



Life begins in the primordial oceans

Transcript: Video clip from *Wonders of Life*, episode one.

SCIENCE PRESENTER BRIAN COX:

These are pictures from deep below the surface of the Atlantic Ocean, somewhere between Bermuda and the Canaries.

And it's a place known as the Lost City. You can see why – look at these huge towers of rock, some of them 50 - 60 meters high, reaching up from the floor of the Atlantic and into the ocean. It's what is known as a 'hydrothermal vent' system. So, these things are formed by hot water and minerals and gasses rising up from deep within the Earth.

The reason it's thought that life on Earth may have begun in such structures is because these are a very unique kind of hydrothermal vent called an alkaline vent and about 4 billion years ago, when life on Earth began, sea water would have been mildly acidic. So here is that proton gradient, that source of energy for life. You've got a reservoir of protons in the acidic sea water and a deficit of protons around the vents.

And the vents don't just provide an energy source they are also rich in the raw materials life needs: Hydrogen gas, carbon dioxide and minerals containing iron, nickel and sulphur. Well there is more than that, these vents are porous. There are little chambers inside them and they can act to concentrate the organic molecules. You've got everything inside these vents. You've got concentrated building blocks of life trapped inside the rock. And you've got that proton gradient, you get that waterfall that provides the energy for life. So this could be where your distant ancestors come from. Places like these could be the places where life on Earth began.