Khaled bin Sultan Living Oceans Foundation

STANDARDS

- **CCSS**: RST.9-10.1, 2, 3, 4, 5, 7, 8, 9, 10; RST.11-12.1, 2, 3, 4, 7, 8, 9, 10; W.9-10.2, 4, 7, 8, 9; W.11-12.2, 4, 7, 8, 9; SL.9-10.4, 6; SL.11-12.4, 6
- **NGSS**: HS-LS4-1
- **OLP**: 4.B.1, 4.B.2, 5.C.22

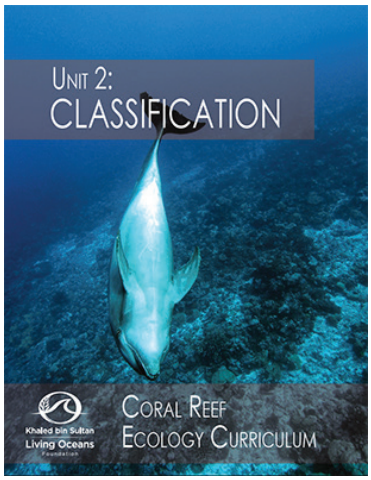
ONLINE CONTENTS

- Classification Quiz
- *What Clade R U?* Interactive (at bottom of *How To Build A Cladogram* section) Use the interactive program to learn and explore more about the anatomy of a stony coral polyp.
- *What Are Corals?* Video Classification helps scientists tell species apart. This educational video explains modern biological classification categories from the most general (domain) to the most specific (species).

CLASSIFICATION

This lesson is part of the *Classification* unit, which explains how to organize the millions of organisms on Earth. Below is a summary of what is included in the entire unit.

UNIT CONTENTS



A. Background Information
   - How Do We Classify Organisms?
   - Linnaean Naming System
   - Coral Classification
   - Modern Classification
   - Understanding Cladograms
   - How to Build a Cladogram

B. Lessons

Watch It! Naming Nature
- A worksheet to accompany the *Naming Nature* video

Classify This!
- A worksheet to classify an organism and identify its characteristics

Rules, Rules, Rules
- A worksheet about scientific names

"Taxing" Corals
- An activity to classify corals based on their characteristics

In Light of New Evidence
- A writing assignment on an organism that has been reclassified

The Key to ID
- An activity using a dichotomous key for sea stars

And Then There Was One
- An activity to create a dichotomous key for corals

Cladograms 1
- A lesson on creating and interpreting a cladogram

Cladograms 2
- A lesson on creating and interpreting a cladogram (with traits already included)

Read It! Troubling Taxonomy
- A worksheet to accompany the *Troubling Taxonomy* field blog

Read It! Blue, You Say?
- A worksheet to accompany the *Blue, You Say?* field blog

Name: _____ Date: _____

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LESSON 2 "TAXING" CORALS

ADDITIONAL BACKGROUND INFORMATION:

With over 1,000 coral species in the ocean, identification and **classification** is not an easy task. That's why scientists use identification keys.

Often when identifying coral, samples have to be collected and transported back to the lab for further identification. The reason is that some corals are identified by the shape of corallite structures. As you will learn in *Unit 3: Coral Anatomy,* a **corallite** is the cup-like skeleton of an individual polyp.

Today, you are a coral ecologist working for the Khaled bin Sultan Living Oceans Foundation. You just returned from scuba diving in French Polynesia where you were conducting coral surveys and identifying corals. You have taken photographs of several corals for further identification and collected samples of each. In the lab, you have removed all of the tissue and now you are left with the corals' skeletons. These corals need to be identified. You will create a classification system based on the living coral photos and the corals' skeletons.

BRAINSTORMING:

UNKNOWN CORAL FP 01:

UNKNOWN CORAL FP 02:

UNKNOWN CORAL FP 03:

UNKNOWN CORAL FP 04:

BRAINSTORMING:

UNKNOWN CORAL FP 05:

UNKNOWN CORAL FP 06:

UNKNOWN CORAL FP 07:

UNKNOWN CORAL FP 08:

UNKNOWN CORAL FP 09:

UNKNOWN CORAL FP 10:

INSTRUCTIONS:

1. Use the *Brainstorming* section to write down the characteristics of each unknown coral.
2. Create a classification system based on the coral's shared characters.
3. See grading rubric for poster and presentation assessment.
4. Make a poster to illustrate your classification system.
5. Present your classification system to the class.
6. Answer the questions below.

