

PHOTOSYNTHETIC ANIMALS

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carbon dioxide + water $\rightarrow$ glucose + oxygen

Since the mitochondria are nearby, it's very easy for them to soak up the oxygen as soon as it's produced by the algal chloroplasts. What does the algae get from its relationship with the salamander? Look at the equation again and notice that photosynthesis requires carbon dioxide as a starting ingredient. The jelly that prevents oxygen from entering the eggs also prevents carbon dioxide from entering as well. Without the carbon dioxide, the chloroplasts can't function to make food and the algae will begin to starve. Luckily, when the

mitochondria produce energy, they use a process called cellular respiration which produces carbon dioxide as one of its products. Observe the equation for the reaction of cellular respiration:

glucose + oxygen $\rightarrow$ carbon dioxide + water

Thus the salamander mitochondria produce the carbon dioxide that is needed by the algal chloroplasts for photosynthesis. Since the relationship between the algae and salamander is beneficial to both partners, this type of symbiotic relationship is called mutualism.

Article Questions

- 1) Kleptoplasty (3) is the process whereby cells take in and use the chloroplasts of another type of organism. Oophilia (7) means egg-loving. A symbiotic relationship where both members in the relationship benefit is called mutualism (7).
- 2) How do the chloroplasts help the sea slug?
The chloroplasts photosynthesize to make food for the sea slug so that it doesn't have to search for its own food. (3)
- 3) What does the sea slug do with the energy that it saves by not needing to find food?
It uses this energy for mating and for evading predators. (5)
- 4) How does the algae help the salamander?
When the algae undergoes photosynthesis, it produces oxygen for the salamander eggs. This is necessary because atmospheric oxygen cannot diffuse through the protective jelly that surrounds the eggs. (7)
- 5) How does the salamander help the algae?
The salamander eggs produce carbon dioxide when their mitochondria undergo cellular respiration. This carbon dioxide is needed for the algae to perform photosynthesis. Without the photosynthesis to make food, the algae would starve. (7)
- 6) Record the equations for photosynthesis and cellular respiration.

Photosynthesis: carbon dioxide + water $\rightarrow$ glucose + oxygen (7)
Cellular respiration: glucose + oxygen $\rightarrow$ carbon dioxide + water (7)

What do you notice about these two equations and how is this important to the algae and the salamander?

They are the opposite equations of one another. The products of one reaction become the ingredients for the other reaction. This allows both organisms to benefit from each other by producing the vital ingredients needed for the survival of their partner. (7)