

Become a CCMI researcher: Reproduction on the Reef

Coral reefs are home to much of the marine life in our oceans, supporting species through various stages of their lifecycle.

1. What feature of coral reefs makes them good nursery grounds for juvenile species?
Their 3-D structure creates great hiding spots for small creatures, offering protection from predators and strong currents during the vulnerable early life stages.
2. Coral reefs cover less than 1% of the ocean floor. What percentage of marine life do coral reefs support? Circle the correct answer below:

10%

25%

40%

Become a CCMI researcher: Classifying organisms

Classification is the process of grouping creatures based on similar features. One of the simplest ways of classifying animals is by looking at whether they have a backbone or not. In the Reefs Go Live episode, the host talked about how animals are either *vertebrates* (have a backbone), or *invertebrates* (do not have a backbone). Below are some of the different types of animals mentioned in today's lesson. Label each photo that shows a vertebrate with a 'V'; label each photo that shows an invertebrate with an 'I'.



V Nurse shark



I Jellyfish



V Fairy basslet



I Caribbean reef squid



I Caribbean spiny lobster



V Nassau grouper

Why is it useful to classify organisms? It makes it easier for scientists to communicate about the natural world, make comparisons across species, and provides insights to evolutionary history.

Become a CCMI researcher: Reproduction in corals: Asexual reproduction

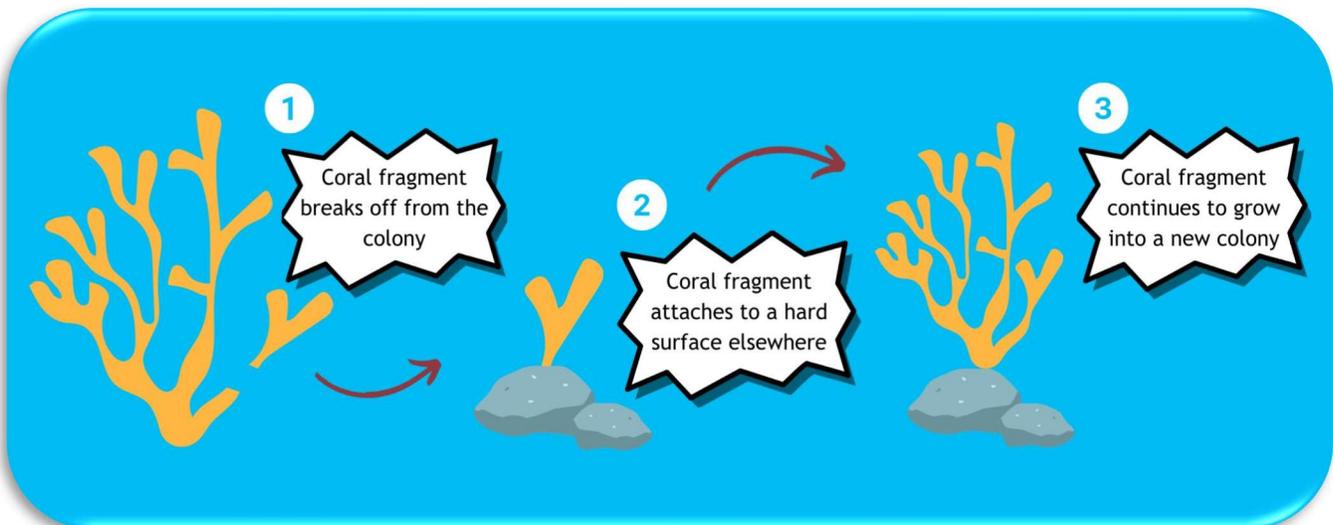
Corals are not only beautiful and diverse; they are also remarkable in how they reproduce. Corals have an incredible and unique ability to reproduce both sexually and asexually.

Asexual reproduction is the type of reproduction that only involves one parent that produces an exact copy of itself. This can happen through two processes:

1. Budding
2. Fragmentation

How do corals reproduce by budding? When a polyp grows big enough, it's able to essentially split itself in half, creating a new 'baby' polyp, which pinches off from the original parent polyp, forming a clone.

