



# Coral Reefs Lesson 1: Where are Coral Reefs?

To join in bring: A4 paper & felt pens

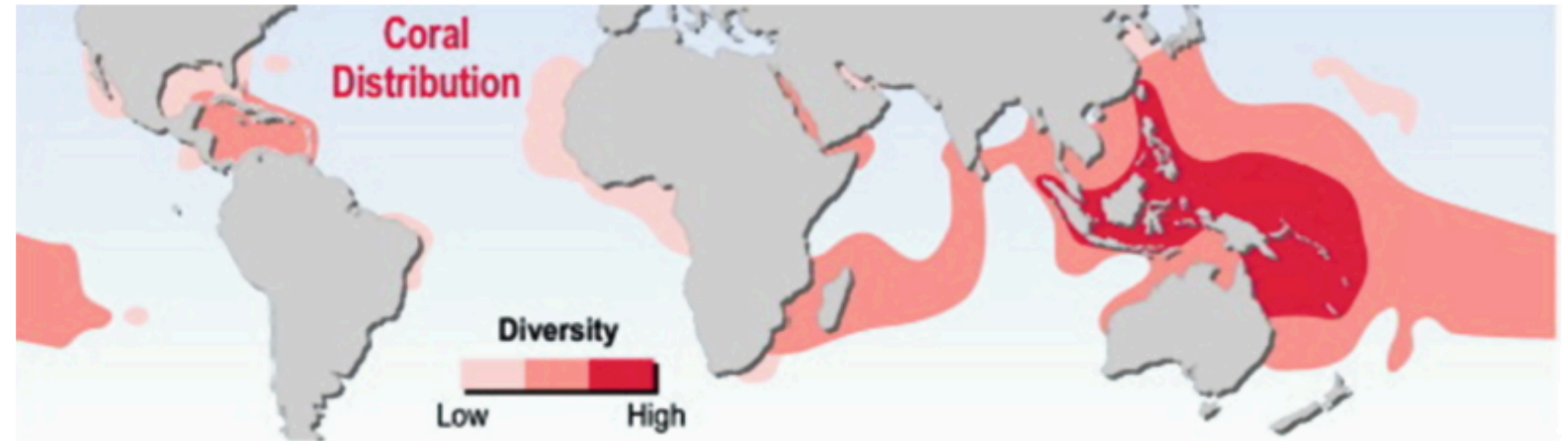


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Map of the coral triangle, and the countries that are working to protect it.

**Note that in the lesson I spell Papua New Guinea wrong!**



# Coral Reefs Lesson 2: What is coral?

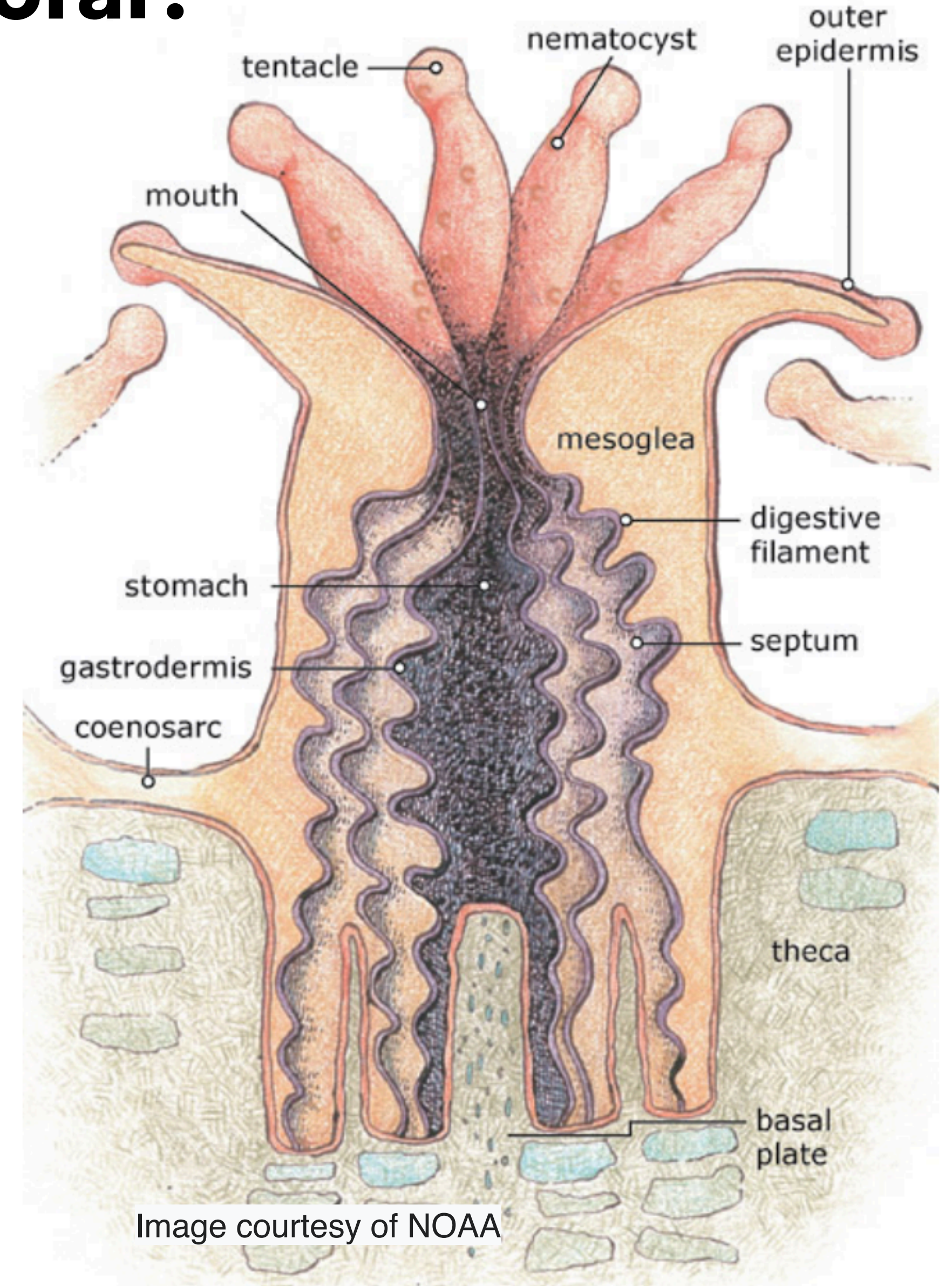
**To join in bring:** Sheet of coloured A4 paper and sheet of white. Sheet of clear plastic about the same size as the paper (I've used an old cereal bag). Scissors, sellotape, glue (PVA best, Pritt stick fine), felt pens.

Today I hope you'll:

- Be able to label the main parts of a single polyp and understand what they are used for

You may also be able to:

- Analyse your polyp model and explain why it is accurate and how it could be better.



