ICEBERGS ARE HOTSPOTS FOR LIFE

The iceberg now has a reputation as an cold murderous force of nature, sinking both ships and Leonardo DiCaprio. But a new study shows that icebergs are not harbingers of death but hotspots of life.

In the late 1980s, about 200,000 icebergsroamed across the Southern Ocean. They range in size from puny ‘growlers’, less than a metre long, to massive blocks of ice, larger than some small countries.

They may be inert frozen lumps, but icebergs are secretly in the business of nutrient-trafficking. As the ice around Antarctica melts in the face of global warming, some parts break free from the parent continent and strike out on their own. As they melt, they release stored minerals into the water around them, and these turn them into mobile homes for a variety of life.

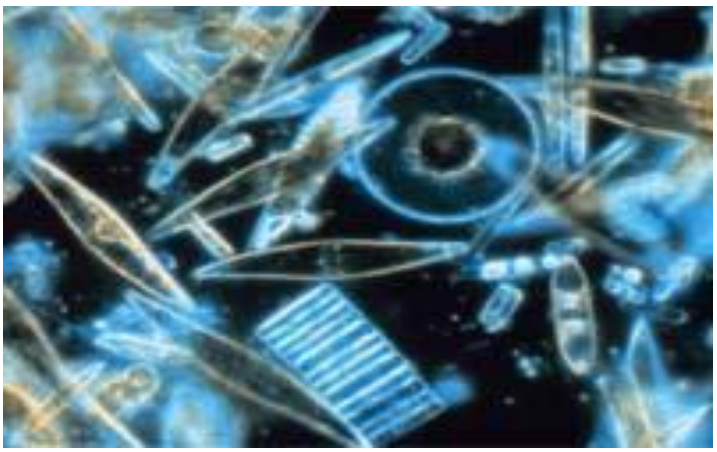
A tale of two icebergs

Kenneth L. Smith Jr, from the Monterey Bay Aquarium Research Institute, and other scientists from San Diego discovered the true extent of these icy ecosystems by studying two icebergs floating in the Antarctic Weddell Sea.

Even the smaller of the two, W-86, has a surface area larger than 17 football pitches. The larger one, A-52 was over a thousand times bigger, with a surface area of 300 km^2 and extending 230 metres into the freezing waters.

Smith and crew identified the duo through satellite imaging, and tracked them down by boat. Their ship spiralled around the blocks of ice collecting water samples as it went, from a dangerously close distance of a few hundred feet to a safer five miles away.

Hotspots for life



The skies above the two icebergs were patrolled by seabirds, including Cape petrels and Antarctic fulmars. Below the water, Smith explored the

icebergs' undersides with a remote-operated vehicle and found them teeming with life.

Below W-86, he saw a lattice-like surface, and the ridges of these were home to diatoms(right). These single-celled algae are part of thephytoplankton, microscopic creatures that make their energy from the sun and form the basis of the ocean's food web. In between these diatom-covered ridges, baby icefishand segmented worms swam among the lattice's nooks and crannies.

A-52 was even more varied, with large caves extending deep into the iceberg's core. The team found diatoms here too, along with Antarctic krill (below), small shimp-like animals with a taste for diatoms. Among these were various invertebrates – comb jellies, colonial jellyfish-like animals called siphonophores, and predatory torpedo-shaped worms called chaetognaths.

Further out, the area immediately around the iceberg was void. But just beyond that, the ice was encircled by another halo of phytoplankton. These creatures, along with the diatoms on the ice itself, were thriving on the nutrients released by the melting ice, such as iron.

When Smith exposed diatoms to tiny mineral-rich particles filtered from his collected water samples, they grew slowly and steadily, while other diatoms cultured in normal water did not.

These drifting islands of ice were dragging entire communities along with them. As they drift and melt, they release small amounts of important nutrients. That triggers the growth of creatures at the bottom of the food chain and provides the foundations for larger animals like krill and seabirds. A-52 alone enriched a massive ring of water about the size of the Isle of Man.

To estimate the effect of other icebergs, Smith used satellites to count the number of bergs in a sample area. Within this space, the satellites spotted almost a thousand individual icebergs that, together, covered less than 0.5% of the ocean's surface. But even this small amount was enough to enrich over 39% of the Southern Ocean!

Icebergs and climate change

By providing support for phytoplankton, the icebergs were also inadvertently helping to mitigate the effects of climate change. Just like land plants, phytoplankton make their own energy through photosynthesis. And just like land plants, they absorb carbon dioxide to do so. By eating the phytoplankton and excreting the remains, krill cause carbon to fall down into the ocean depths in a rain of droppings.

So even as their parent continent melts and releases carbon into the atmosphere, icebergs serve to draw planet-warming carbon away from the air and transfer it to the deepest sea. Smith believes that climate modellers need to take this into account to better predict the effects of melting Antarctic ice.

The disappearing ice can reveal underlying rock which absorbs more heat, hastens melting and releases even more trapped carbon – this is known as ‘positive feedback’. But as the ice melts, icebergs break off and these help to suck in carbon from the atmosphere – this is ‘negative feedback’. The next task is to understand how these two processed balance out.

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