Below is a graphic showing how corals reproduce by fragmentation.



Thinking back to what you learned during Reefs Go Live, can you think of three ways a section of coral might break from its colony?

1. Naturally, through its growth patterns
2. Storm damage
3. Herbivores, such as parrotfish, graze on the coral and accidentally break fragments off

Become a CCMI researcher: Reproduction in corals: Sexual reproduction

Corals also reproduce sexually. This type of reproduction involves two parents who produce new offspring that has traits from both. This happens through the mixing of **gametes** - the male and female reproductive cells, also known as the **eggs** and **sperm**.

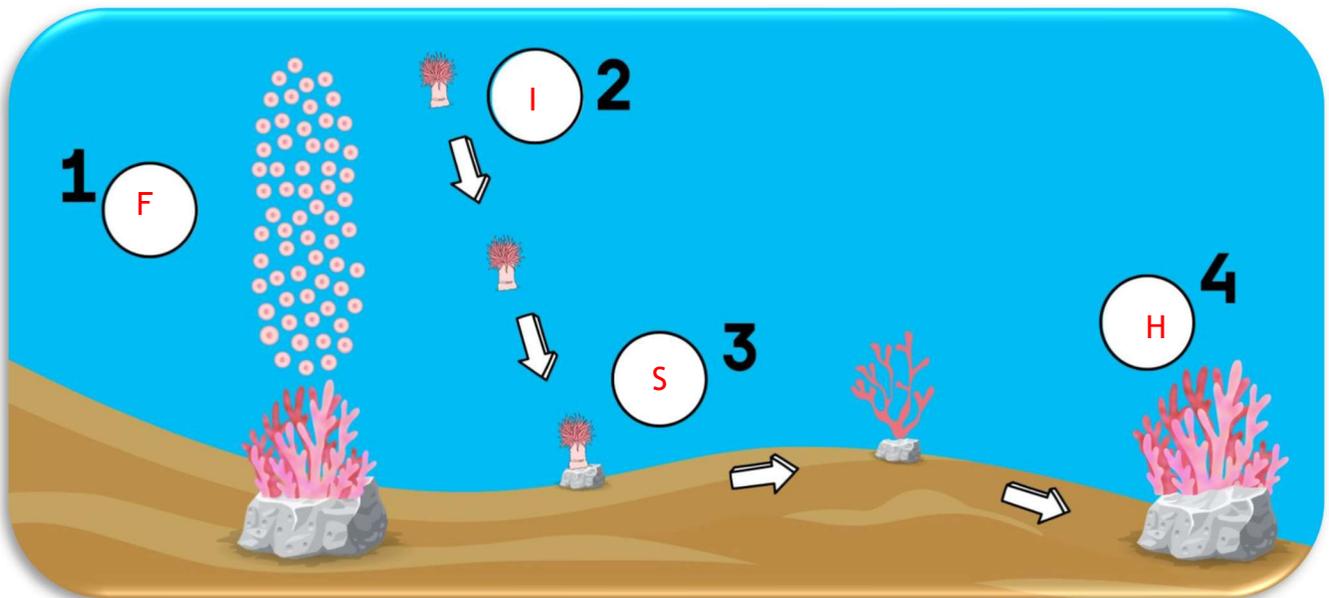
Sexual reproduction in corals happens through a process called **broadcast spawning**. The stages of coral spawning are below, but they are not in the right order. Notice how each one is assigned its own letter. Label the diagram below with the correct stages of coral spawning.

S - The coral baby sinks back to the ocean floor and settles onto a hard surface before developing into a coral polyp

H - The coral polyp grows and grows through asexual reproduction until it forms a new colony

I - The coral gametes meet at the surface and join together to form a baby coral

F - Coral gametes are released into the water like an underwater snowstorm



If you have labelled the diagram correctly, the letters should make up a word. Write down what this is in the space below.