# Questions: Please put aside until the end!

**Which part of a polyp may be venomous?**

- A: Nematocysts
- B: Mouth
- C: Mesoglea
- D: Skeleton

**The inner layer of cells can be seen on a polyp. Why is this?**

- A: There are holes in the outside layer.
- B: They only have one layer of cells.
- C: The outside layer of cells are see-through.
- D: Most polyps are inside-out.

**Some cells on the surface of polyps can be venomous. Other cells...**

- A: Produce high-pitched sound waves to warn off predators
- B: Give off slime which keeps the polyp clean
- C: Flash to attract fish which defend the polyp
- D: Provide milk to young polyps

**What do an adult human and a polyp both have?**

- A: A septum
- B: Ectodermis
- C: Tentacles
- D: Venomous cells

**A polyp captures a creature with its tentacles and eats it. Which two parts of the polyp does the food go past first?**

- A: Pharynx then mouth
- B: Pharynx then Theca
- C: Mouth then stomach
- D: Mouth then pharynx

**On the picture, label where food goes into the polyp and where waste (eg poo!) comes out.**

- A: A septum
- B: Ectodermis
- C: Tentacles
- D: Venomous cells

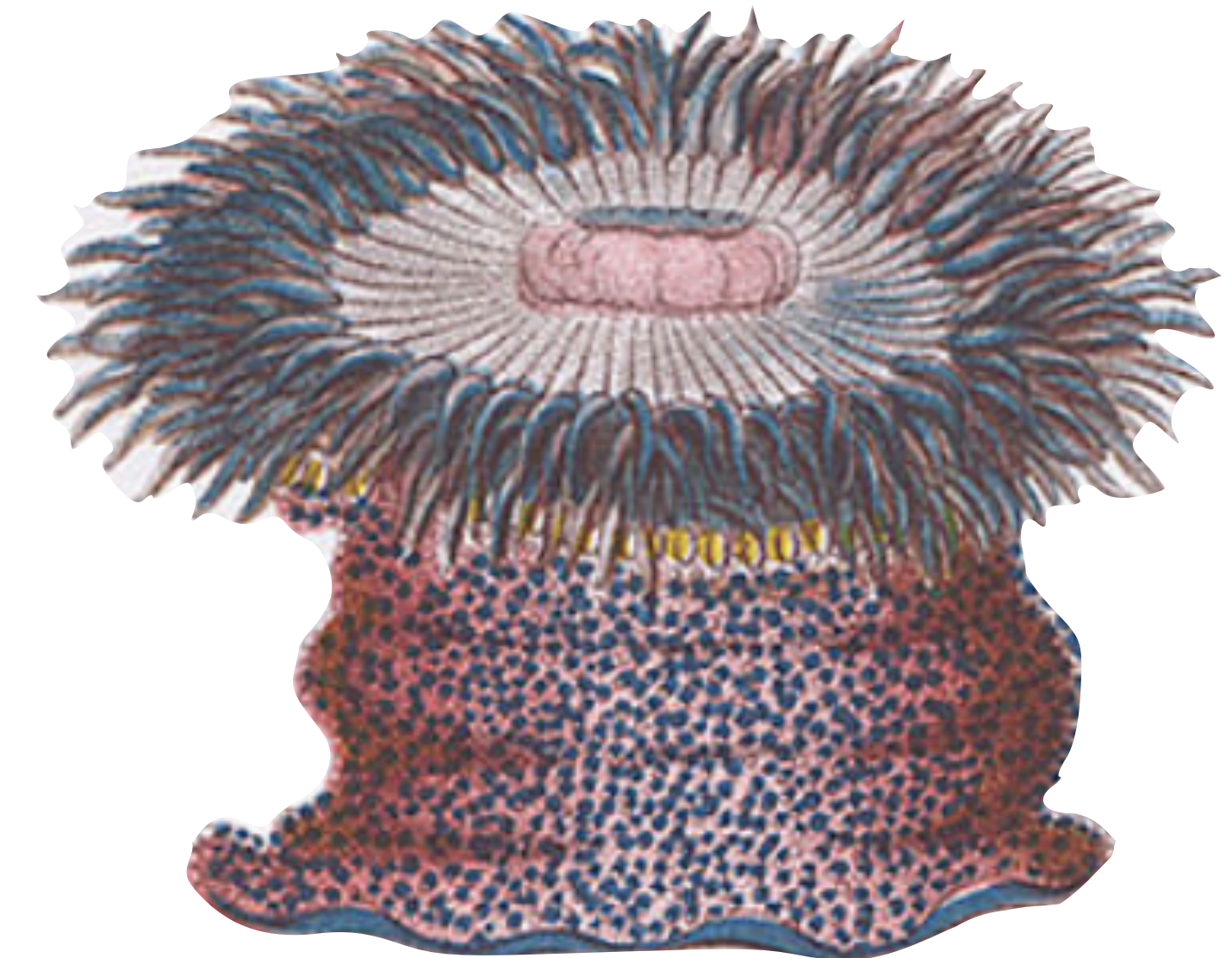


Image courtesy of Smithsonian Institution Libraries

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# Coral Reefs Lesson 3: Coral Bleaching and Coral Colour

Coral have a \_\_\_\_\_ relationship with Zooxanthellae. Zooxanthellae are \_\_\_\_\_, and plant-like; they use energy from \_\_\_\_\_ to make \_\_\_\_\_. They live in the \_\_\_\_\_ (gastrodermal) cells of the coral, where they are safe and protected, and give up to 90% of what they make to the coral! The coral uses this material as food, and to make calcium carbonate, which is what their \_\_\_\_\_ are made of.

**To join in bring:** Sheets of white A4 paper, coloured paints, paint brush & water, scissors, glue, felt pens

**Use some of these words!** 

symbolic the Sun symbiotic  
the ocean tiny sugar food inner  
outer skeletons sympathetic  
the coral luminous tentacles

Done? Coral get some of their food from zooxanthellae and some from elsewhere. How might you test whether they rely on zooxanthellae to survive?

