Lab: Coral Structure and Function

Background Information:
Many people don't think about the concept of coral as a growing organism. Coral organisms are some of the oldest and longest living animals on the planet. In fact, the geological record shows that ancestors of current coral ecosystems were formed a minimum of 240 million years ago; therefore, the most established coral reefs on the planet today are estimated between 5,000 and 10,000 years old.

Corals are indeed animals. While sessile, they rely heavily on their relationship with plant-like algae called zooxanthellae. Combined with the symbiotic, mutualistic relationship with zooxanthellae, coral organisms have built some of the largest biological structures on Earth. To make it short, coral provides a shelter for zooxanthellae, while zooxanthellae essentially provides the coral with nutrients.

Since coral permanently attach themselves to a hard substrate like the ocean floor (sessile) it is no wonder people assume they "take roots" like plants. Corals definitely fall into the animal category of life because unlike plants, animals can't make their own food. Animals must acquire food or energy from plants and animals by consuming them. Corals do this by extending tiny arms (very similar to a tentacle) out into the ocean to capture their food and bring it to their mouth to eat.

When examining coral structure more often than not you are looking at many individual coral organisms together as they tend to live grouped together in a colony like setting. When looking at what you might call "a single coral" organism you are more than likely looking at hundreds or even thousands of coral polyps. These individual coral polyps are soft bodied and thus vulnerable so they must secrete a hard outer shell or skeleton. This skeleton is made up of limestone or calcium carbonate and this is the park of the coral organism that attaches to the substrate whether it be rock, the ocean floor, or even the skeletons of other polyps (dead or alive).

Coral structure is heavily dependent on the type of coral you are examining. Now, most people imagine hard or stony corals when picturing coral in their head. Stony or hard coral polyps grow, die, and endlessly repeat this cycle until over time they create a limestone foundation for coral reefs to build upon. This endless cycle of growth, death, and regeneration for individual polyps gives rise to many substantial coral colonies that have the potential to live a very, very long time.

Soft corals are less common in the minds of many and include organisms such as sea fingers and sea whips. Soft corals are ahermatypes or non-reef building corals and because of this do not always need or have zooxanthellae. As their name suggests, they are soft and bendy resembling trees or plants. They tend to live shorter lives than their hard or stony counterparts. (Coral 101: Structure and Growth by Ashley Gustafson Nov. 16, 2016)

Pre-lab Questions:
1. How old are the most established coral reefs on the planet?
2. What kingdom are corals classified in?
3. Name and discuss the relationship between coral and zooxanthellae.
4. Describe how corals, although sessile, collect food.
5. Discuss the formation of the limestone coral foundation that reefs are built upon.
6. Differentiate between stony or hard corals and soft corals.

Activity Directions: For each of the coral types presented, draw a picture of the entire piece of coral. Then, using the dissecting scope or magnifying glass, draw a picture of an individual corallite. Hypothesize the functional differences of each coral species.

Brain *Diploria* Coral	Brain *Diploria* Coral Corallite
Star *Montastraea* Coral	Star *Montastraea* Coral Corallite
Fossilized Star *Montastraea* Coral,	Fossilized Star *Montastraea* Coral Corallite
Staghorn *Acropora* Coral	Staghorn *Acropora* Coral Corallite
Bushy *Acropora* Coral	Bushy *Acropora* Coral Corallite,
Deepwater *Lophelia* Coral	Deepwater *Lophelia* Coral Corallite

Post-lab Questions:

7. What is the key difference that you see when comparing the deep sea *Lophelia* coral and the star *Montastraea* coral?
8. How do the various shapes of the coralite influence the overall body structure of the coral?
9. Star *Montastraea* coral is commonly found on the beaches of North Carolina. What can you determine about the environmental requirements that this type of coral needs to survive based on this information?