Unscrambled word:

F I S H

Is the unscrambled word an example of a vertebrate, or invertebrate? Vertebrate

Test your knowledge! Can you answer the following questions?

1. Why do corals release such high numbers of gametes?

Hint: Safety in numbers!

To increase the chances that more coral babies will form and survive, since so many get eaten, washed ashore, or struggle to find a hard surface to attach to.

2. Why is it so important that different corals release gametes at the same time?

Hint: Corals can't move so they can't come into reproductive contact with each other!

So gametes from different colonies get a chance to mix.

3. What is the advantage of sexual reproduction for corals?

Hint: broadcast spawning is a type of sexual reproduction, which means the offspring has characteristics from both parents rather simply being a genetic clone of just one parent.

It increases genetic diversity, which means more corals are likely to have resistant characteristics to future threats and be able to survive.

4. Why is it great that corals can reproduce both sexually and asexually?

Hint: Think about your answer to question 3, and what the benefit of asexual reproduction is

Sexual reproduction increases genetic diversity, but asexual reproduction requires less energy from the coral so they can do it more often than once a year, meaning they can grow more quickly.

Become a CCMI researcher: Coral spawning in the Cayman Islands

Since it is SO exhausting to produce such large numbers of gametes all at the same time, coral spawning only happens once a year. This is usually during the warmer months - which is different depending on where a coral reef is located in the world.

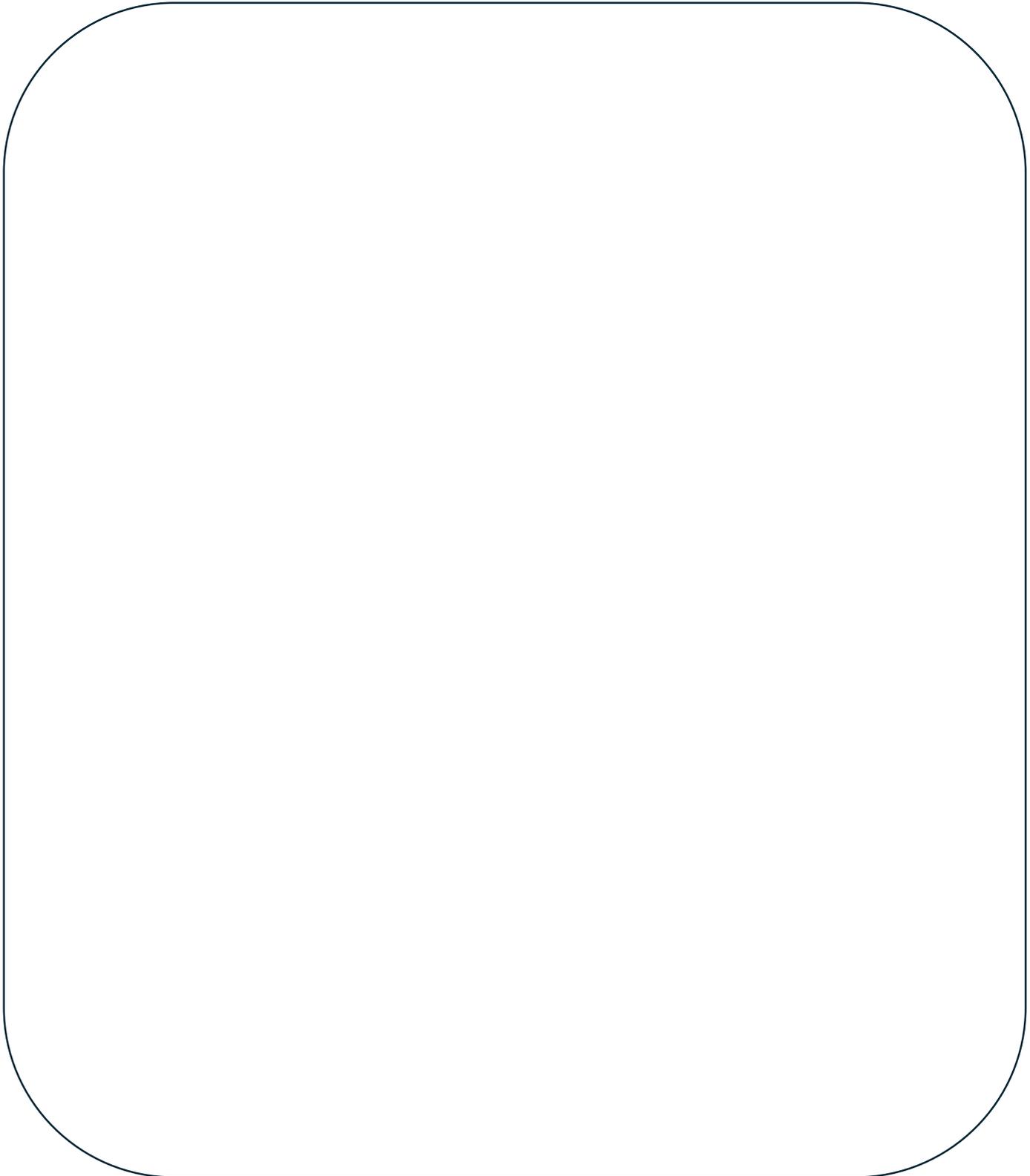
Coral spawning is also triggered by the moon phases, happening a few days after a full moon. The period of darkness after sun set and before moon rise, which happens the day after a full moon, reminds corals to start producing gametes. This takes a few days because it requires a lot of energy!! The corals wait until they have produced many gametes before releasing them all at the same time.