Done?! Without looking, spell these words..!  
The algae: Z\_\_\_\_\_ Inner layer of corals' cells: D\_\_\_\_\_  
The stuff coral skeletons is made of: C\_\_\_\_\_

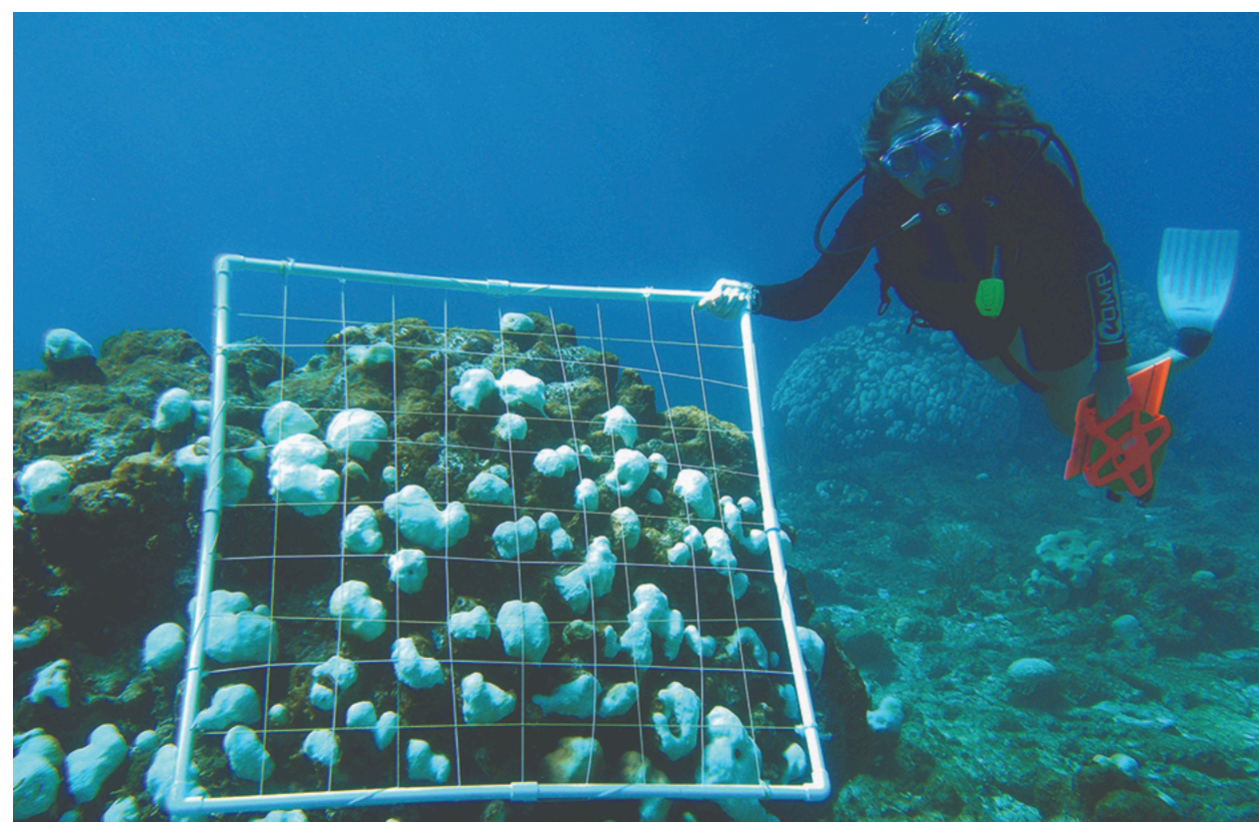
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## Coral Bleaching

If coral gets stressed, it ejects the zooxanthellae. Stresses include disease, less salt in water, or low temperatures. But the most common / obvious cause of the ejection is high temperatures and/or increased light (often as a result of unusually calm seas).

The corals' tissue is naturally transparent, like a jellyfish, so you can see the white skeleton when the the algae are gone. That's why it's called bleaching.

*Can you think why too much light might cause the coral to eject the plant-like zooxanthellae?!*

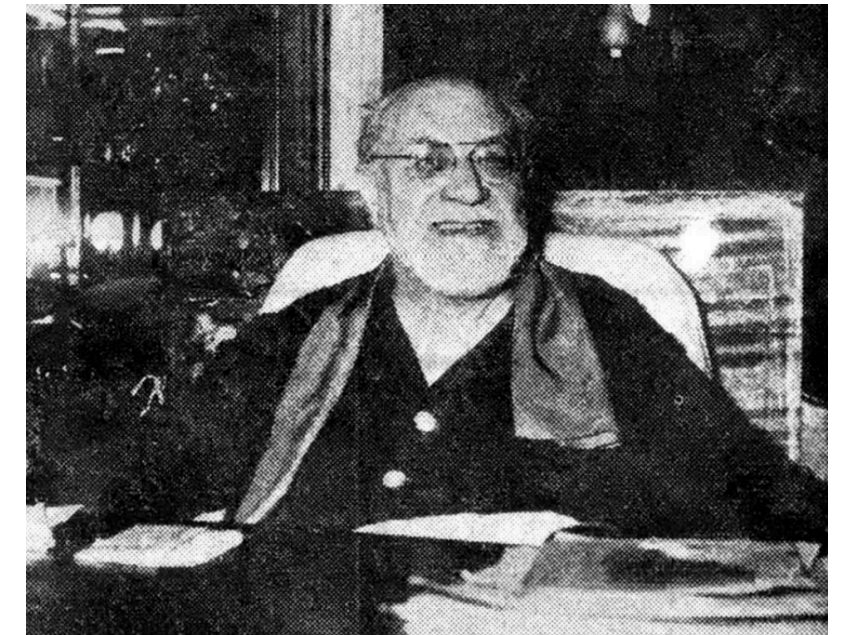


A NOAA scientist sampling some bleached coral with a quadrat. Image: NOAA.

Bleaching doesn't automatically kill coral. It can recover if the stressful conditions go away and the zooxanthellae come back.

But bleached coral is vulnerable. It's lost its main energy source, and may have cell damage from the oxygen. Or may simply not have enough gastrodermal cells to survive.

*Henri Matisse*



**Henri Matisse (1869 - 1954)**

**was a French artist who loved colour.** He used contrasting colours in his work: blue and orange, red and green, or yellow and purple.

In his later life he had an operation and painting was too difficult, so he created art by cutting shapes out of paper. These are called his 'cut outs'. Search 'Matisse Coral' online to see some beautiful examples.

