

Jellyfish have superpowers – and other reasons they don't deserve their bad reputation

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People rarely enjoy meeting a jellyfish. On the beach they appear limp, amorphous, and blistered in the sun. In the water it's often a brush of a



tentacle on exposed skin followed by a sting. They hardly evoke the serene elegance of a turtle or the majesty of a breaching humpback whale. But despite making a poor first impression, jellyfish are among the most unusual animals on Earth and deserve a second chance to introduce themselves.

They're survival masters

Jellyfish are among the most abundant organisms in the sea. <u>Recent</u> <u>research</u> suggests there are about 38m tonnes of them just in the mesopelagic, the upper 200 metres of ocean. What's more, they are common in all oceans and have colonised the majority of marine habitats including the deep sea.

One reason they are so common is that contrary to appearances, a body made from jelly is a very successful strategy. Gelatinous bodies have evolved independently three times and have existed, largely unchanged, for at least 500m years, surviving all five major extinction events in the Earth's past that wiped out 99% of all life.

They have super powers

Many jellies have evolved unique abilities, some of which seem almost supernatural. <u>Comb jellies</u> produce mesmerising bio-luminescent displays. One tropical species has formed a <u>symbiotic relationship with</u> <u>photosynthetic algae</u>, which act like their own personal solar panels and let them obtain energy straight from the sun. Other species can produce copious amounts of offspring: large moon jellyfish females have been witnessed releasing over <u>400,000 young at a time</u>.





Very successful jelly.

The pièce de résistance is surely their second chance at youth. When conditions are unfavourable, certain species including compass, barrel, and moon jellyfish can <u>reverse their development</u> and effectively turn back into jelly-children in order to wait out the hard times.

They have an amazing childhood

Many jellyfish belonging to the class scyphozoa have a remarkable and complex life cycle. These different life stages are so different they were thought to represent <u>entirely different species</u> for a long time. Adult jellyfish reproduce sexually, releasing thousands of babies known as



planulae into the plankton. Planulae spend a handful of days floating around before settling on hard substrata such as rocks, or artificial surfaces such as concrete <u>or plastic</u>.

Each planula then develops into a polyp, a small (2mm-3mm), stationary lifeform that feeds off floating bits of plankton. These polyps reproduce asexually, forming a colony of clones. When the time is right, the clones undergo a process known as strobilation, which transforms each one into something that looks like a stack of pancakes. One by one, they are then released into the surrounding plankton.

Although only a few millimetres in size, and lacking the obvious characteristics of an adult, the "pancakes" are in fact tiny jellyfish. Eventually they will mature into sexually reproducing adults and begin the cycle anew (assuming they don't reverse develop if conditions are bad).

Depending on the species, a polyp can produce one, a handful, hundreds or even thousands of jellyfish at a time, sometimes over a period of many years. The combination of the amazing reproductive ability of adult jellyfish, coupled with the asexual reproduction of polyps, is thought to be one of the reasons why vast swarms, known as blooms, of jellyfish can apparently <u>appear out of nowhere</u>.

They have been a boon for mankind

Jellyfish can undoubtedly cause <u>ecological and economic problems</u> for humans. Mass outbreaks of jellyfish can overrun fish farms, block cooling pipes of power stations, burst fishing nets and damage tourist businesses. Their stings can also cause a severe allergic reaction <u>known</u> <u>as anaphylaxis</u> and even kill people. But jellyfish are also a source of <u>medical collagen</u>, which can be used in wound dressings or reconstructive surgery, and they are considered a <u>delicacy in Japan and</u>



China.



Credit: AI-generated image (disclaimer)

But the greatest jellyfish contribution to humankind must be the green fluorescent protein (GFP), a common biomarker synthesised from crystal jellies. GFP allows scientists to monitor how certain genes work in real time, and has proved invaluable in medical research, being used in well over 30,000 studies including the study of HIV and Alzheimer's disease. As such, the scientists behind the synthesis of GFP were awarded the Nobel prize in chemistry in 2008. Jellyfish may well have started the villain, but to many scientists around the world, they have become the inadvertent hero.



They remain a fascinating mystery

There is still so much to discover about these amazing organisms. There is a lot of evidence to suggest jellyfish numbers are increasing in certain areas due to <u>climate change and overfishing</u> of other species. This has lead to the idea they <u>may be increasing worldwide</u>. However, at present, we simply <u>lack the hard data to say with any confidence</u> what is happening to the majority of these populations.

Another mystery is the actual role jellyfish play in ecosystems. Until recently it was thought that jellyfish may not be eaten by anything aside from the occasional turtle or sunfish, and they <u>didn't make</u> a significant contribution to the food chain. This prompted concerns that as jellyfish populations swelled there would be no natural control, and ecosystems may become jelly-dominated.

This concern is not totally trivial and a jellyfish-dominated ecosystem seems to have established off the coast of Namibia. But new analytical techniques involving acoustics, marine cameras, chemical analysis and DNA analysis have shown a variety of species actually do eat jellyfish. This means jellyfish likely play a more important role in marine ecosystems than previously thought. Documenting and understanding this is a top priority for jellyfish researchers.

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