Coral reef knowledge

for the International Year of the Reef 2018

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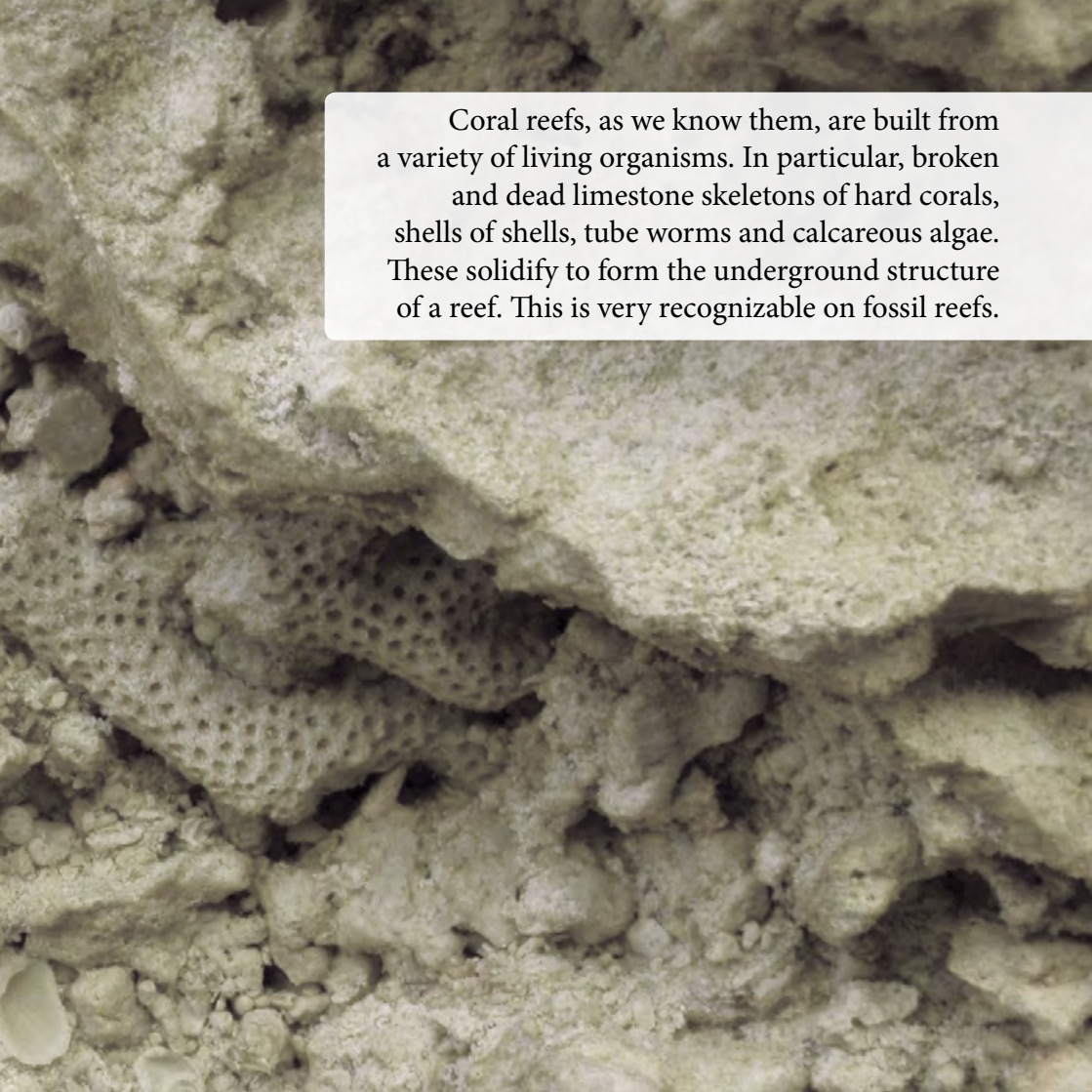
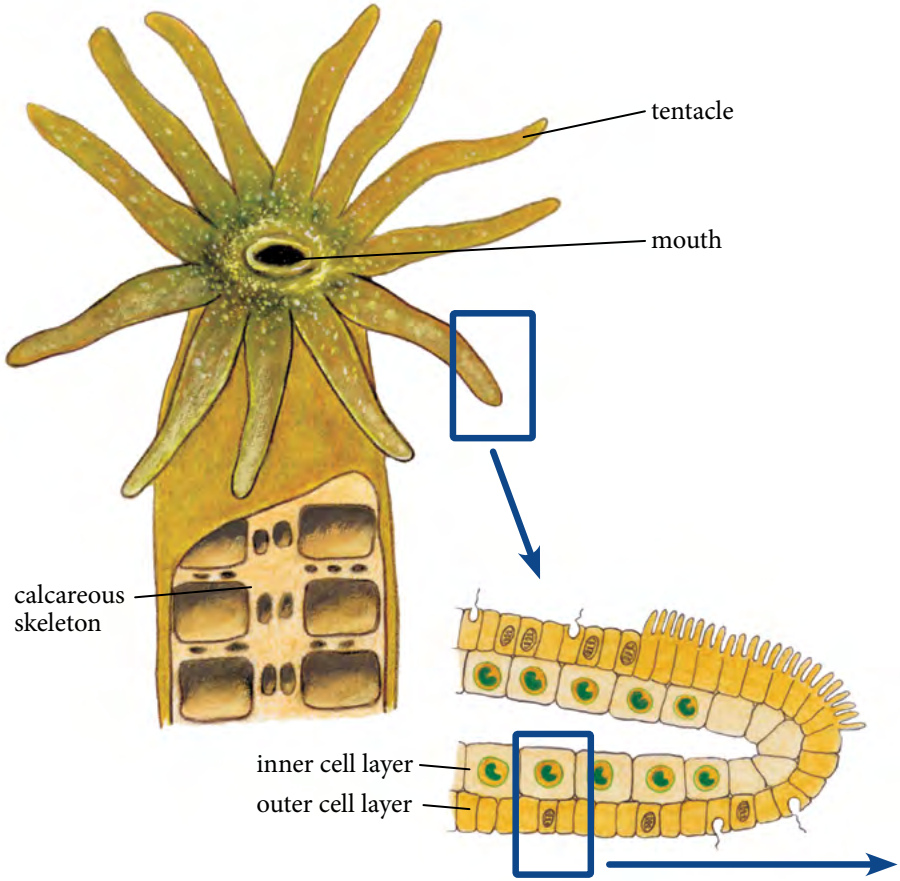
Coral reefs

are the most beautiful and most spectacular habitats of our planet. With an overwhelming variety of living organisms – estimated at over a million species.