*When you've made your Matisse-inspired coral painting, write a description telling viewers what a great artist you are! Explain what a good representation of coral bleaching your painting is. Use the words:*

*zooxanthellae hot stressed white bleaching*

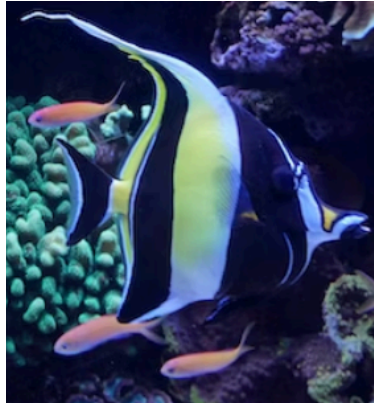


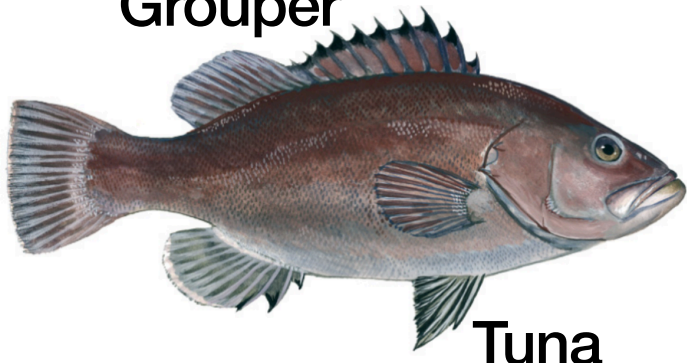



# Coral Reefs Lesson 4: Predators and Prey!

To join in bring: Small piece of scrap paper, bowl of water

Starter questions:

1. If 'micro' means small, what means big?! \_\_\_\_\_
2. Do fish have teeth? \_\_\_\_\_

Reef Fish	Fish of the open ocean ('pelagic' fish)
 Moorish Idol  Blue Tang  Masked angelfish and Blue Stripe Butterflyfish	 Grouper  Tuna

Reef fish are...	Because...
	It camouflages them against the coral
	They don't have to camouflage; they can hide in crevices!
	To help them fit into small spaces
	To help them change direction quickly

What differences do you notice between the reef fish and the fish that live in the open ocean? Write your ideas here:



The scientific word for seaweed is \_\_\_\_\_! It's not technically a plant, but it is plant-like. It competes with coral for space and light; herbivore fish eat it and so help the coral.

Some fish are corallivores: they eat coral.

Scrapers and excavators bite off living tissue and a bit of skeleton.

When Parrotfish eat coral, what are they actually eating? Choose as many as you think!



Parrotfish

- Soft tissue
- Fish
- Calcium carbonate
- Algae

White Hawaiian sand is actually Parrotfish poo!

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## Important Message

We are aware of a number of spam e-mails, text messages and social media posts, from third-parties posing as Morrisons, for the purpose of fraudulent activity.

If you receive one of these suspicious messages, please do not click any links, open attachments or enter personal information.

**We would never ask for your bank details in order to redeem a voucher.**

If you believe you have been contacted please contact us on 0345 611 6111 or call Action Fraud on '0300 123 2040' or visit 'www.actionfraud.police.uk' to report fraudulent activity to the authorities.



## PHISHING SCAM ALERT!

**Beware of FAKE SMS with links that lead you to a PHISHING WEBSITE**

If you received the following SMS, please do not respond or click on the link. This is a fake SMS designed to trick you into revealing your online banking details.

### How to Spot the Signs of Phishing

- RM0 PBB/BB: Your PBB account will TERMINATED on 02Dec20 01:30:00 AM. Please make verification via
- 1 <http://www.mypbebank.cc> to avoid service interruption. Verify now keep on using PBB services.
  - 2 SMS content has multiple grammar mistakes.
  - 2 PBe will never embed URLs into SMS.

**Some real scam warnings to inspire you!**

The Bluestreak Cleaner Wrasse advertises its cleaning services to fish with its blue stripe, and by dancing. The Bluestriped Fangblenny mimics the wrasse but instead of cleaning the fish, it bites them!

Design a scam warning that the wrasse can send out to the fish on the reef, warning them about the fangblenny. Try and make it eye-catching and get the important information down without using too many words.

