- Lakes



ENVIRONMENT

WHY IS THE DEAD SEA DEAD?

This huge body of water is largely lifeless because of one crucial factor

WORDS AILSA HARVEY

The Dead Sea, located between Israel and Jordan, is a landlocked lake with a salt concentration so high that it holds no visible life. It has the lowest elevation of any body of water on Earth at more than 400 metres below sea level. It began its formation around 3 million years ago, when Earth's tectonic plates moved apart beneath the region. This caused a depression in the land, which filled up with seawater as it was connected to the Mediterranean Sea. However, over the next million years, further tectonic activity caused the land to the west of the Dead Sea to lift upwards, separating the Dead Sea from the coastline and turning it into a lake. Being isolated meant that the Dead Sea's water was now trapped. Water could evaporate out of the basin, but the salt was left behind.

The Jordan River, which connects to the Dead Sea, deposits minerals into the basin. With low rainfall and high evaporation rates, over time the salt level has accumulated and become hypersaline. This means it is much saltier than the other seas, killing any fish, plants and other animals that end up in its waters. In this incredibly salty water, bathing tourists find that they are extremely buoyant. This happens because the salt makes the water much more dense than their bodies and holds them up in the water.

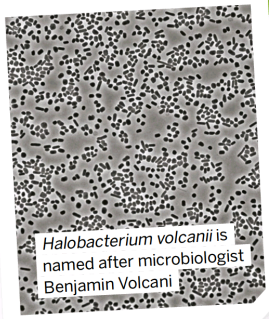
SEA SEPARATION

How the Dead Sea has changed over recent years



1972: UNIFIED BASIN

The water level of the Dead Sea has fluctuated over time. In these images, the darker shades of blue show deeper water. In 1972 the Dead Sea comprised one basin, with the southern part beginning to split into a separate basin.



Halobacterium volcanii is named after microbiologist Benjamin Volcani

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EXTREMOPHILES ONLY

Not many life forms can survive in the Dead Sea, but it's not completely dead. Some single-celled microorganisms thrive in the high-salt environment. These are called halophilic organisms, and they have evolved to survive in places where other life can't. Many halophilic bacteria produce organic compounds called osmolytes that prevent water loss from their cells. One species of bacteria that has been found in a sample from the Dead Sea is *Halobacterium volcanii*. This bacterium contains proteins that remain stable in high-salt conditions.

DID YOU KNOW? The Dead Sea's salt concentration is ten times higher than the ocean's



2 1989: BASIN SEPARATION

The Dead Sea lies over a tectonic plate boundary, where the African and Arabian plates meet. The tectonic activity, caused by Africa and Asia slowly pulling apart from each other, altered the shape of Earth's crust in this region. This, alongside a reduction in water level, caused a southern basin to split from the Dead Sea.



3 2011: PLOTTING SALT PANS

People turned the southern basin into salt evaporation pools for the mining of sodium chloride and potassium salts. These salts can be used to make widely used materials such as polyvinyl chloride, a high-strength synthetic plastic.

Did you know?

The Dead Sea has 34 per cent salinity



'Salt mushrooms' are made when rings of rectangular salt crystals form on top of the pyramidal stems of hexagonal-structured crystals

IT'S SHRINKING

The Dead Sea itself is dying, with the water level dropping around one metre every year. Compared to its condition just 50 years ago, the sea is about 15 per cent shallower and has a third of the surface area. Part of this change is human-impacted as water that would naturally replenish the Dead Sea is diverted elsewhere. The surrounding areas of Israel, Jordan and Syria are largely dry landscapes, so the region's natural water sources are needed for irrigation and drinking water. At the edges of the Dead Sea, where salty water used to lie, there are mesmerising salt sculptures that have dried in place, including pebble and chimney shapes. The different mineral ions in the Dead Sea cause salts to naturally crystallise into a range of structures.



The Dead Sea is so buoyant, visitors feel as if they're sitting on the water

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