1. What characteristics did you use to group your corals? List all of the distinguishing characteristics.

2. Were the characteristics determined by the live or dead coral photos? Explain.

3. Why do scientists classify corals? Give two answers.

4. How do you think scientists classify new species of corals?

5. After listening to your classmate's presentations, would you change your classification system? Why or why not?

GRADING RUBRIC:

Name: _____ Date: _____ Score: _____

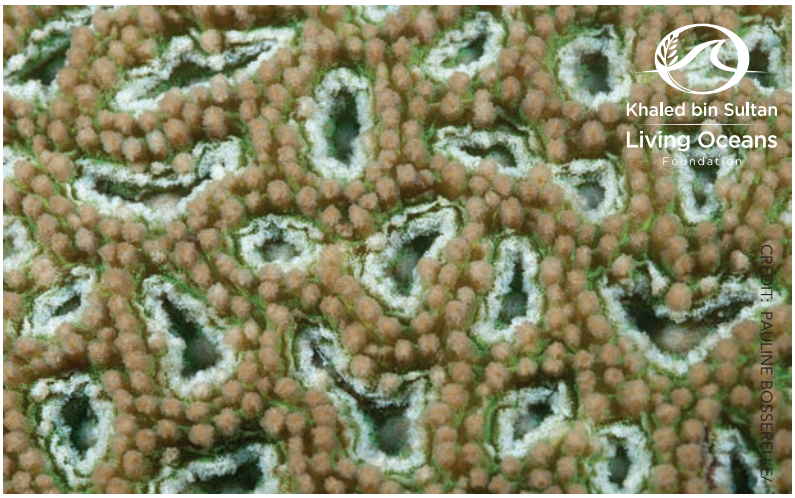
Category	4	3	2	1	Score
Organization	Clear title, clearly defined sections, clear flow of topics, and easy to follow	Clear title, sections defined, generally easy to follow, though may require rereading for clarity	Title present, sections unclear or inappropriate, takes effort to follow thoughts and ideas	Title unclear or absent, sections unclear or absent, no flow of ideas, and cluttered, messy	
Attractiveness	The poster is exceptionally attractive in terms of design, layout, and neatness.	The poster is attractive in terms of design, layout and neatness.	The poster is acceptably attractive, though it may be a bit messy.	The poster is distractingly messy or very poorly designed. It is not attractive.	
Grammar/ Spelling	There are no mistakes on the poster.	There are 1-3 mistakes on the poster.	There are 4-6 mistakes on the poster.	There are more than 6 mistakes on the poster.	
Knowledge Gained	Student can accurately answer all questions related to facts in the poster and processes used to create the poster.	Student can accurately answer about 75% of questions related to facts in the poster and processes used to create the poster.	Student can accurately answer about 50% of questions related to facts in the poster and processes used to create the poster.	Student appears to have insufficient knowledge about the facts or processes used in the poster.	
TOTAL				**Out of 16:**	

You will be awarded one point for accurately labeling each distinguishing characteristic. _____/50

TOTAL SCORE _____**/66**

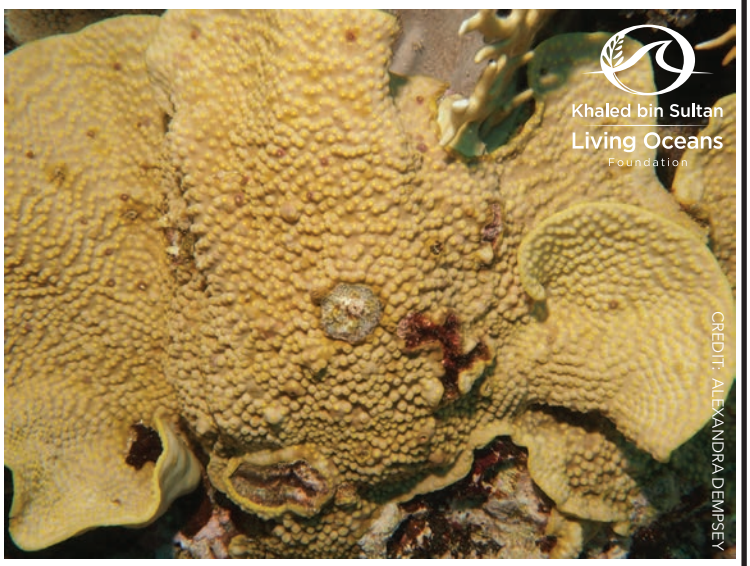
25/09/2012 - FP 01
Full Frame Photo – Live coral