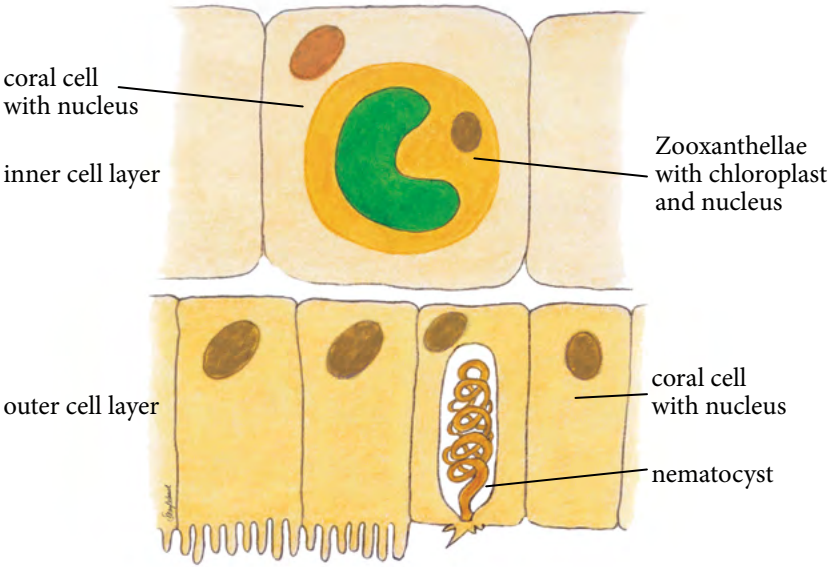
The first reef-like structures are about 2 billion years old and were built from bacteria and blue-green algae.
They composed of dense mats in which sediment particles become captured. A solid structure is gradually emerged.



Coral reefs, as we know them, are built from a variety of living organisms. In particular, broken and dead limestone skeletons of hard corals, shells of shells, tube worms and calcareous algae. These solidify to form the underground structure of a reef. This is very recognizable on fossil reefs.

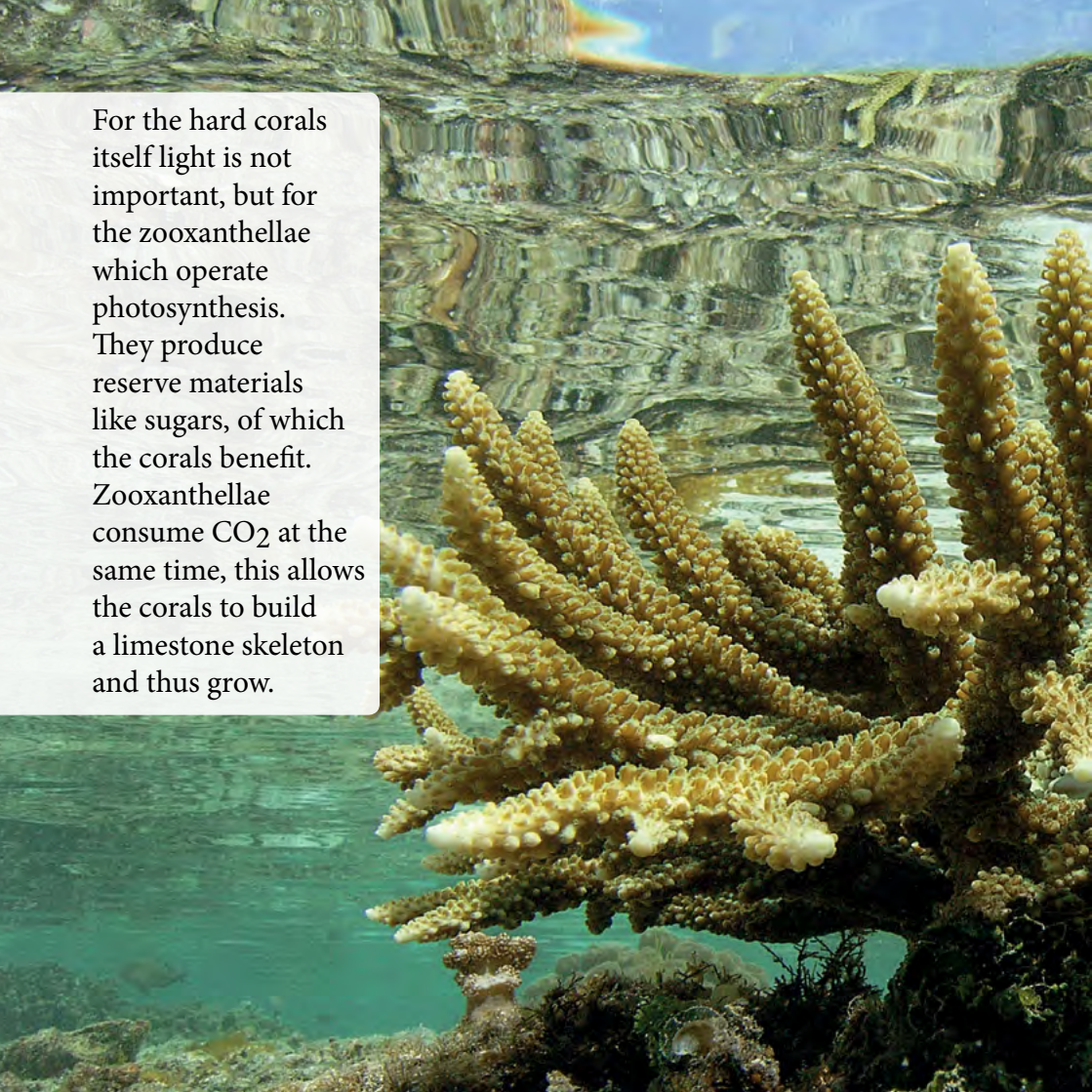

tentacle
mouth
calcareous skeleton
inner cell layer
outer cell layer

Corals are animals which consist of two layers of cells that cover the self-produced calcareous skeleton. The nematocysts are present in the outer cell layer. The zooxanthellae are small protozoa, they live in the inner cell layer.



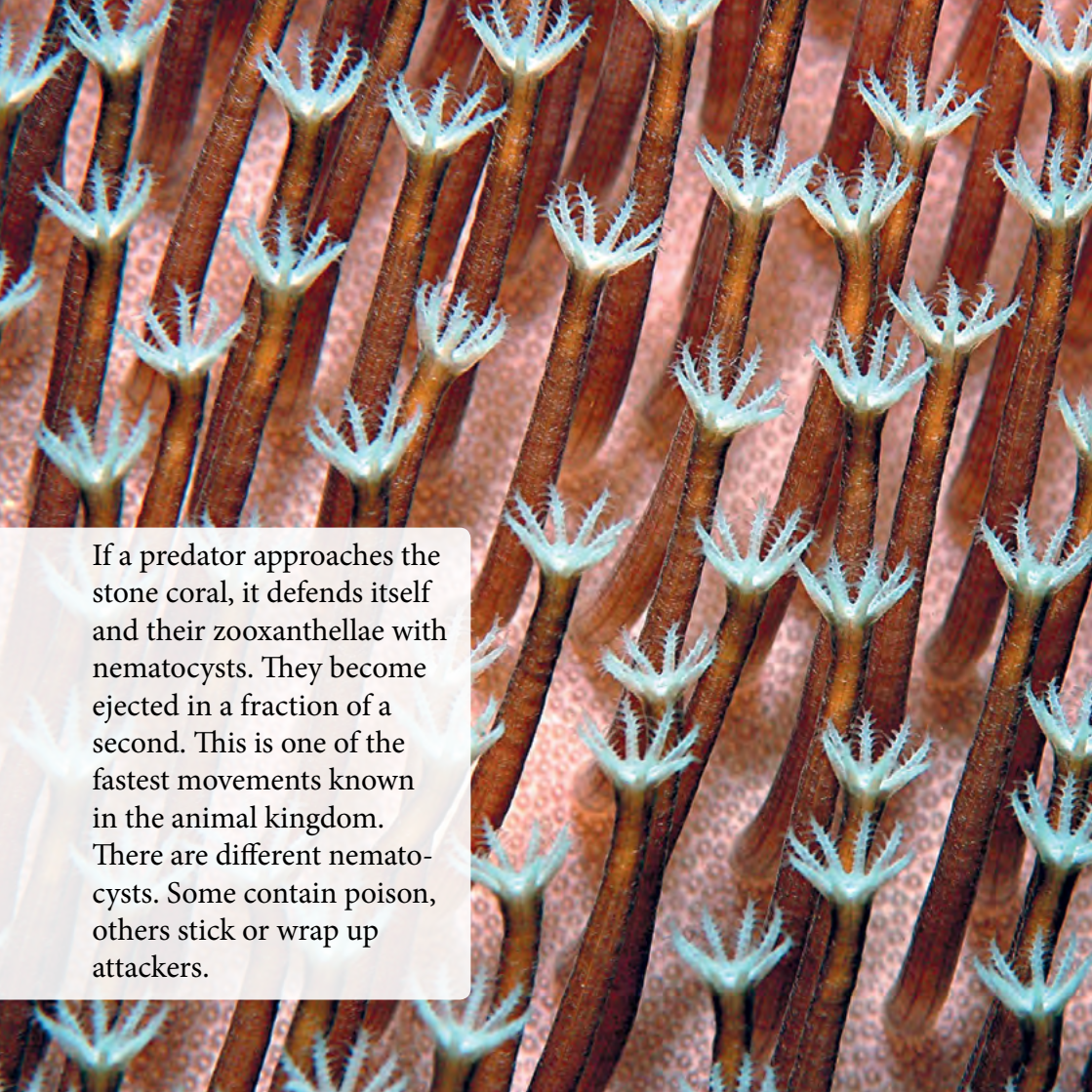
A coral reef grows only a few millimeters per year. But single stony coral species can grow very fast. Some other coral species grow up to 40 cm per year.