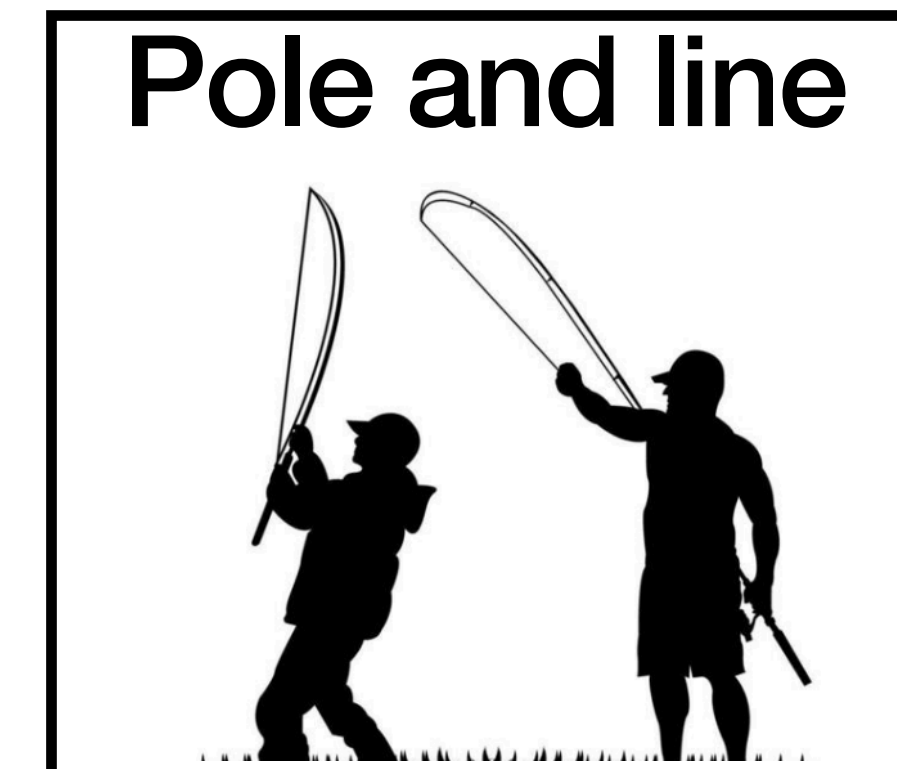
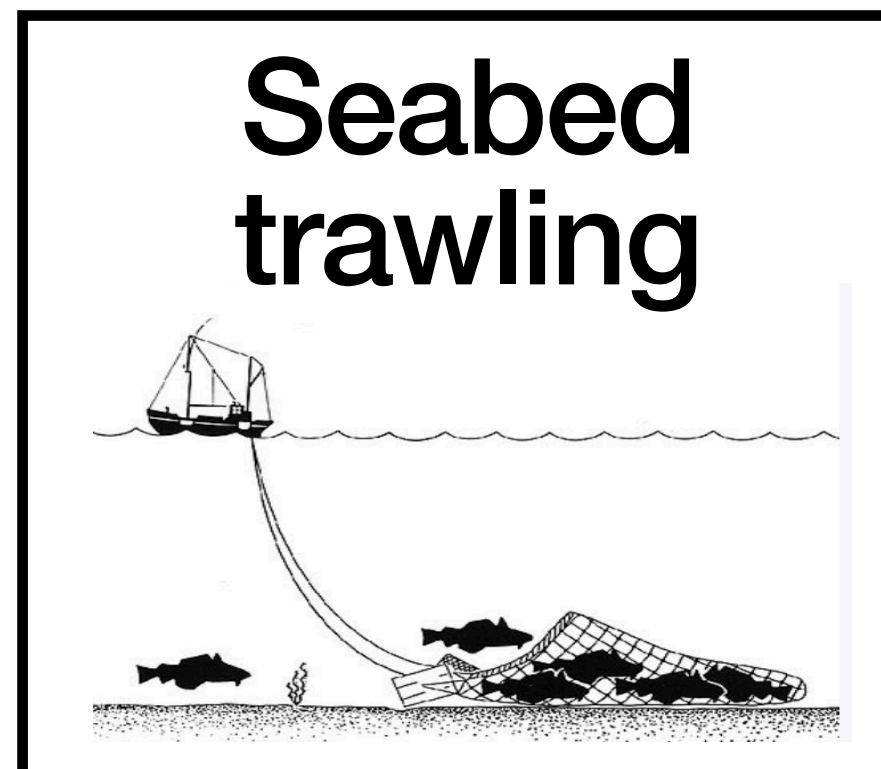
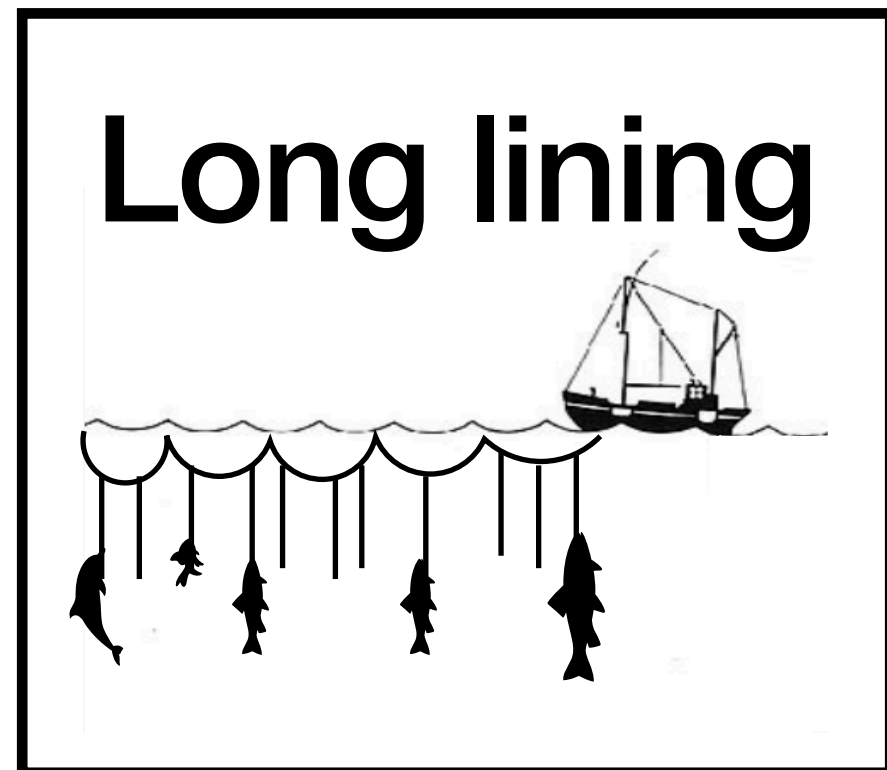
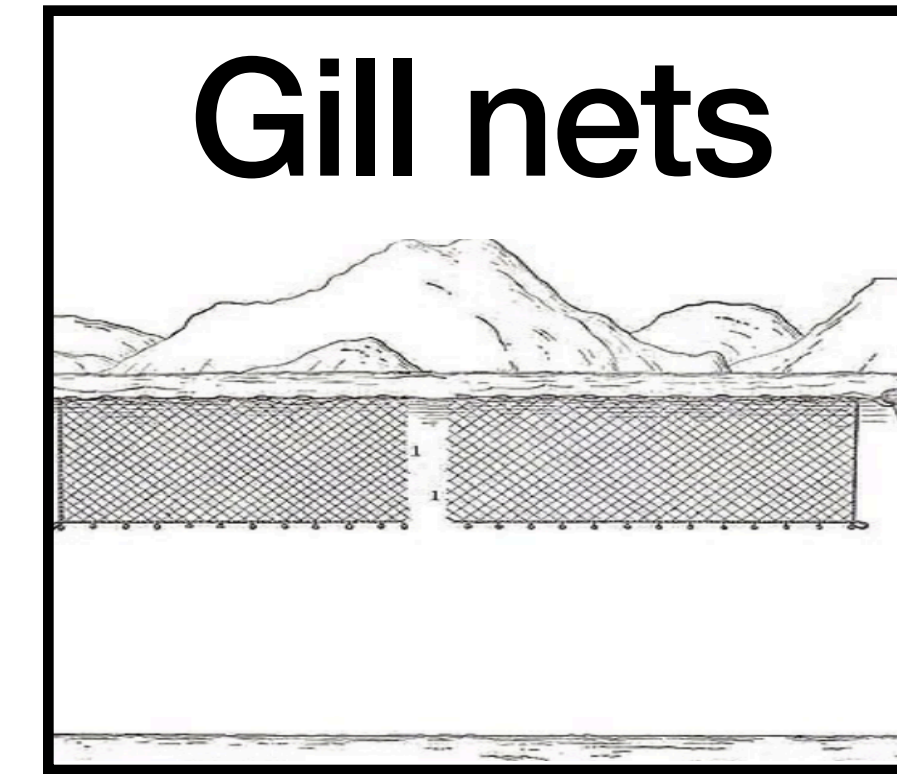
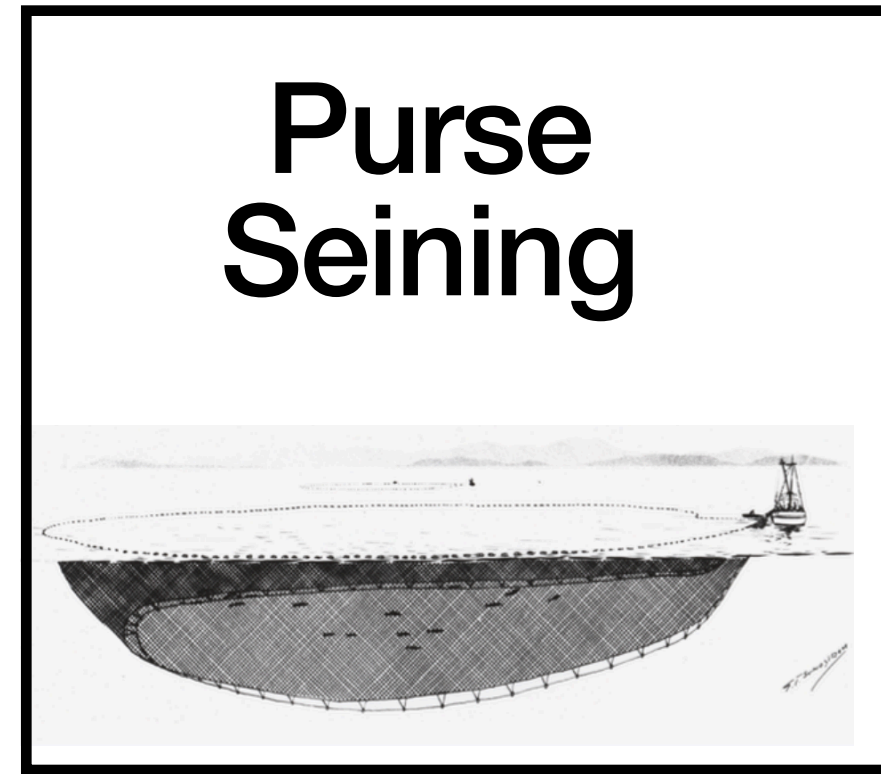
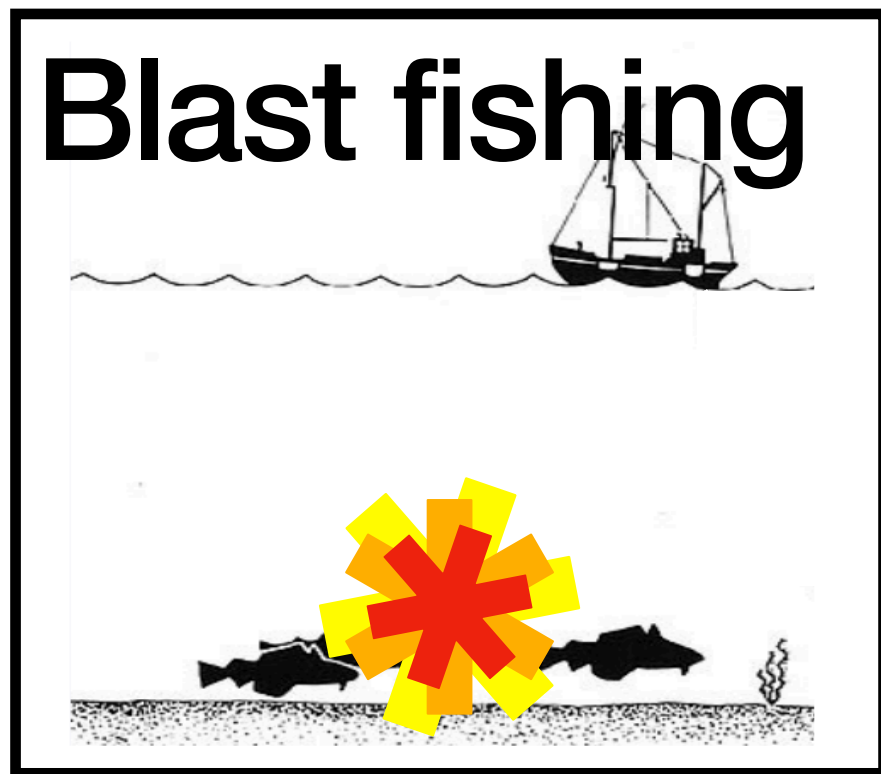
Notes / Quiz Answers!



