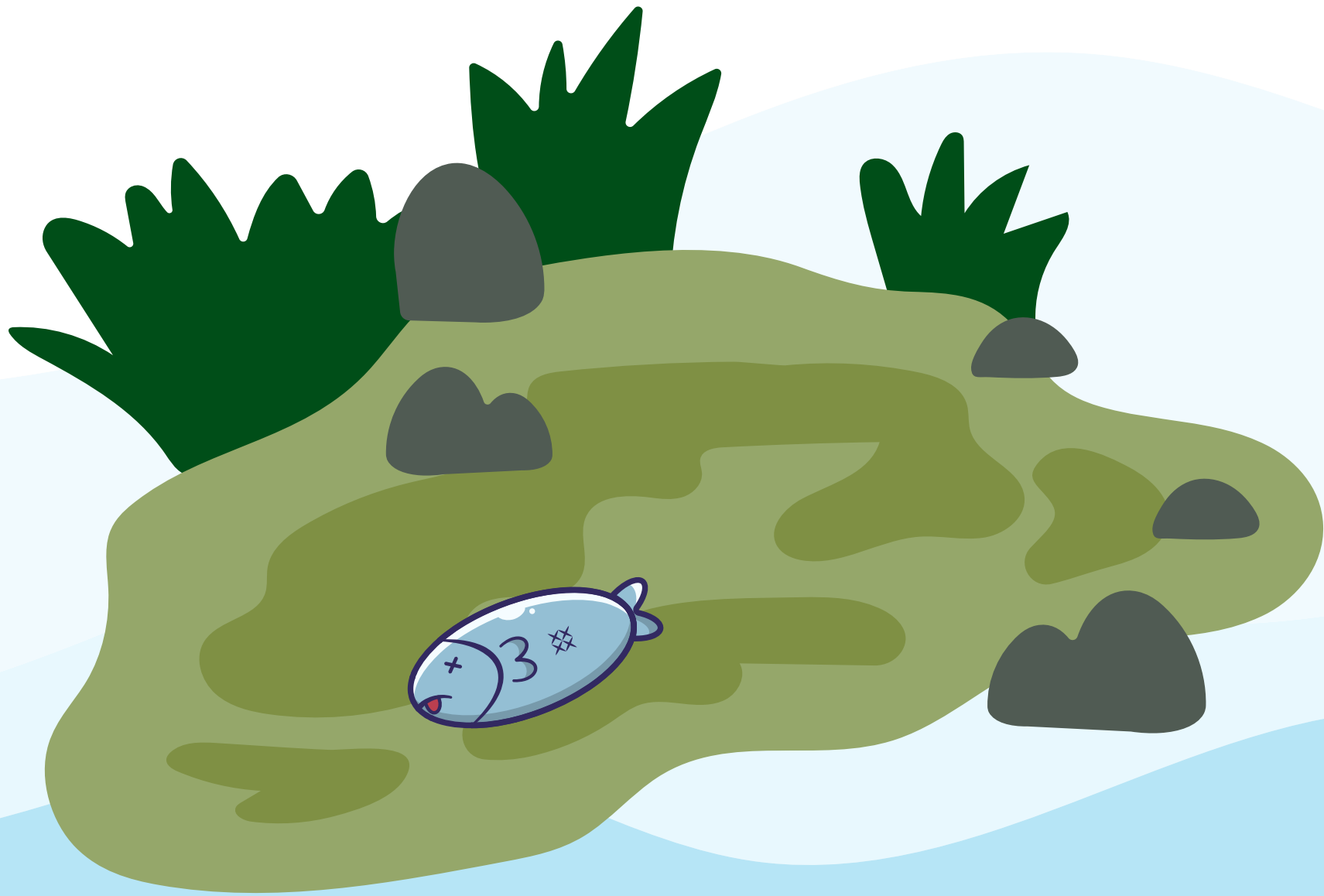


ORGANIC SUBSTANCES ARE FOOD FOR MANY MICROORGANISMS, WHICH ARE LIKE VERY, VERY TINY LIVING CREATURES. THEY CONSUME OXYGEN WHEN THEY EAT UP THE ORGANIC SUBSTANCES.



I'M SO HAPPY!