Macro Photo – Live coral



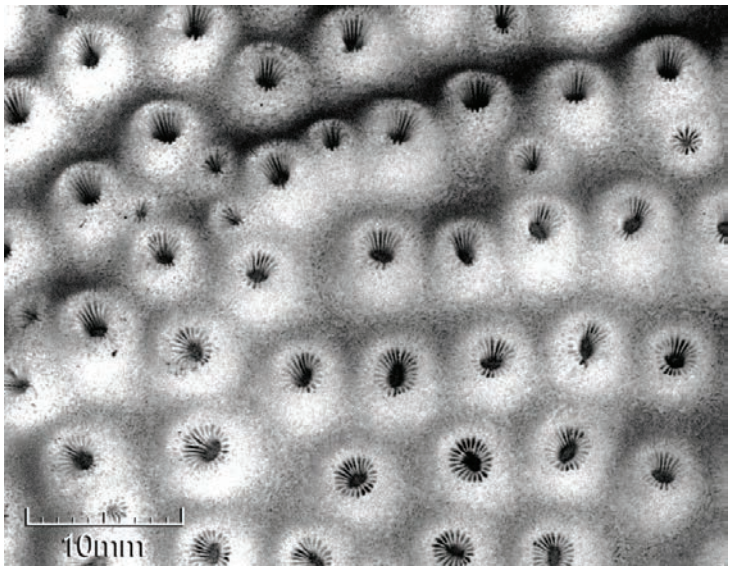
Macro Photo – Coral skeleton

25/09/2012 - FP 02
Full Frame Photo – Live coral



Macro Photo – Live coral

Macro Photo – Coral skeleton

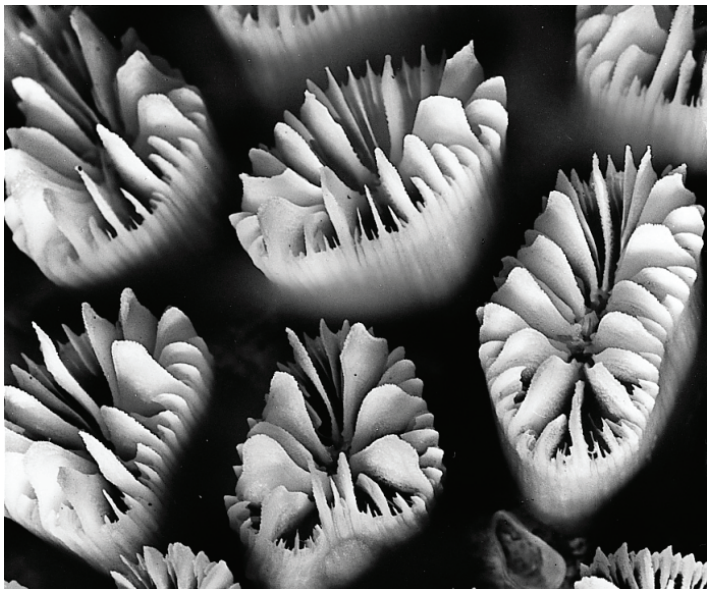


30/09/2012 - FP 03

Full Frame Photo – Live coral

Macro Photo – Live coral

Macro Photo – Coral skeleton

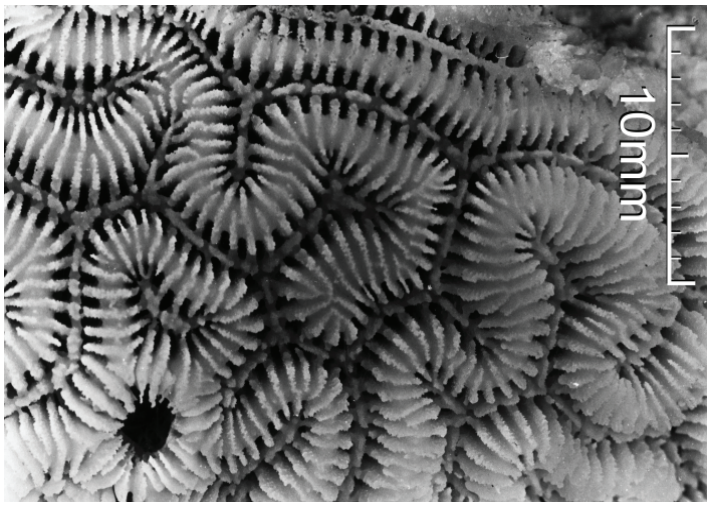


09/10/2012 - FP 04

Full Frame Photo – Live coral

Macro Photo – Live coral