The fastest growing hard corals are on the top in shallow water depths, flooded with light. The massive corals like the salad corals grows very slowly.



For the hard corals itself light is not important, but for the zooxanthellae which operate photosynthesis. They produce reserve materials like sugars, of which the corals benefit. Zooxanthellae consume CO_2 at the same time, this allows the corals to build a limestone skeleton and thus grow.

The zooxanthellae also benefit from this symbiosis. They receive some metabolic products from the stony corals which act as 'fertilizer' and they are protected in the coral tissue.



If a predator approaches the stone coral, it defends itself and their zooxanthellae with nematocysts. They become ejected in a fraction of a second. This is one of the fastest movements known in the animal kingdom. There are different nematocysts. Some contain poison, others stick or wrap up attackers.

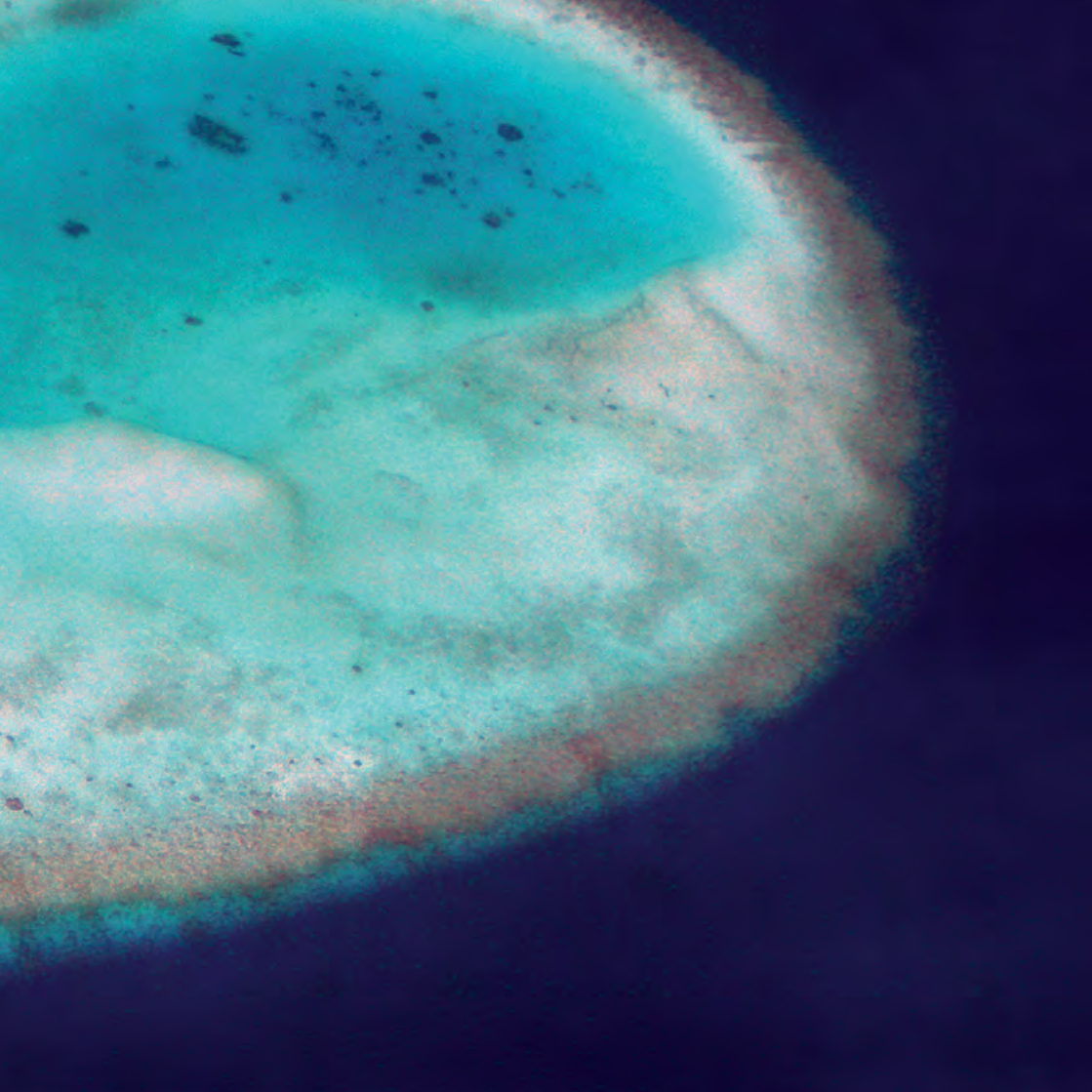
These nematocysts are also used to feed the corals. Especially at night, the small coral polyps are stretched into the water to catch food.

On interaction with the other reef builders, stony corals build large coral reefs over millennia. The Australian Great Barrier Reef is more than 2,300 kilometers long. The second largest barrier reef is after all, more than 200 km long and in front of Belize. The barrier reefs are mostly in the open sea and grown with the rising sea level.