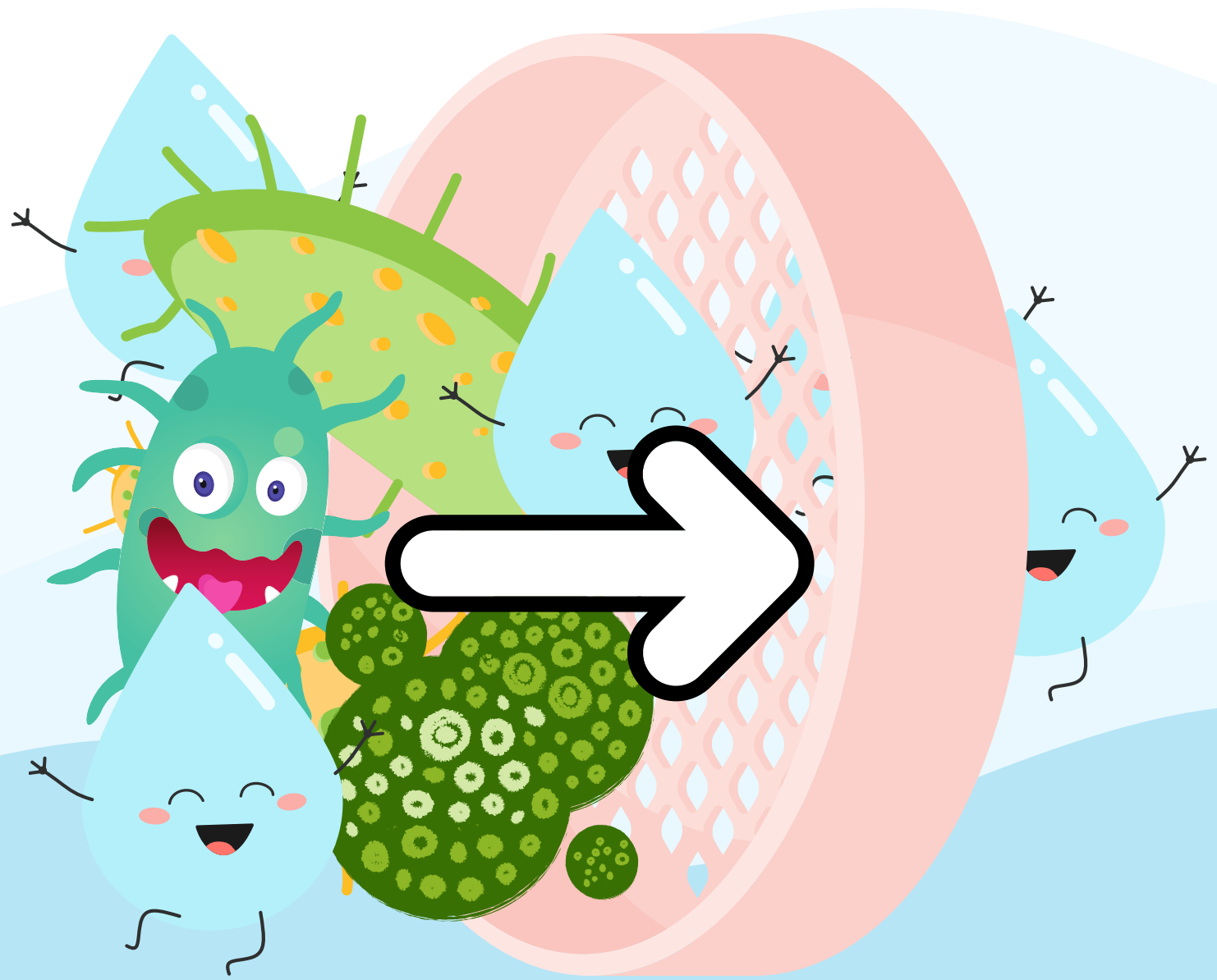
**WHEN THESE LITTLE MICROORGANISMS FIND
LOTS OF ORGANIC SUBSTANCES TO EAT, THEY
WILL ALSO CONSUME LOTS OF OXYGEN AND
THAT IS MAKING THE STINKY BACTERIA
HAPPY!**