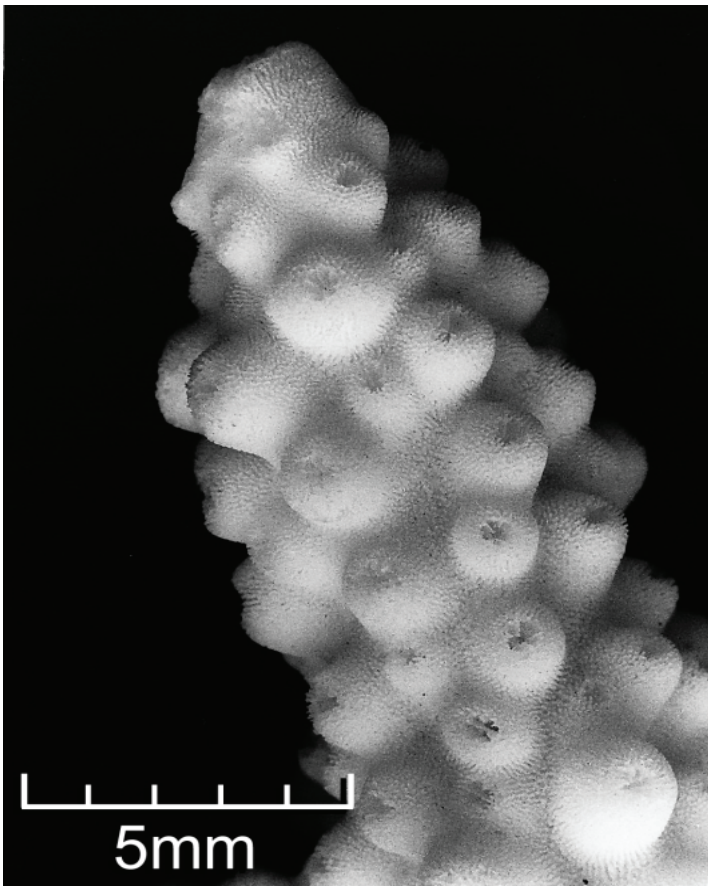
Macro Photo – Coral skeleton



10/10/2012 - FP 05

Full Frame Photo – Live coral

Macro Photo – Coral skeleton

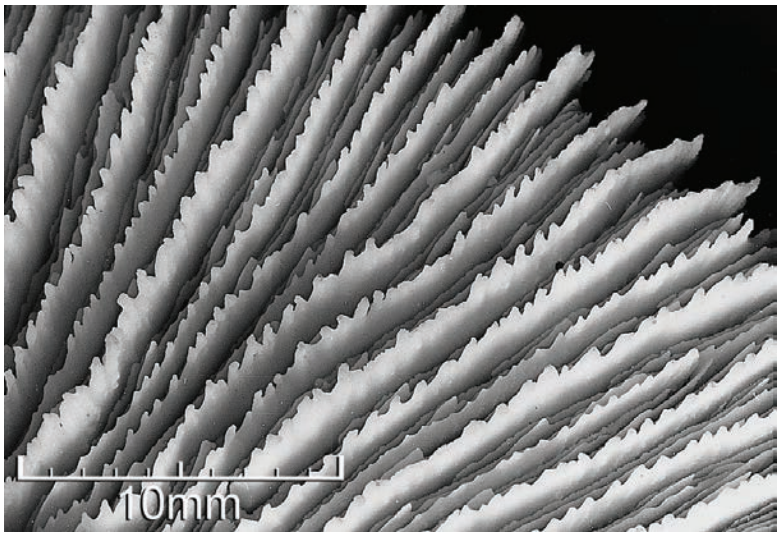


Macro Photo – Live coral

15/10/2012 - FP 06
Full Frame Photo – Live coral

Macro Photo – Live coral

Macro Photo – Coral skeleton



17/10/2012 - FP 07
Full Frame Photo – Live coral

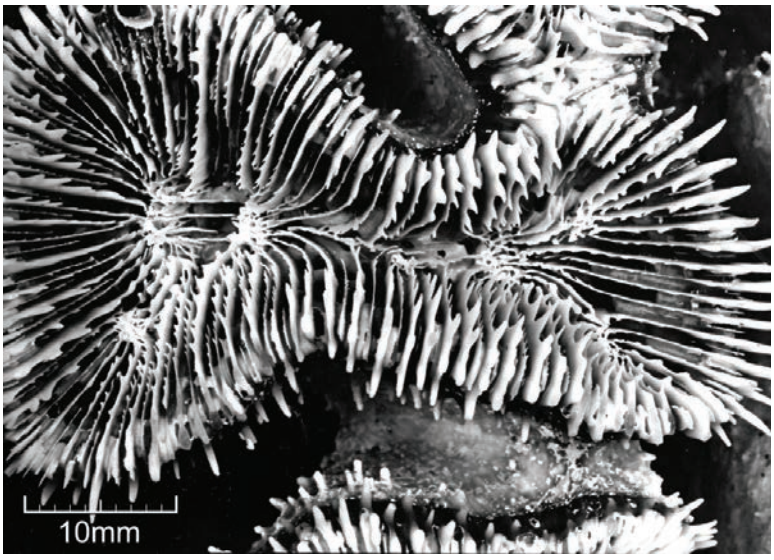
Macro Photo – Live coral

