



### Why do puffer fish build sand castles?

The white-spotted puffer fish (*Torquigener albomaculosus*) found off the coast of Japan occupies itself with making a circular pattern on the sea floor. It burrows and scurries around to make a temporary base in the sand, astonishingly accurate in its geometry, hoping for the attention of another puffer fish intrigued by such a display. Once complete, the fish has to tend to it continuously, as the moving tide will gradually wear away at the sandy ridges and even out the troughs, until all signs have vanished along with the hopes of meeting another. The fish dedicates itself to its small construction site, and ignores the surrounding void. There is no boundary — no wall — between this little perimeter of calm and the vast ocean. This is eternity for the fish, because it could never swim far enough to know that all the oceans are connected.

There is a limit to how we as human beings can understand our place in time. We have our understanding of 'now', forever presenting itself yet never remaining still for us to be aware before it's already moved on. How do we fathom how this 'now' fits into the grand idea of 'time'? We remember what happened yesterday and plan for tomorrow. We are told our birthday and can guess what will be our last decade. We read books about history. We carbon date. Telescopes look to the farthest reaches of the known universe, to where we will go to escape a messy planet. The irony of searching deeper into this abyss for a solution, is that the further we look, the further into the past we're seeing. We run theoretical models of our beginnings to predict how this will all end, give or take a few million years. Giant telescopes are perched upon mountains, located far away from light-polluting cities, meaning that to even begin looking for a way out we are already leaving civilisation behind. For the time being we have no choice but to stay, wishing upon stars we increasingly can't see.

The movement of time is rarely perceived as slow but rather sudden, because the realisation of change only occurs upon recognition of a difference. And by definition, these changes have to be significantly different enough from the present. They can be as significant as tracing *Homo sapiens* through our evolutionary branch to a different species, or as significant as throwing out leftovers from the fridge because they're from Sunday and it's Thursday, and that means they're five days old not two.

Hypothetically, if the little puffer fish could swim far enough, setting off in one direction around the globe it would eventually meet up again at the same point. All signs of its creation would now be gone, eroded by the shifting tide. How would the fish understand that the floor comes back around to meet itself? Similarly, what if time did not have a beginning and an end but looped in this way? Harold Ramis' *Groundhog's Day* (1993) depicts a world in which a 'short' loop has comedic results, starting over every morning, conveniently with previous memory still intact. The moral in *Groundhog's Day* is that we can learn from our mistakes, but only if we still remember them. But what if this time loop was longer than memory, generations, or recorded history? And that time is constantly writing over itself, slowly churning, erasing all identifiable marks of the past? A time loop longer than species, longer than the lifespan of the suns and planets themselves?

The fish that once lived, becomes sediment on the seabed, written over by new matter and later dredged to the surface to be reincarnated as plastic. In 2018 researchers found a plastic bag in the Mariana Trench, the deepest point on the surface of the planet. Perhaps the bag had been trying to return itself, prevented however by the vast lifespan of its current incarnation, far greater than any of its previous lives. The metaphor of something being a drop in the ocean would apply here, except the amount of drops are such that they've already seeped their way into our diet. In the past few years recent surveys have shown nearly all sea salt sold in UK supermarkets contains microplastics. I switched to buying Himalayan rock salt, as I figured the rock being mined is older than humankind and therefore would contain no plastic. It formed along the edge of the super continent Gondwanaland approximately 600 – 450 million years ago, predating the earliest dinosaurs by 200 million years.

Steve Bishop