

Genetic study of immortal jellyfish may help explain its longevity

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Juvenile medusae of *Turritopsis dohrnii* collected from polyps of Santa Caterina, Nardò, Italy. Credit: Maria Pascual-Torner

A team of researchers at Universidad de Oviedo in Spain reports

findings that could explain how the jellyfish *Turritopsis dohrnii* is able to live, at least in theory, forever. In their paper published in *Proceedings of the National Academy of Sciences*, the group describes sequencing the genome of the jellyfish and a close mortal relative to see if they could spot pertinent differences.

Prior research has shown that *T. dohrnii* begin their life as a larva drifting around in the sea. At some point, they attach themselves to the seabed and shortly thereafter begin to sprout as [polyps](#). Next, they repeatedly clone themselves as a means of forming a [colony](#). Once mature, the colony then begins producing mature medusas. Most other [jellyfish](#) reproduce in the same way, but their story ends there—if the colony runs into trouble, it can die. But when *T. dohrnii* runs into trouble, things are different. One of the medusas can morph into a cyst, similar to its original polyp, and stick itself to the [bottom of the sea](#) in a new location and restart the whole cycle. Because it reproduces via cloning, the creature never actually dies—some version of itself continues to live on, possibly indefinitely.

In this new effort, the researchers wanted to know how the jellyfish is able to recycle itself. To find out, they captured samples and conducted [whole genome](#) sequencing. Once they had the whole genome, they did the same for a very close relative of *T. dohrnii*, *Turritopsis rubra*, which is not immortal. Then they looked for the differences in the genomes that allowed one to live forever while the other perished when trouble arose.



Polyp of *Turritopsis dohrnii* from a colony generated by a single rejuvenated medusa. Credit: Maria Pascual-Torner

The researchers found that *T. dohrnii* had double the number of genes associated with gene repair and protection as *T. rubra*. And it also had mutations that allowed for stunting [cell division](#) and for preventing telomeres from breaking down. The researchers also noted that during the time when the jelly was metamorphosing, some genes related to development changed back to the state when the jelly was still just a polyp.

More information: Maria Pascual-Torner et al, Comparative genomics of mortal and immortal cnidarians unveils novel keys behind rejuvenation, *Proceedings of the National Academy of Sciences* (2022).

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