# Coral Reefs Lesson 5: Fishing

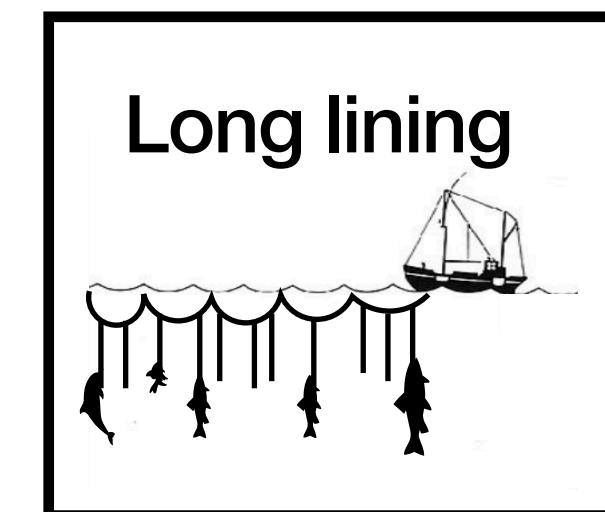
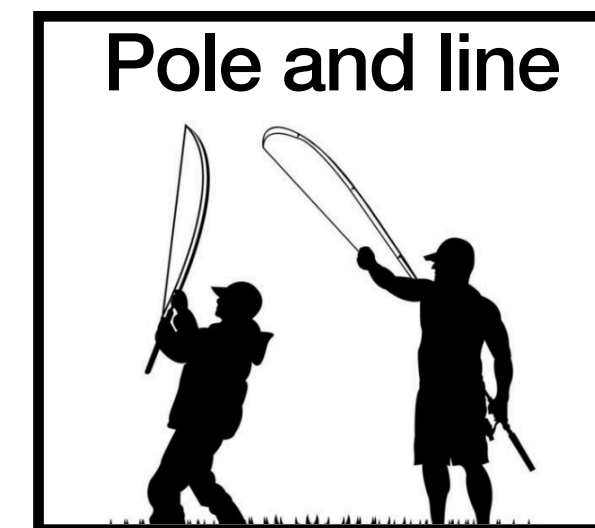
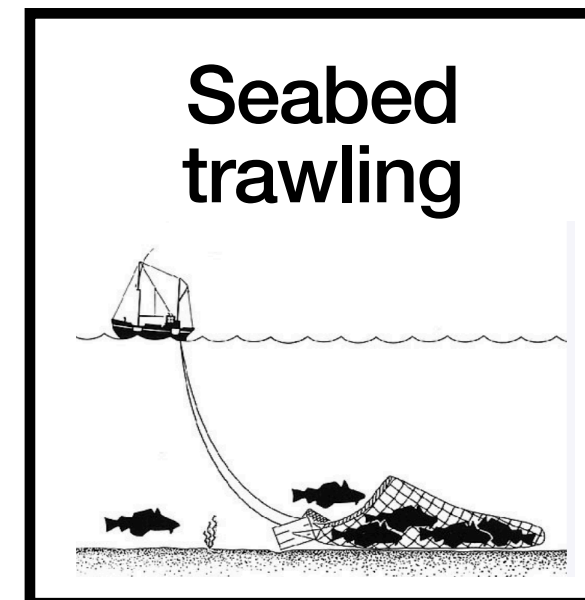
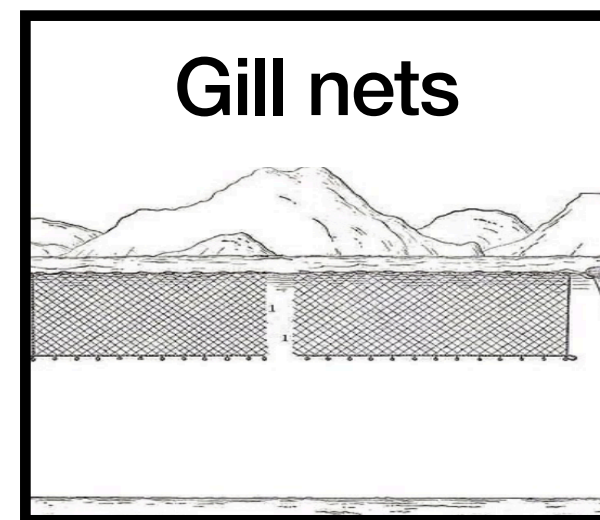
Nothing to bring!

