Reef Relationships

Trace benefits, costs, and changing interactions on a coral reef.

BIO.5.5 "Evaluate symbiotic relationships (e.g., mutualism, parasitism, and commensalism) and other co-evolutionary (e.g., predator-prey, cooperation, competition, and mimicry) relationships within specific environments."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each benefit, circle each cost, and number the interacting pairs to track how each organism is affected.

Who Gains on the Reef?

1. At a coral reef cleaning station, a cleaner wrasse picks tiny parasites from a larger fish's skin and gills. The wrasse gets food, while the visitor loses parasites that can drain blood or irritate tissue. The parasite, a small gnathiid isopod, benefits when it feeds on the fish; the fish pays the cost. These two interactions involve the same visitor but have different effects on each partner. When a wrasse signals with a quick, rocking swim, some fish pause and hold still. That behavior gives the wrasse access to food and gives the visitor a chance to be cleaned.

2. Elsewhere on the reef, a remora attaches to a shark and eats scraps from its meals. In this case, the remora gains food and transport, while the shark shows no clear benefit or harm. A grouper, however, hunts young parrotfish among the coral branches. The grouper gains a meal, and the captured parrotfish dies; surviving parrotfish may escape by turning sharply into narrow gaps. A false cleanerfish adds another twist: it resembles a cleaner wrasse and approaches fish that expect cleaning, but it bites scales instead. Its disguise works best when visitors recognize real cleaners.

3. Space and sunlight are scarce on a crowded reef. Corals and fast-growing algae compete for both, and algae can shade young corals. If grazing fish decline, algae may spread and leave fewer places for coral larvae to settle. Such changes can also alter hiding spots for prey and hunting routes for groupers. Each relationship describes effects among organisms in a particular setting. Coevolution is a stronger claim: it requires evidence that inherited traits in both interacting populations changed over generations in response to each other. A single feeding event or a useful disguise does not, by itself, prove that history.

2 ANSWER WITH EVIDENCE

Use the passage

1. The larger fish interacts with both a cleaner wrasse and a gnathiid isopod. How does the effect on the larger fish differ in these two relationships?

2. Compare the remora's relationship with the shark to the grouper's relationship with a captured parrotfish. Who benefits, and who is harmed or has no clear effect?

3. Why might the false cleanerfish's resemblance to a cleaner wrasse help it get food? Explain the cost to the fish it approaches.

4. If grazing fish decline, how could competition between algae and corals change? Use two details from the passage.

3 YOUR TURN

Your own words

Imagine cleaner wrasses disappear from this reef. In four or five sentences, predict effects on two other organisms and explain how two relationships might change; distinguish your predictions from proof of coevolution.

Reef Relationships

PART 1 · READ AND MARK

Underline each benefit, circle each cost, and number the interacting pairs to track how each organism is affected. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	The larger fish interacts with both a cleaner wrasse and a gnathiid isopod. How does the effect on the larger fish differ in these two relationships?	**The fish benefits when the wrasse removes parasites, but it is harmed when the isopod feeds on it.**
2	Compare the remora's relationship with the shark to the grouper's relationship with a captured parrotfish. Who benefits, and who is harmed or has no clear effect?	**The remora benefits, while the shark has no clear benefit or harm. The grouper benefits, while the captured parrotfish is harmed.**
3	Why might the false cleanerfish's resemblance to a cleaner wrasse help it get food? Explain the cost to the fish it approaches.	**Fish that recognize real cleaners may allow the look-alike to approach. The false cleanerfish gets scales to eat, while the other fish loses scales.**
4	If grazing fish decline, how could competition between algae and corals change? Use two details from the passage.	**Algae may spread and shade young corals, leaving fewer places for coral larvae to settle.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Without cleaner wrasses, visiting fish would lose a way to remove gnathiid isopods, so parasites might become more common on them. The isopods would gain feeding opportunities while the fish would face greater costs from parasitism. False cleanerfish might fool fewer visitors if fish stop approaching animals that look like cleaners. These predictions do not prove coevolution, which would require evidence of inherited changes in both interacting populations across generations.

Accept other passage-supported predictions that identify effects on at least two organisms and explain changes in two relationships. The response must not treat a predicted change in behavior or population size as proof of coevolution.