DIATOMS: A MICROSCOPIC WORLD OF WONDER

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We look around and see a world full of plants and animals, but our eyes are deceptive; is this really what our world is full of? Most of life on earth is microscopic. This immediately conjures up an image of bacteria and viruses but amongst the microorganisms is a striking group of single-celled organisms called diatoms, or Bacillariophyta if you want to give them their scientific name.

The special feature of diatoms is that each cell is enclosed in a complex, highly ornamented cell wall made not of organic compounds, as in most plants and algae, but of silica. Diatoms absorb dissolved silicate from the environment and transform it into elaborate solid structures forming many interesting shapes and patterns and it is on the basis of these patterns that we identify species.

Diatoms are a group of single-celled algae that photosynthesise—a process that converts sunlight into chemical energy which is then used by animals which feed on them. They are the unsung heroes of our planet, integral to life on earth. Their importance cannot be underestimated. Diatoms produce around the same amount of oxygen as all of the world's tropical rainforests combined, with around a quarter of all our oxygen being attributed to diatoms. Try to imagine a world without diatoms; it would be very different as they are responsible for every fourth breath that we take.

These tiny organisms are responsible for keeping the planet alive. They occur everywhere there is water, from the tropics to the poles, in freshwater and the seas and everywhere in-between. Some diatoms live as free floating cells in the plankton, while others are attached to rocks or hard surfaces. Some of my favourites are those that live in the sediments and fine muds of estuaries, like those found along the Sefton Coast. They are able to move around and there is nothing more captivating than watching these tiny things whizzing around the microscope screen in what appears to be a haphazard way.

Among the immense diversity of single-celled life, the diatoms stand out for their amazing variety; there are about 200,000 species, around the same amount as flowering plants. This makes them among the most species-rich lineages of the eukaryotes (plants and animals whose cells contain a nucleus and are organised into membrane-bound compartments).

Almost anywhere that there is a drop of water, you will find diatoms and they are extremely important for many animals as they form thbase of the food chain. We can't see these 'plants' without a microscope, yet because of their huge abundance they are of enormous ecological importance. Being single cells they respond rapidly to changes in the environment and scientists use diatoms as tools to assess the quality of water. By looking for the presence of key species, they are able to tell ifthe water body has been polluted or infer things about the chemistry of the water.

As diatoms are made from silica; once dead, their remains preserve extremely well in the sediments and can be used to map changes in our climate and environment. They can be used to reconstruct past histories and investigate climate change. In the study of lake and seabed sediments they can be used to estimate the pH and nutrient status of the water body back in time when the sediments were laid down. Following the death of a diatom, the empty cell wall may be deposited in the sediments of lakes and oceans where it can be preserved as a record of the past environments and climate changes; as such they are important fossils for the reconstruction of millions of years of the Earth's history. They can also be used by archaeologists and forensic scientists to establish cause and place of death. Given that diatoms have a key role in monitoring the environment, it is vital that we identify them correctly as misidentification could completely undermine the results and conclusions from a study.

Many people have no idea of the wonders and diversity of the diatoms that live within our waters. These diatoms are a hidden, rarely seen form of life and yet they underpin the whole marine food chain; they provide the world with oxygen and play a central role in the global carbon cycle.