Design a poster in the space provided on the next page, to teach people about coral spawning in the Cayman Islands!



Here are some Cayman-specific facts from the Reefs Go Live episode to help you remember this important information about local coral reefs:

- Coral spawning in the Cayman Islands usually happens in the month of September
- Full moon in September 2024 is on the 17th
- Coral spawning is expected to happen a few days after a full moon (i.e., 22nd - 24th)





Unfortunately, human activities are having negative impacts on coral spawning. Below we have some ways that human activities are impacting coral spawning. Fill in the table with the matching stressor from the answer bank below.

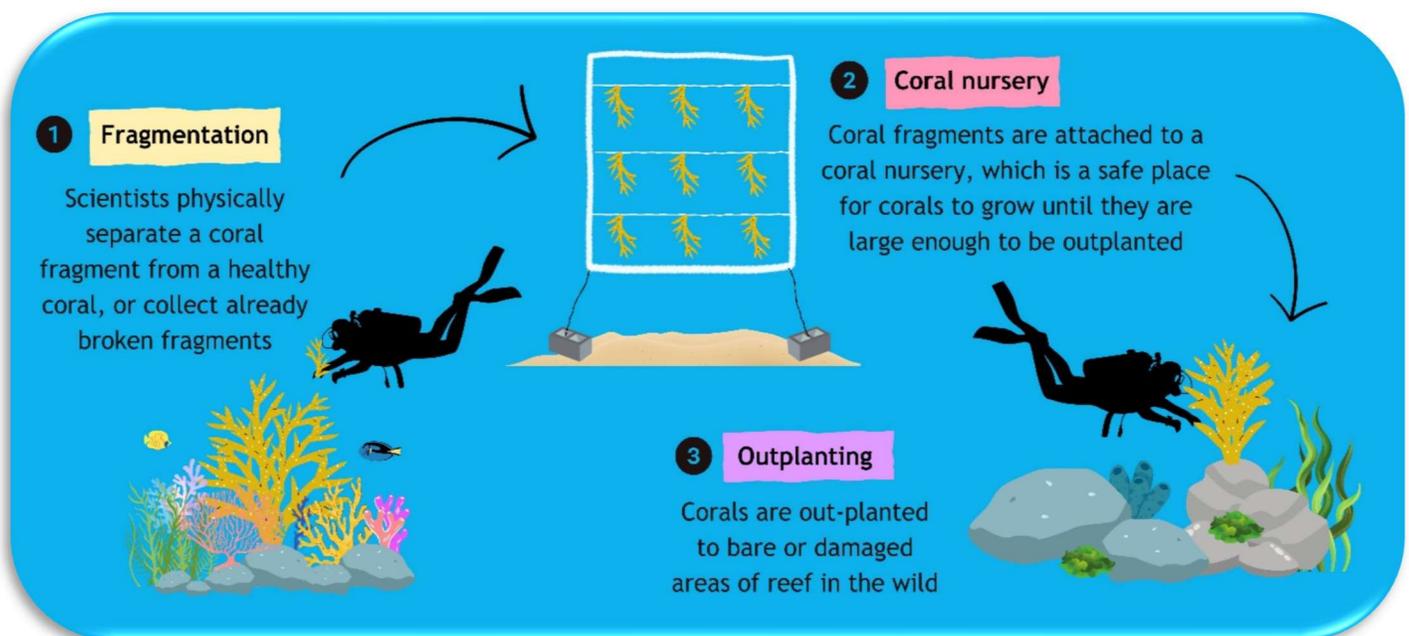
Light pollution Sedimentation Water pollution Global warming Disease

