

Check your understanding

1 What problems does global climate change pose for marine creatures?

Answer

Both land and oceans are getting warmer. The warming temperatures are causing many changes in the ocean. First, direct changes: it's getting too hot for some creatures. If they can move (like fish or squids), they can move to areas with cooler waters. (Others, like corals, are not so lucky, and wither or die). Second, climate change can have indirect effects, such as lowering the oxygen content in the water. This is a problem for many animals that need higher oxygen levels.

There are other problems that we have not discussed in this paper, such as ocean acidification: more CO₂ in the atmosphere means more CO₂ dissolved in the ocean, which lowers the pH of the water and causes a lot of problems for coral and other creatures with shells or so-called exoskeletons made of calcium carbonate (such as crabs and mollusk).

2 What does the Gill-Oxygen Limitation Theory (GOLT) describe?

Answer

The GOLT is based on the fact that gills, because they work as a surface, cannot keep up with the rest of a fish's body, which works as a volume. That means that they cannot keep up with the higher demand for oxygen of larger fish in warmer water. This limits the size of fish and forces them to remain smaller.

3 So what is the limiting factor for fish growth, according to our theory?

Answer

The oxygen content in the surrounding water (and the growth rate of gills).

4 What is the competing argument of some of our critics?

Answer

They argue that gills can indeed grow as fast as the rest of the fish's bodies. According to them, fish are not limited in growth by low oxygen supply, and they can just grow bigger gills when they need more oxygen. However, we believe that they misinterpreted physiological experiments and thus arrived at a wrong conclusion.

5 What other evidence besides calculations or models do we have that indicate our GOLT theory is valid?

Answer

It can also be used to explain other phenomena of fish biology. And it can be validated by empirical data. Finally, it also makes the most sense of all the theories used to explain why fish are shrinking as a result of climate change.