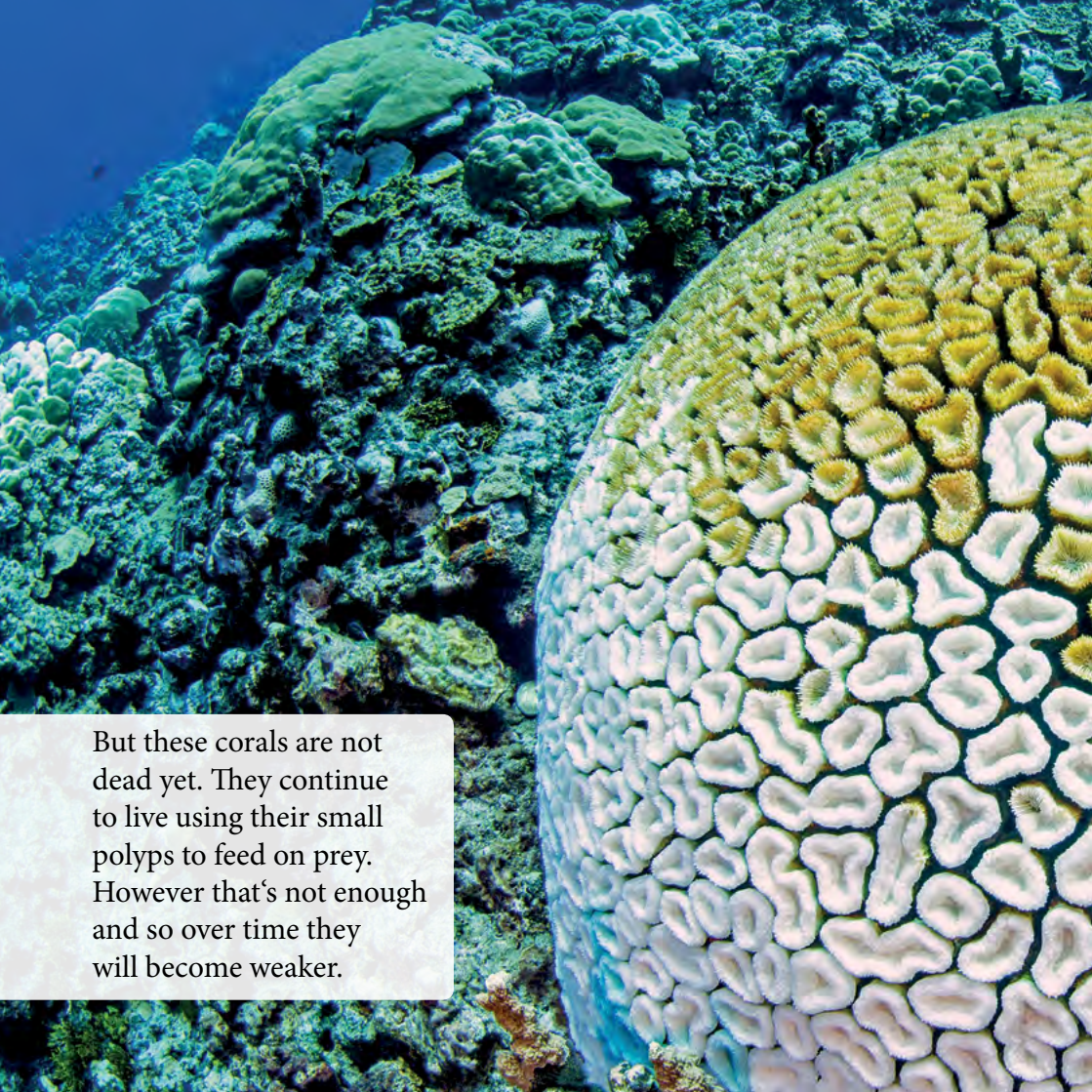
Fringing reefs arise along a coastline and grow slowly out into the sea. They can form a lagoon with coral sand by dismantling the coral skeletons between the beach and the reef slope.

Fringing reefs are the most common reef types, especially in the Red Sea, Southeast Asia, the Indian Ocean and the Caribbean.

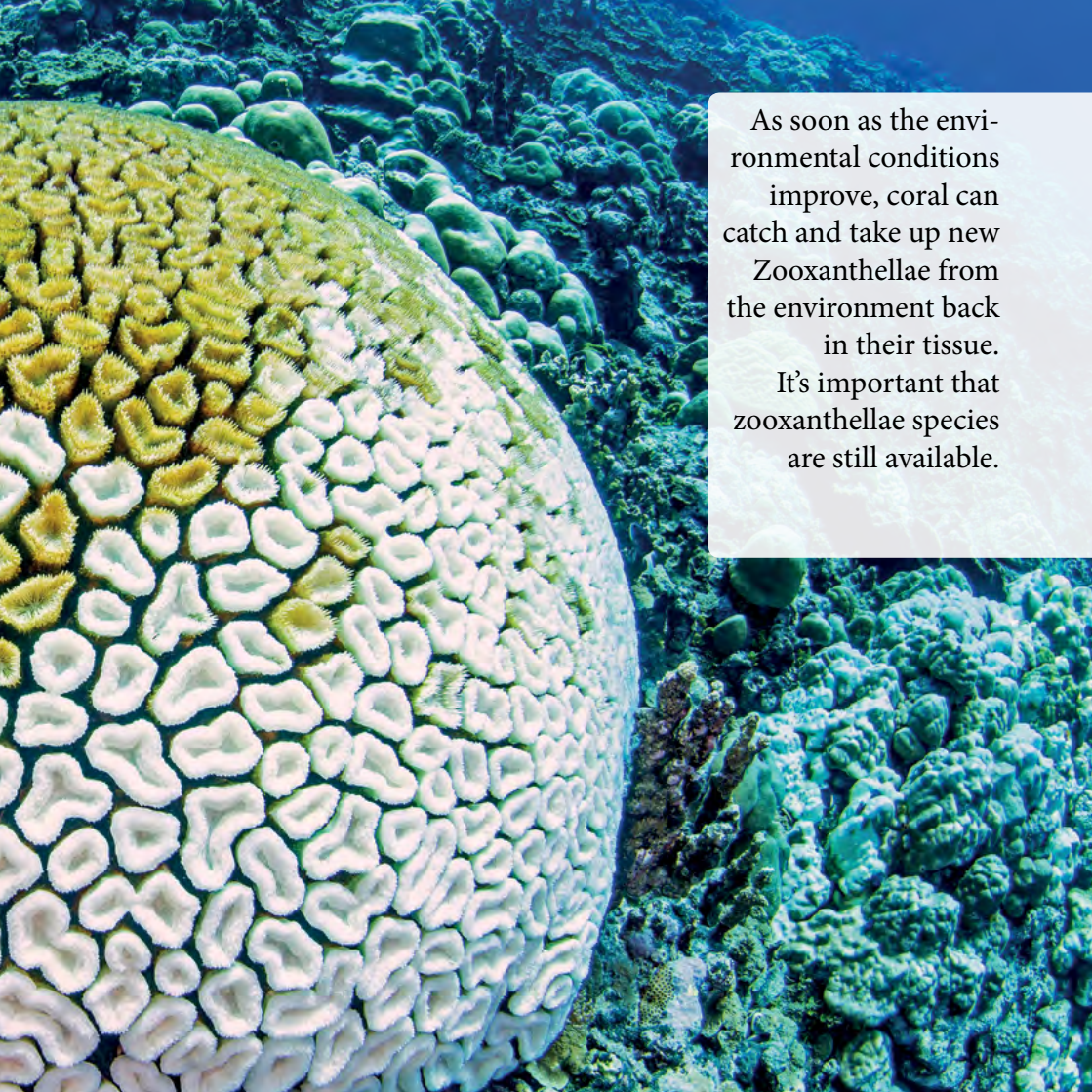
An atoll is the coral ring of an earlier fringing reef around a sunken island. The sinking of the island happens over millennia, so it slowly forms a lagoon in the middle. The most famous atolls are the Maldives or in the South Seas.