Stressor	Impact on coral spawning
Light pollution	Changes in light from the moon as it moves through the lunar cycle is an important trigger for coral spawning. Artificial light from nearby cities can make these changes in moonlight less obvious. This confuses corals and causes them to release their gametes at different times.
Global warming	Corals usually spawn in the warmer months of the year. However, with rising ocean temperatures due to climate change, it's harder for corals to tell when this is. This causes them to release their gametes at the wrong time.
Water pollution	Harmful pollutants in the water can damage the coral gametes, which means they can't successfully merge to form a healthy coral baby.
Sedimentation	Coral babies need to settle onto a hard surface before they can start growing into a polyp. Human activities are causing more sand and algae to cover the hard surfaces on the seafloor, which means coral babies can't find a hard surface where they can settle and grow into an adult coral.
Disease	Changes to the environment from some human-related activities are causing corals to get sick more easily. This means corals must put all their energy into getting better, leaving little or no energy to produce gametes and spawn. This means corals might not to spawn that year.

Become a CCMI researcher: Reproduction for restoration

Corals are under a lot of pressure due to changes in their environment, largely a result of human activity. This is unfortunately resulting in a loss of corals around the world. Understanding coral reproduction is crucial because if we know how it works, scientists can help them do it! By helping corals reproduce, we can help re-build healthy reefs.

The diagram below shows how we carry out coral restoration through the form of asexual reproduction known as fragmentation, which we have already covered.

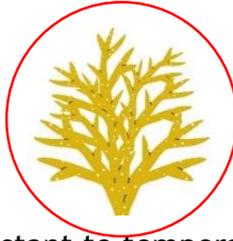


Sexual reproduction is important for the boost it gives to genetic diversity. Genetic diversity is important for coral reefs because it increases their resilience to future threats. More genetic diversity means that there is a greater chance that some corals will have resistant characteristics to help them survive.

As scientists, we can choose to breed specific corals based on their characteristics to form resilient coral babies. Circle the two corals you think would make the most resilient and healthy coral baby if their gametes were to combine.



I am not resistant to anything, and I grow slowly.



I am resistant to temperature increases and I grow quickly.



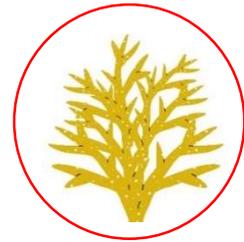
I am not resistant to anything, but I grow quickly.



I am resistant to disease, but I grow slowly.



I am resistant to temperature increases, but I grow slowly.



I am resistant to disease, and I grow quickly.

Explain your why you picked these two: Because one is resistant to temperature increases, and the other is resistant to disease, and both have high growth rates.