Listen to the descriptions of these fishing methods. Which do you think are most damaging? (Put some ! next to them) Why? Which do you think are illegal? (Put an 'i' next to them). You may like to make some notes, or just listen.





Match the fishing method to the descriptions. You can use the descriptions as many times as you like.



Damage the seabed (and therefore coral reefs)

Lots of bycatch (catches fish that weren't meant to be caught)

Cause 'ghost fishing'; nets get lost and trap marine life

Can allow smaller, younger fish to escape

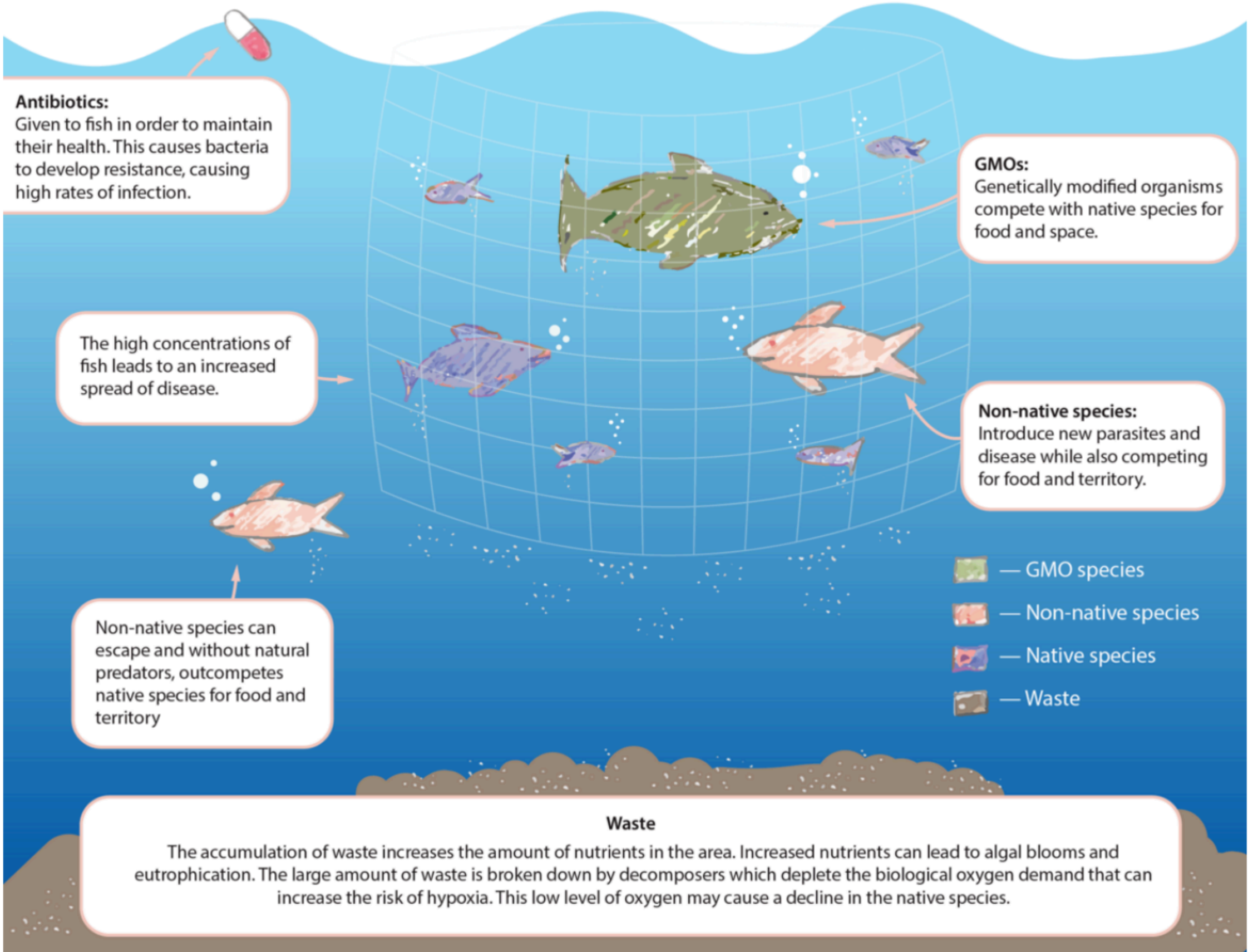
Can reduce fish stocks quickly (catch too many fish)

Fish can easily be thrown back if the wrong one is caught

# Are fish farms the solution?!

How do you feel about inland fish farms? Take a minute to make some notes.

## Some problems with fish farming (Aquaculture)



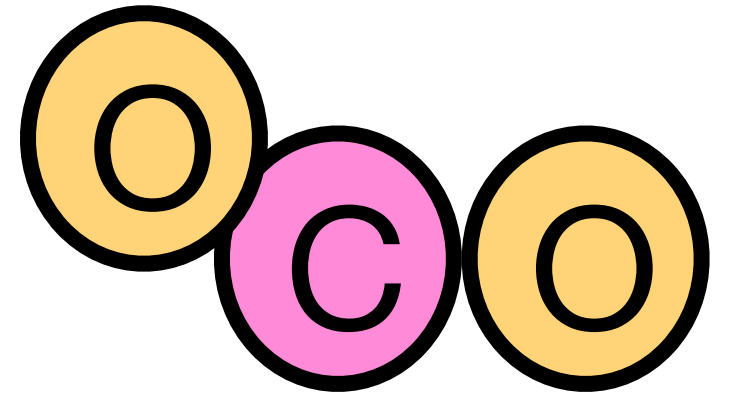
Now listen to the article about a fish farm in Maine, USA. Have you changed your mind or do you feel the same?

Why?