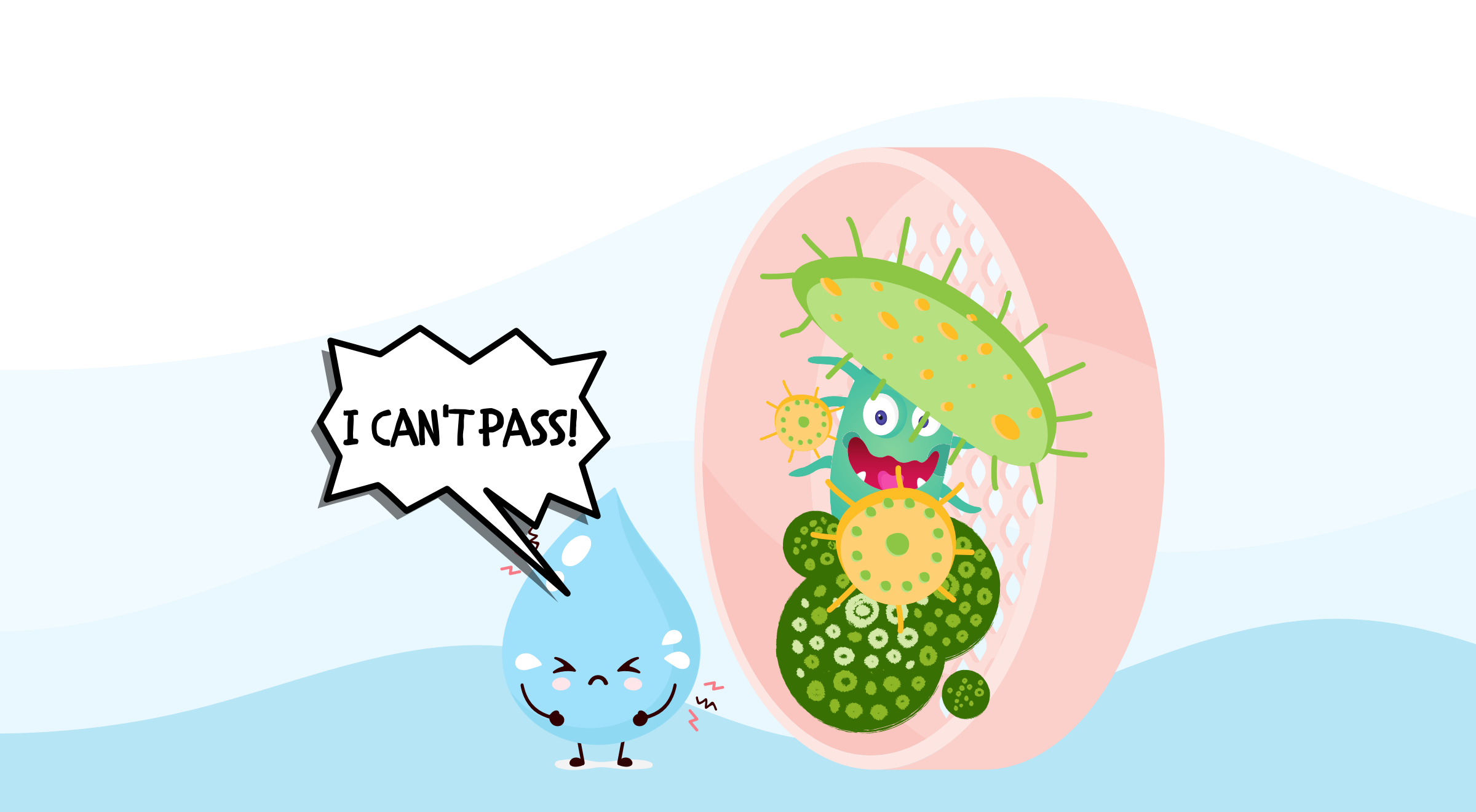
**WATERS WITH TOO MANY ORGANIC SUBSTANCES IN IT
COULD "OVERTURN". THAT MEANS, THAT A LAKE OR A
RIVER IS THROWN OUT OF BALANCE. IF THERE'S TOO
MUCH TO EAT FOR OUR MICROORGANISMS, THEY
CONSUME ALL THE OXYGEN AND FISH AND OTHER
ANIMALS CAN'T BREATHE ANYMORE.**



SO, IF THERE ARE TOO MANY ORGANIC SUBSTANCES IN WATER, IT WILL BE FOOD FOR MICROORGANISMS WHICH ARE BREATHING OXYGEN WHEN THEY EAT. DUE TO THE LACK OF OXYGEN, BACTERIA AND ALGAE START TO MAKE THE WATER STINKY. THAT'S WHY WE CAN LINK THE AMOUNT OF ORGANIC SUBSTANCES IN WATER TO A POOR WATER QUALITY.