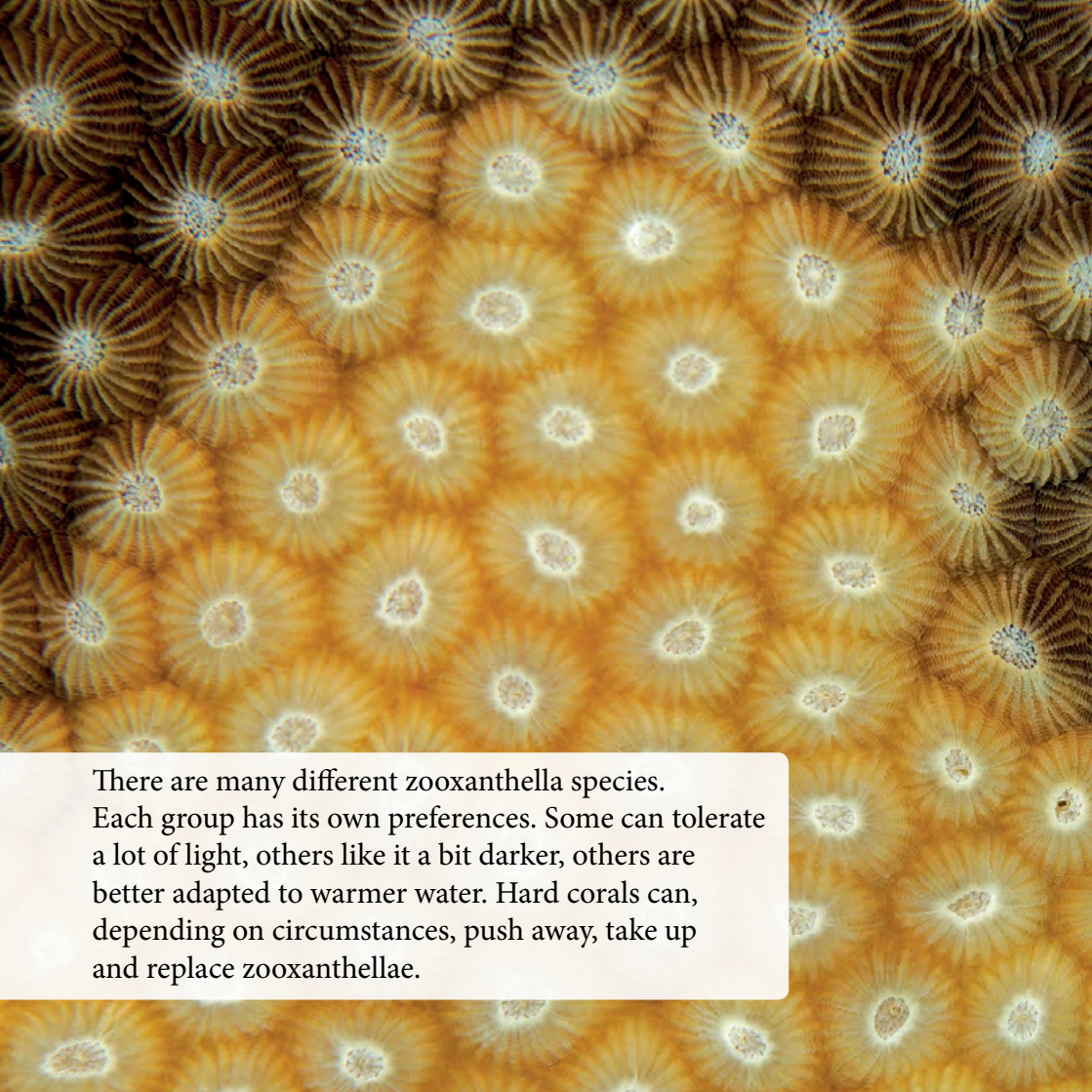
If hard corals are stressed, then they throw the zooxanthellae out of their tissues. This can be a reaction to warm water, strong UV radiation, pollutants in the water or diseases. As the living tissue of the stony coral largely is colorless, you can see the white calcareous skeleton which is known as coral bleaching.



But these corals are not dead yet. They continue to live using their small polyps to feed on prey. However that‘s not enough and so over time they will become weaker.



As soon as the environmental conditions improve, coral can catch and take up new Zooxanthellae from the environment back in their tissue. It's important that zooxanthellae species are still available.

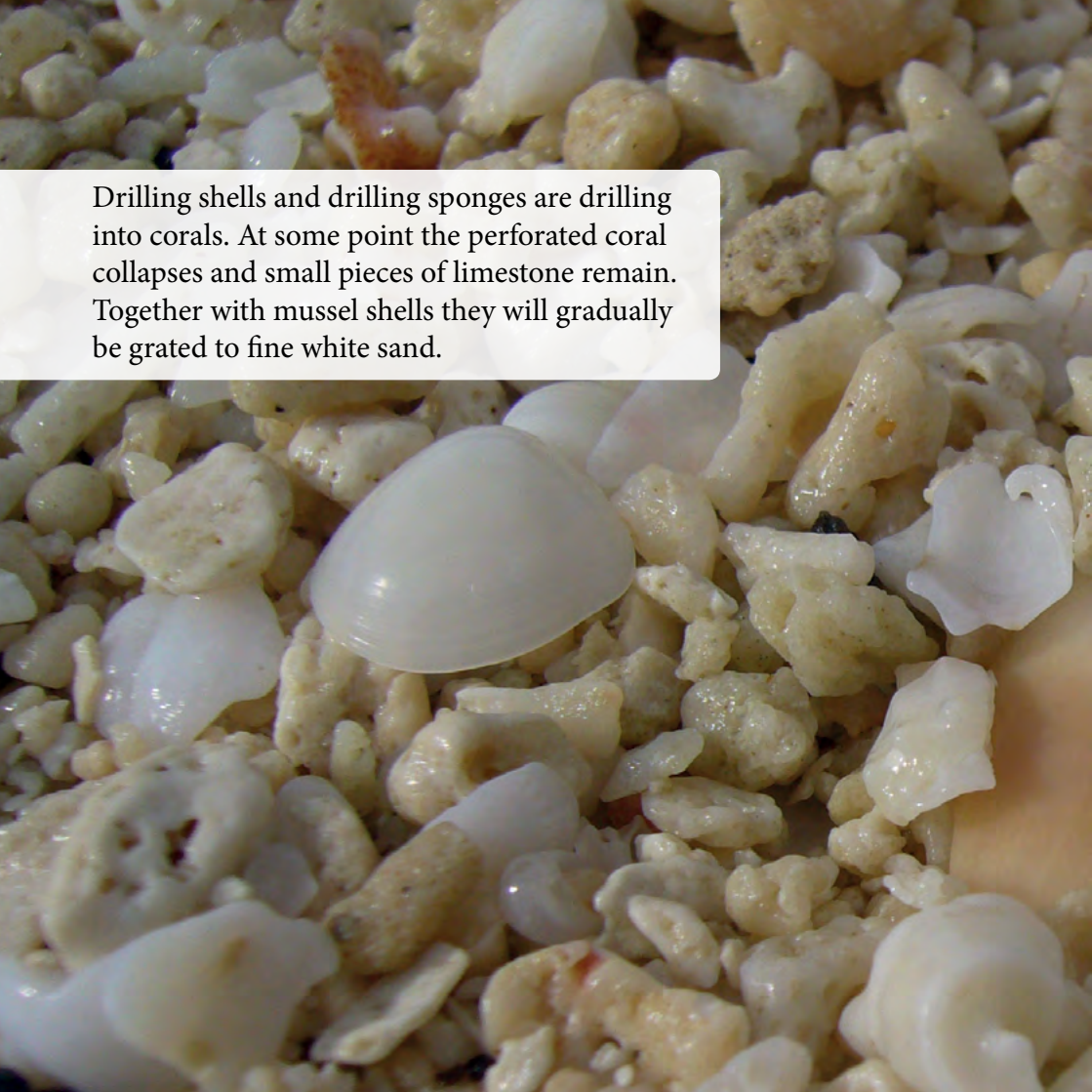


There are many different zooxanthella species. Each group has its own preferences. Some can tolerate a lot of light, others like it a bit darker, others are better adapted to warmer water. Hard corals can, depending on circumstances, push away, take up and replace zooxanthellae.