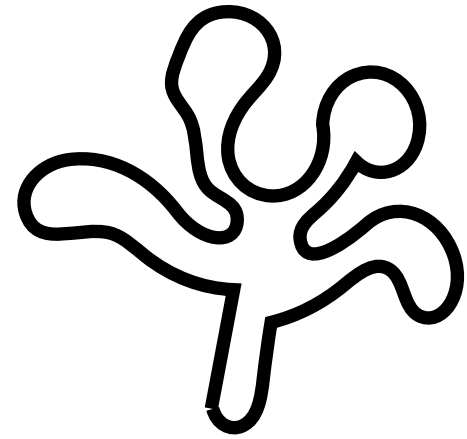


# Coral Reefs Lesson 6: Types of Reef and Acidification

Carbon  
Dioxide



**Bring:** Crushed egg shells (or bicarb), vinegar, narrow necked bottle\* and balloon\*. Optional!



Coral skeleton is made of Calcium Carbonate. What three kinds of particles (atoms)

make up calcium carbonate? \_\_\_\_\_ and \_\_\_\_\_.

More carbon dioxide in the atmosphere means  
\_\_\_\_\_ carbon dioxide is absorbed by the oceans.

This means \_\_\_\_\_ hydrogen particles in the water.

So the ocean is \_\_\_\_\_ acidic than it used to be.

## Three types of Coral Reef

Atoll

Fringing

Barrier

Use this space for playing 'What's the word?'

# Questions! Please put aside until the end of the lesson!

1) What are coral skeletons made of?

2) Explain what is meant by the term 'ocean acidification'.

4) Why is acidification a problem for coral reefs?

5) The diagram shows three types of coral reef

a) Complete the labels

b) What is the feature marked 'A'? \_\_\_\_\_

c) Write a fact about each type of reef underneath its image.

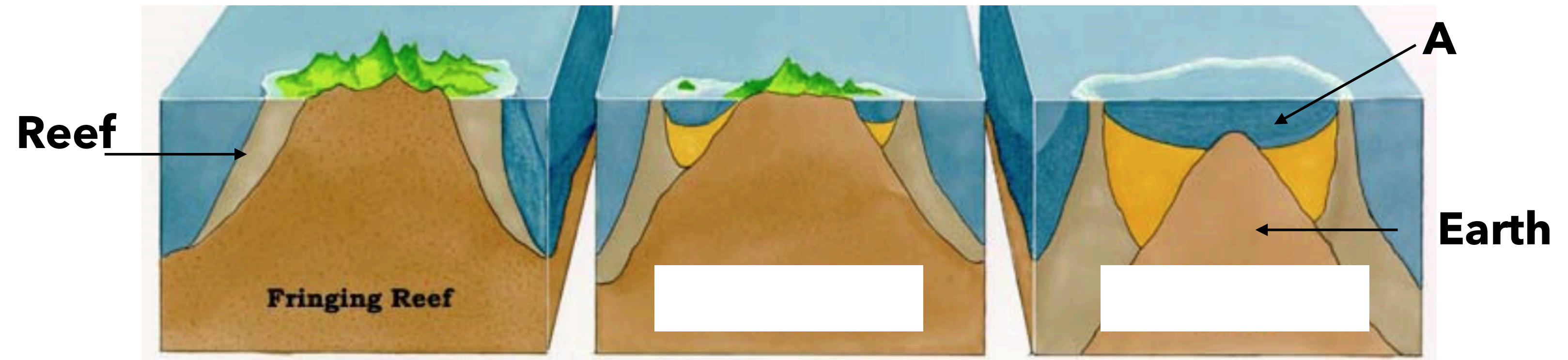


Image by Poli.mara via wikimedia commons. License: <https://creativecommons.org/licenses/by-sa/4.0/legalcode>

3) What causes acidification?



# Coral Reefs Lesson 7: Fossils and End of Topic Quiz!

**Nothing to bring**

Team up with algae and become more successful!  
Not reef-builders at first!

Scleractinian Coral  
Rugose Coral and Tabulate Coral

PERIOD	MILLIONS OF YEARS AGO
Quaternary	1.6
Tertiary	66
Cretaceous	138
Jurassic	205
Triassic	240
Permian	290
Pennsylvanian	330
Mississippian	360
Devonian	410
Silurian	435
Ordovician	500
Cambrian	570
	2500
	3800?

Why was Pangea forming bad news for Rugose coral?!



Coral usually forms 360 growth ridges per year. (Sometimes less when conditions are bad or when they're breeding). But some Devonian corals have 400 ridges per year. What conclusions might you draw from this?

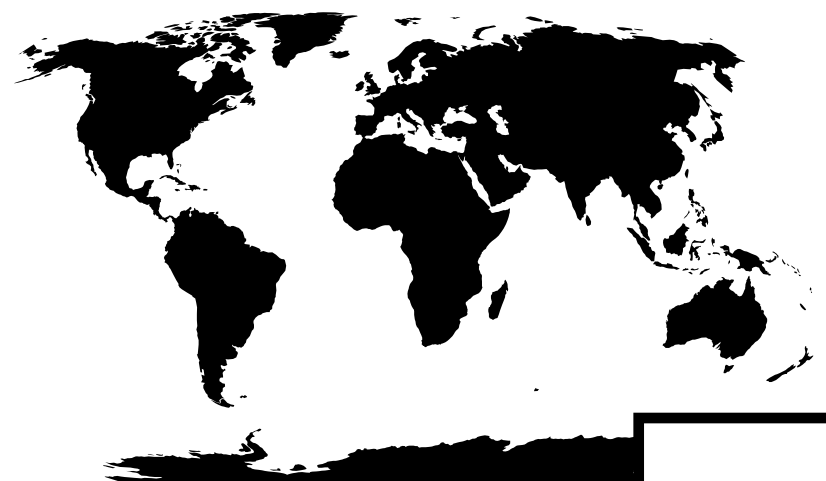
Your ideas:	Answer:
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1) Say 'Bingo' when you get 4 in a row! Across, up & down or diagonal counts.

Orange	Barrier	Plant	Circle
Mouth	Triangle	Atoll	See-through
Tentacle	Animal	Macroalgae	Fringing
Fungus	Zooxanthellae	Square	Mineral

2) What's the Word?! Circle/write the answer and the matching letter when I put them on the board.

Where would you NOT find tropical reef-building coral?



Put the letters in the boxes:

Where is the Great Barrier Reef?




Coral and zooxanthellae help each other to survive. What's this kind of relationship called?

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What happens during coral bleaching?

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And what causes most coral bleaching?

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3) Which of these 6 countries are in the Coral Triangle?

Maldives

Indonesia

The Philippines

Timor Leste

India

Bahamas

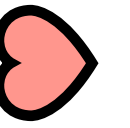
Solomon Islands

Papua New Guinea

Australia

Malaysia

4) True or False! Let's get some exercise.



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