IF WE WANT TO CLEAN WATER, WE USE SPECIAL FILTERS WITH VERY, VERY TINY HOLES - WHICH WE CALL PORES - THAT LET WATER PASS AND KEEP THE YUCKY STUFF OUT. WE CALL THEM MEMBRANE FILTERS.



I CAN'T PASS!

BECAUSE MEMBRANE FILTERS HAVE SUCH TINY LITTLE PORES, THEY ARE VERY SENSITIVE TO WHAT WE CALL FOULING. FOULING IS, WHEN ORGANIC SUBSTANCES ARE FILTERED WITH A MEMBRANE FILTER AND THEY STICK TO IT AND BLOCK IT. THEN, IT IS VERY HARD FOR THE WATER TO GET THROUGH.



**IF WE WANT TO AVOID FOULING ON OUR
MEMBRANE FILTER AND LOTS OF TROUBLE WITH
CLEANING OF OUR FILTERS, WE NEED TO
UNDERSTAND ABOUT THE WATER QUALITY BEFORE
WE START.**



WHEN WE ANALYZE WATER, WE COUNT HOW MUCH OXYGEN IS USED TO BREAK DOWN ALL THE YUCKY ORGANIC SUBSTANCES IN THE WATER. JUST LIKE YOU WOULD COUNT THE COOKIES YOU ATE TODAY, TO UNDERSTAND HOW HUNGRY YOU WERE. THE MORE OXYGEN WE NEED, THE HIGHER WILL BE OUR NUMBER. THIS IS WHAT WE CALL THE CHEMICAL OXYGEN DEMAND.



WHEN SCIENTISTS ARE CHECKING WHAT CHEMICAL OXYGEN DEMAND IS IN THE WATER, THEY ADD A SPECIAL MIXTURE OF CHEMICALS TO A SAMPLE TO BREAK DOWN THE YUCKY ORGANIC SUBSTANCES IN IT. THEN, THEY WILL HEAT UP THE SAMPLE, MAKE THE OXYGEN IN THE WATER REACT WITH THE CHEMICALS AND MEASURE HOW MUCH OXYGEN WAS USED UP DURING THE CHEMICAL REACTION.



**IF THERE ARE TOO MANY ORGANIC SUBSTANCES
IN THE WATER AND WE EXPECT TO SEE FOULING
ON OUR MEMBRANE FILTER. THEN, WE CAN GO
FOR A BIOLOGICAL TREATMENT WITH SPECIAL
BACTERIA THAT EATS PARTS OF THE ORGANIC
SUBSTANCES.**

BOD5

THEN, THERE IS ANOTHER NUMBER THAT SCIENTISTS ARE CHECKING. IT IS CALLED BIOLOGICAL OXYGEN DEMAND. THIS NUMBER HELPS US TO UNDERSTAND HOW MUCH OF THE ORGANIC SUBSTANCES CAN ACTUALLY BE EATEN BY THE BACTERIA. THIS NUMBER IS TYPICALLY USED TOGETHER WITH THE NUMBER OF THE CHEMICAL OXYGEN DEMAND.



**NOW, YOU ARE AN EXPERT. YOU HAVE
LEARNED HOW WE MEASURE WHETHER
WATER HAS A GOOD OR A POOR QUALITY AND
WHY WE NEED TO KNOW THAT BEFORE WE
FILTER IT WITH OUR MEMBRANE FILTERS.**



THAT'S WHY WATER AND WASTEWATER TREATMENT IS SUCH AN EXCITING FIELD. MAYBE, YOU WILL ALSO CHOOSE TO WORK IN THE MEMBRANE FILTRATION INDUSTRY ONE DAY AND HELP US TO KEEP OUR WATERS CLEAN.