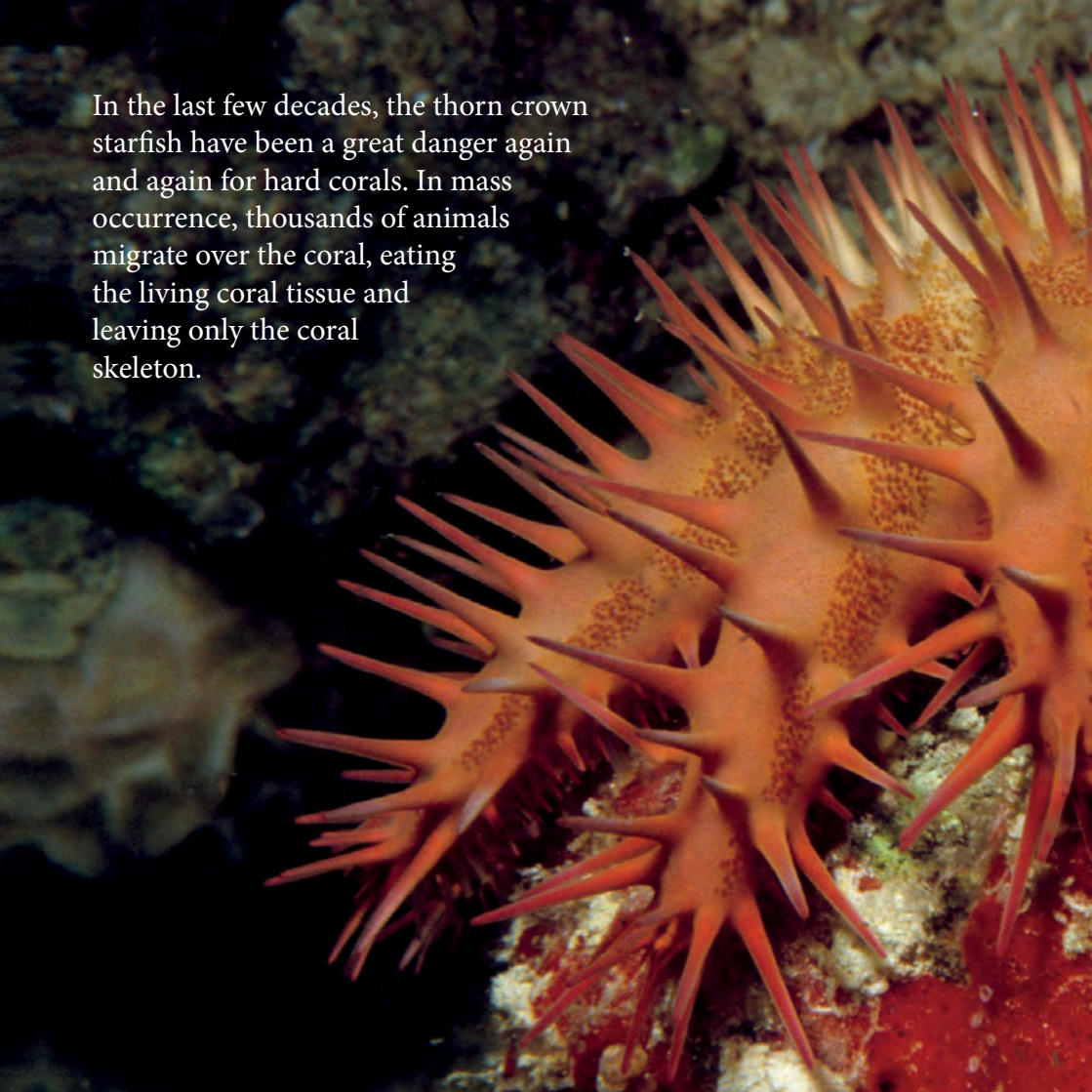
Although zooxanthellae can swim through the water themselves, they are usually transported by butterfly fish to their new homes. Butterfly fish eat coral polyps. However, not all zooxanthellae are digested. When the fish are swimming over other corals the feces fall down with the zooxanthellae and can be taken up.

When environmental conditions do not improve, algae cover corals like a dense carpet, leading to their deaths.

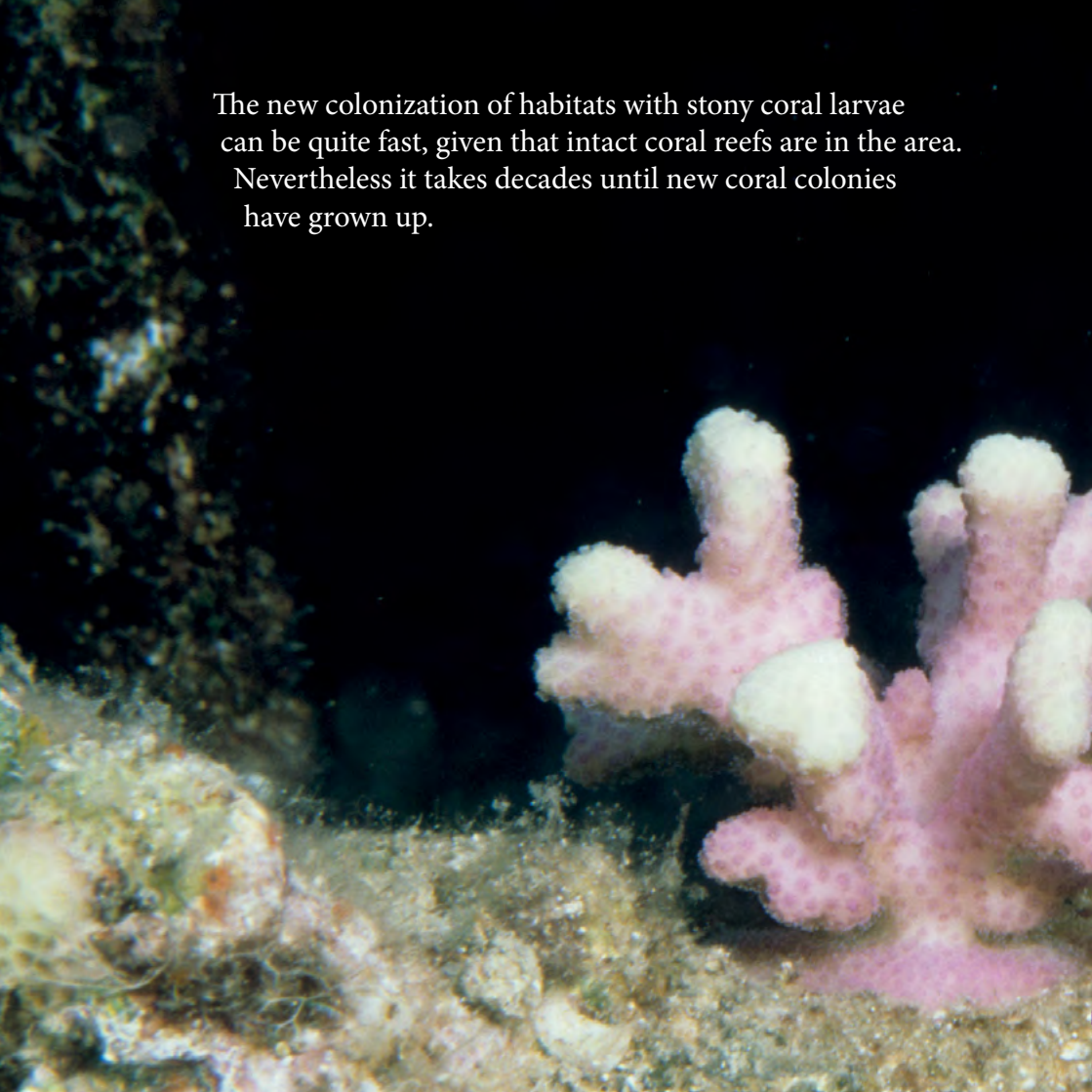
Algae-eating fish, such as parrotfish, or sea urchins make their way over the overgrown coral. When they are gnawing the algaes, the coral skeletons also become crushed.



