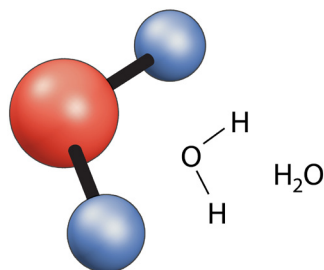


# A BESTIARY

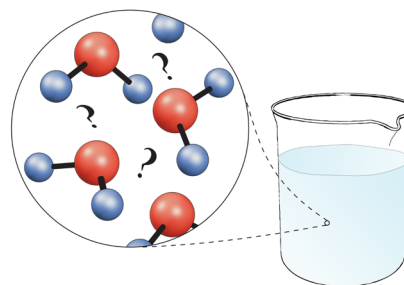
A READER'S GUIDE TO THE SPECIES THAT LURK  
WITHIN THE MYSTERIOUS AQUEOUS DOMAIN

## WATER MOLECULE



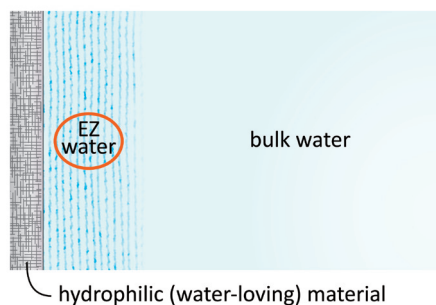
The familiar water molecule, composed of two hydrogen atoms and one oxygen atom.

## BULK WATER



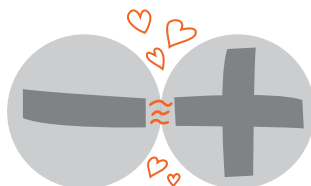
The standard collection of water molecules, whose arrangement is still debated.

## EXCLUSION ZONE (EZ)



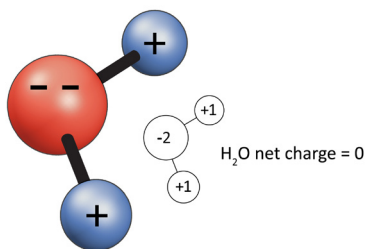
The “exclusion zone” is the interfacial zone of water that forms next to many submerged materials. Its character differs from bulk water, and it is surprisingly extensive. It is called the exclusion zone, or EZ, because it excludes almost everything that tries to enter. It also contains a lot of charge.

## ELECTRON AND PROTON



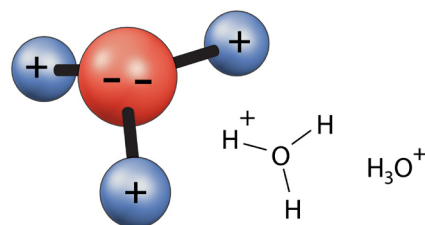
Electrons and protons are the elementary units of negative and positive charge. They attract one another because of their opposite charge. Electrons and protons play central roles in water's behavior — more than you might think.

### WATER—MOLECULE CHARGE



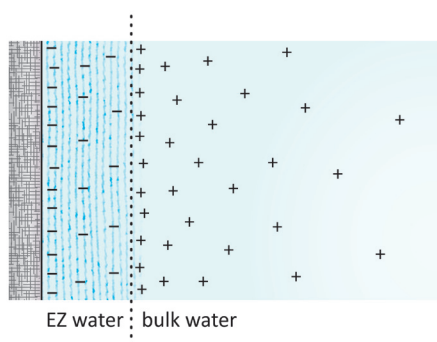
The water molecule is neutral. Oxygen is charged minus two, while each hydrogen is charged plus one.

### HYDRONIUM ION



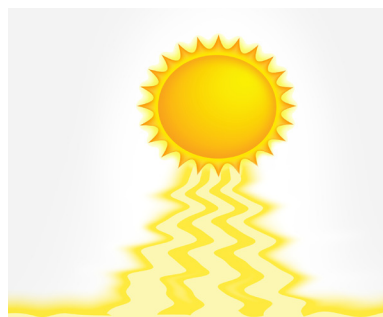
Protons latch onto water molecules to form hydronium ions. Imagine a positively charged water molecule and you've got a hydronium ion. Charged species like hydronium ions are highly mobile and can wreak much havoc.

## INTERFACIAL BATTERY



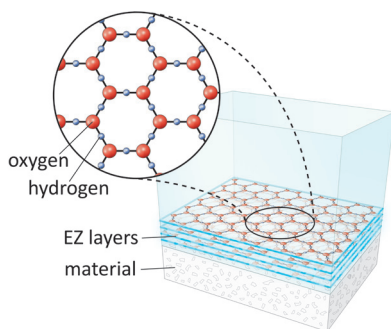
This battery comprises the exclusion zone and the bulk water zone beyond. The respective zones are oppositely charged, and the separation is sustained, like an ordinary battery.

## RADIANT ENERGY



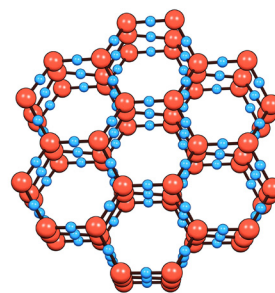
Radiant energy is the battery charger. The energy comes from the sun and other radiant sources. The water absorbs these energies and uses them to charge the battery.

## HONEYCOMB SHEET



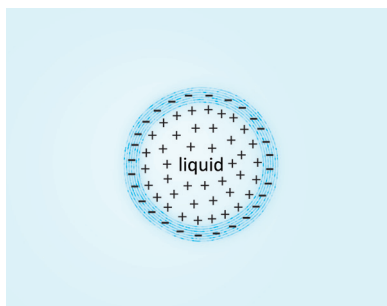
The honeycomb sheet is the exclusion zone's unitary structure. Sheets stack parallel to the material surface to build up the full EZ. Some people refer to the EZ as water's fourth phase, or fourth state, over and above solid, liquid and vapor.

## ICE



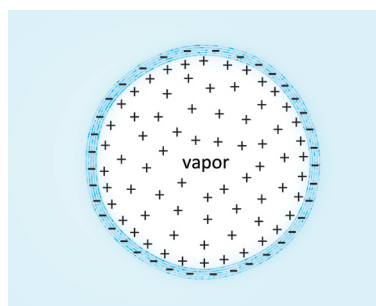
The atomic structure of ice closely resembles the atomic structure of the exclusion zone. This similarity is beyond coincidence: one transforms readily into the other.

## DROPLET



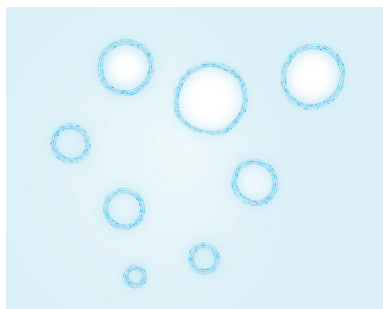
The water droplet consists of an EZ shell that envelops bulk water. The two components are oppositely charged.

## BUBBLE



The bubble is similar to the droplet except that the interior is gaseous. Commonly, that gas is water vapor.

## VESICLE



Since droplet and bubble are similarly constructed, we introduce the generic label: vesicle. A vesicle can be a droplet or a bubble, depending on the phase of the water inside. When a droplet absorbs enough energy it can become a bubble.