

Aquatic Life

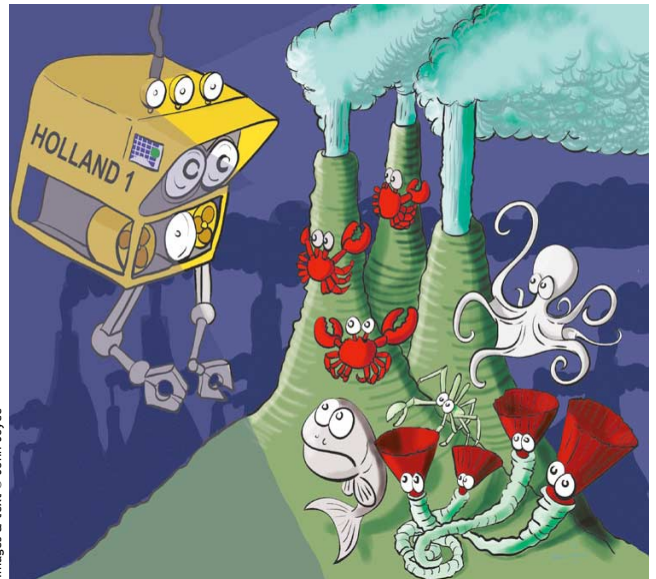
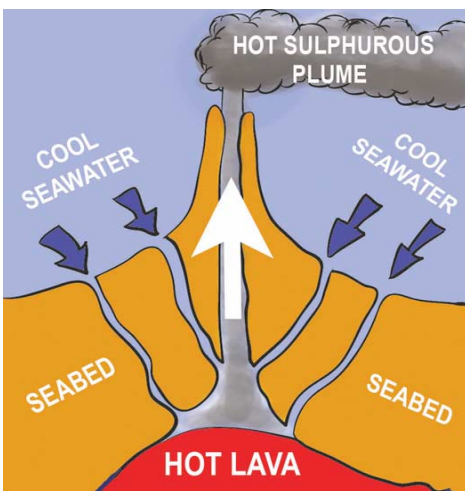
Life in Inner Space . . .

In August 2011 the Marine Institute's deepwater remotely operated vehicle (ROV), *Holland 1*, descended from the research vessel RV Celtic Explorer to a depth of three kilometres to film a field of 'black smokers' along the Mid-Atlantic Ridge. The expedition was led by University College Cork and filmed for the National Geographic Society's TV series *Alien Deep*.

Up until just over a hundred years ago, the view of science was that life could not exist in the deep oceans where sunlight could not penetrate. However, the area around the black smokers was teeming with life - from deepwater crabs and one-eyed shrimps that can 'see' heat in infrared to filter feeding worms and clams - not only in total darkness and tremendous pressure, but also at temperatures close to boiling point.

'Black smokers' are formed when cracks in the seabed around geological faults, such as the Mid-Atlantic Ridge, allow seawater to reach red hot volcanic material from the Earth's core. The resulting hot water, saturated with minerals, boils to the surface of the seabed in black,

smoke-like clouds of copper, zinc, gold, iron and other minerals, creating a unique environment of towering 'chimneys' which derives its energy not from sunlight, but from heat. Bacteria, which feed on minerals, form a slime that in turn is food for filter-feeding worms and molluscs. These larger animals in turn are food for deepwater crabs, fish, octopi and squid creating an entire alien ecosystem in super-heated, darkness.



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. . . and Outer Space

In 1989 the space probe Galileo surveyed Europa, one of Jupiter's moons, and found it to be covered in a sheet of ice. While the smoothness of the ice surface suggests that an ocean exists below it, nobody knows for sure if it is solid right the way through to the moon's surface or if it is simply a thin sheet covering a hidden sea - just as the ice at our planet's own North Pole covers the ocean below.

So far, no probes have actually landed on Europa but in 2022 the European Space Agency plans to launch JUICE - the Jupiter Icy Moon Explorer - to see if an alien ocean exists there.

Could it be, if JUICE is successful, that in some future mission to Europa, a specially adapted remotely operated vehicle like the Holland 1 will penetrate that moon's ice sheet into the ocean below?

And if it does, and if 'Black Smokers' exist there as they do on Earth, will the first extraterrestrial life we encounter in 'outer space' be a version of that which already exists in the 'inner space' of our deep oceans back here on our home planet?