Drilling shells and drilling sponges are drilling into corals. At some point the perforated coral collapses and small pieces of limestone remain. Together with mussel shells they will gradually be grated to fine white sand.

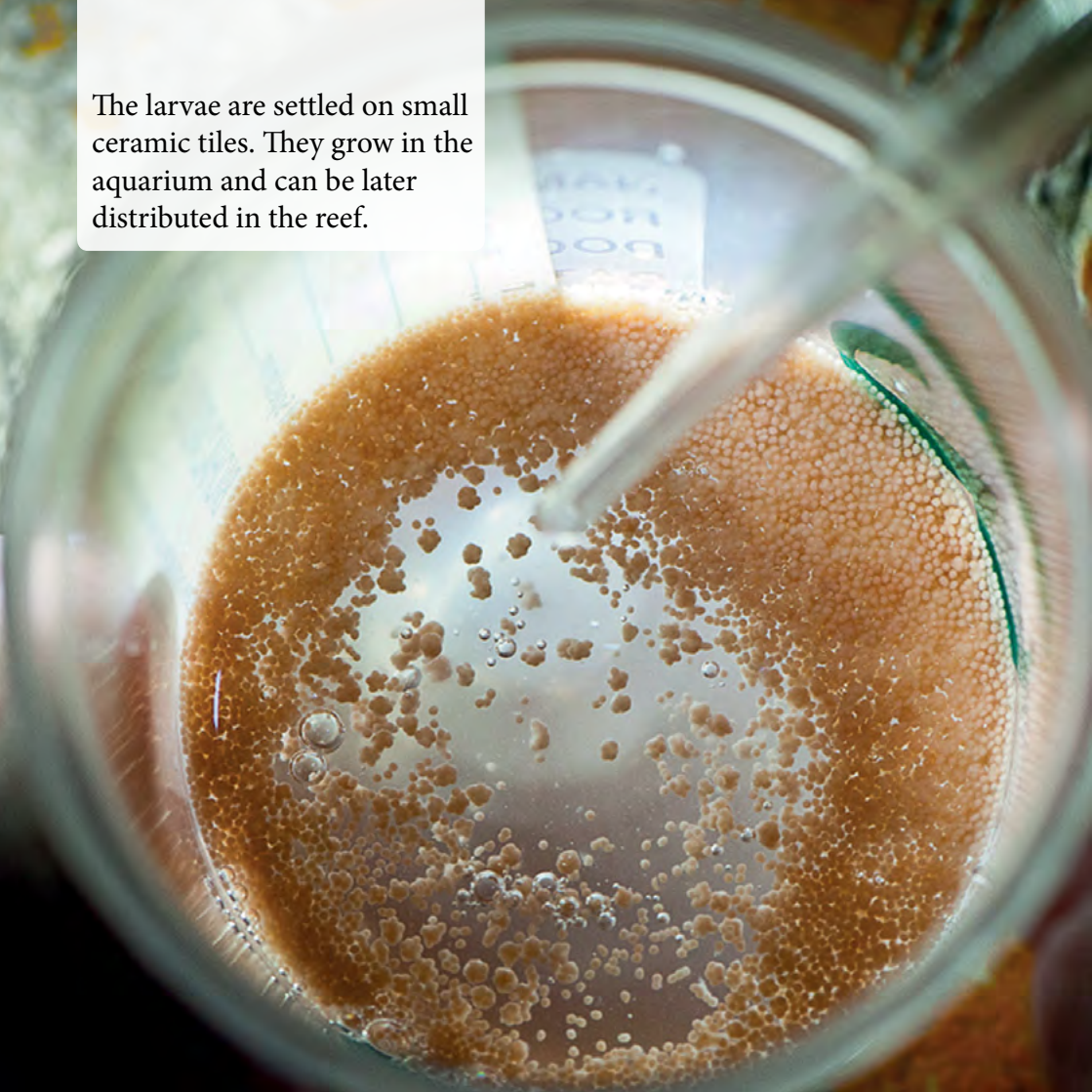


In the last few decades, the thorn crown starfish have been a great danger again and again for hard corals. In mass occurrence, thousands of animals migrate over the coral, eating the living coral tissue and leaving only the coral skeleton.



The new colonization of habitats with stony coral larvae can be quite fast, given that intact coral reefs are in the area. Nevertheless it takes decades until new coral colonies have grown up.

There are different ways to get new corals on damaged reef areas. For example, fertilized hard coral eggs and larvae can be collected by scientists.



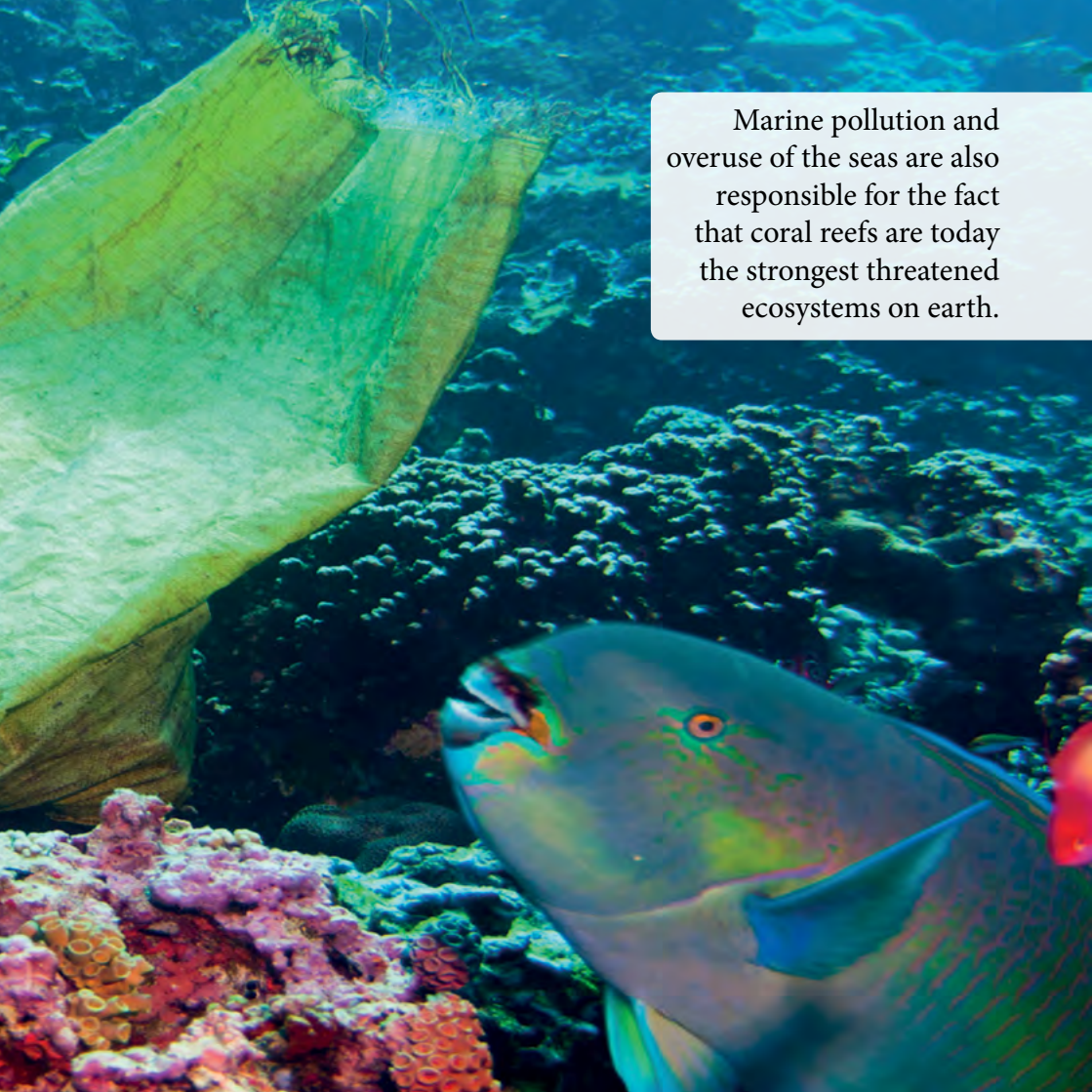
The larvae are settled on small ceramic tiles. They grow in the aquarium and can be later distributed in the reef.

Stone corals can also become multiplied by using cuttings. These are small pieces broken off and glued on a new underground.

For the reconstruction of artificial coral reefs, different materials and forms can be used.

Today our reefs are unfortunately not only beautiful, but also severely threatened – especially by human activities. The danger has increased due to global climate change.

Climate change leads to a warming of the water, to sea level rise and to an acidification of the oceans.
For the hard corals, this results in difficulties to grow fast enough and build up stable calcareous skeletons.



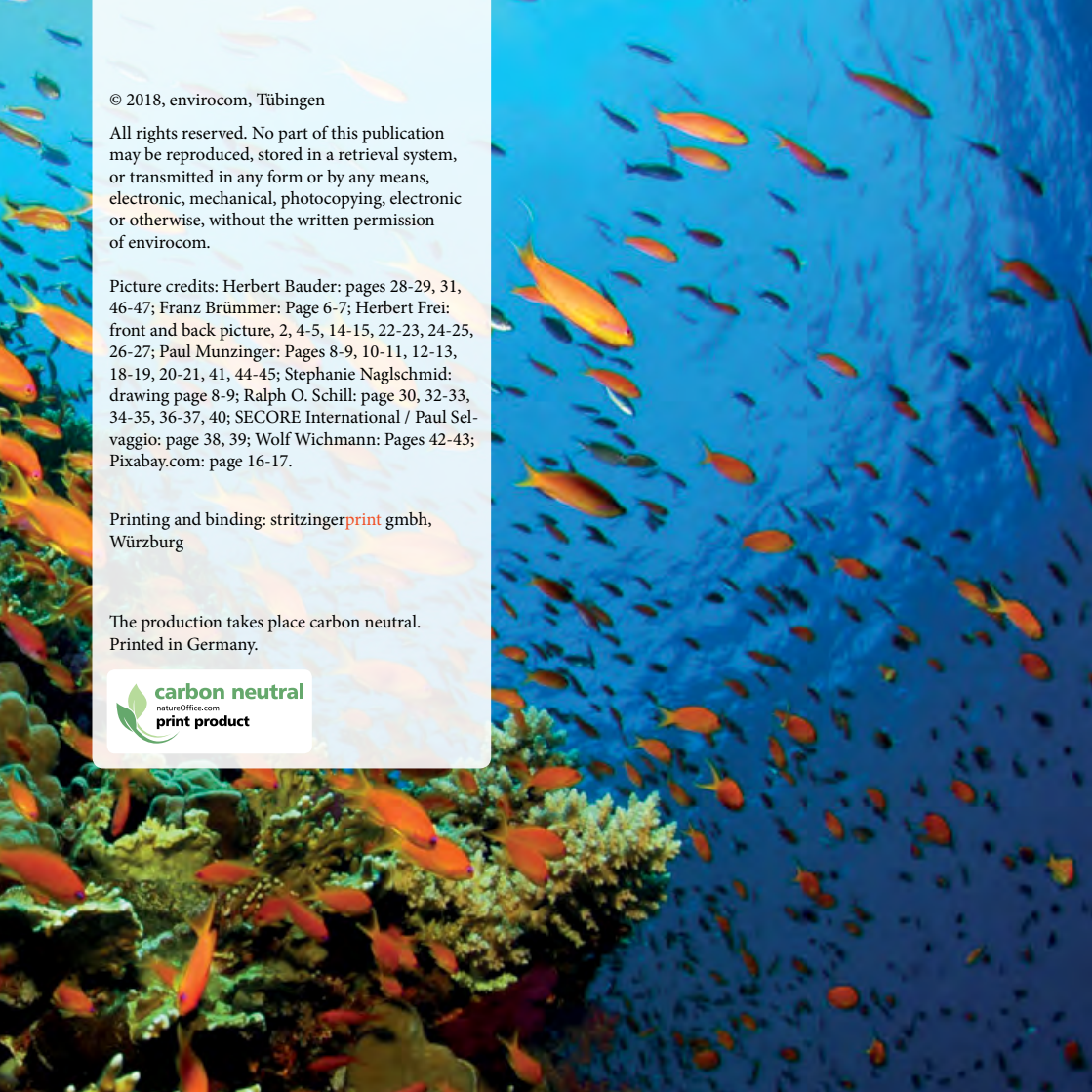
Marine pollution and overuse of the seas are also responsible for the fact that coral reefs are today the strongest threatened ecosystems on earth.

In order to be able to experience the fascinating underwater world in the future, everyone has to take a little responsibility for it.

The World Underwater Federation (CMAS)
joins and supports
the International Year of the Reef 2018.

CMAS


Your will find more information about the International Year of the Reef 2018 at www.iyor2018.org



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