Macro Photo – Coral skeleton

18/10/2012 - FP 08
Full Frame Photo – Live coral

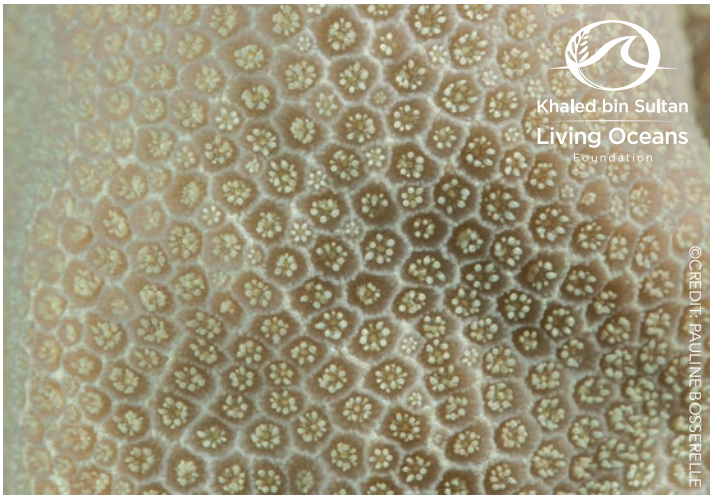
Macro Photo – Live coral

Macro Photo – Coral skeleton

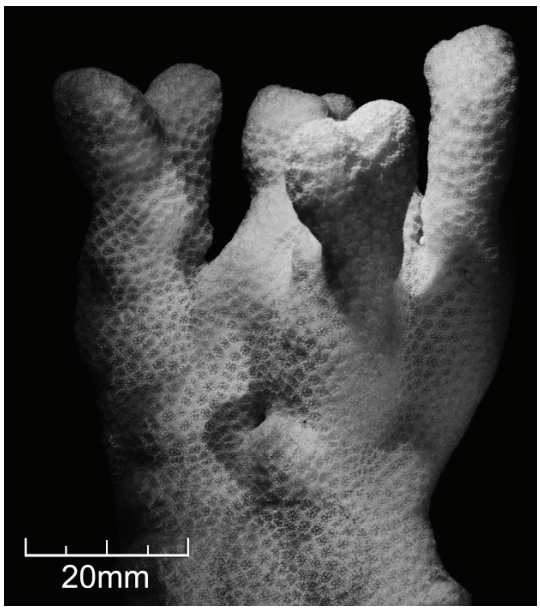


18/10/2012 - FP 09
Full Frame Photo – Live coral

Macro Photo – Live coral



Macro Photo – Coral skeleton

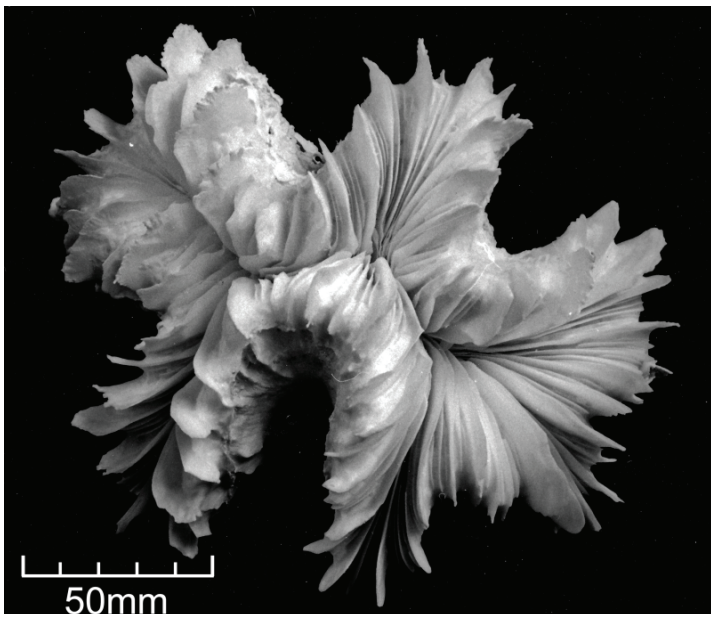


22/10/2012 - FP 10

Full Frame Photo – Live coral

Macro Photo – Live coral

Macro Photo – Coral skeleton



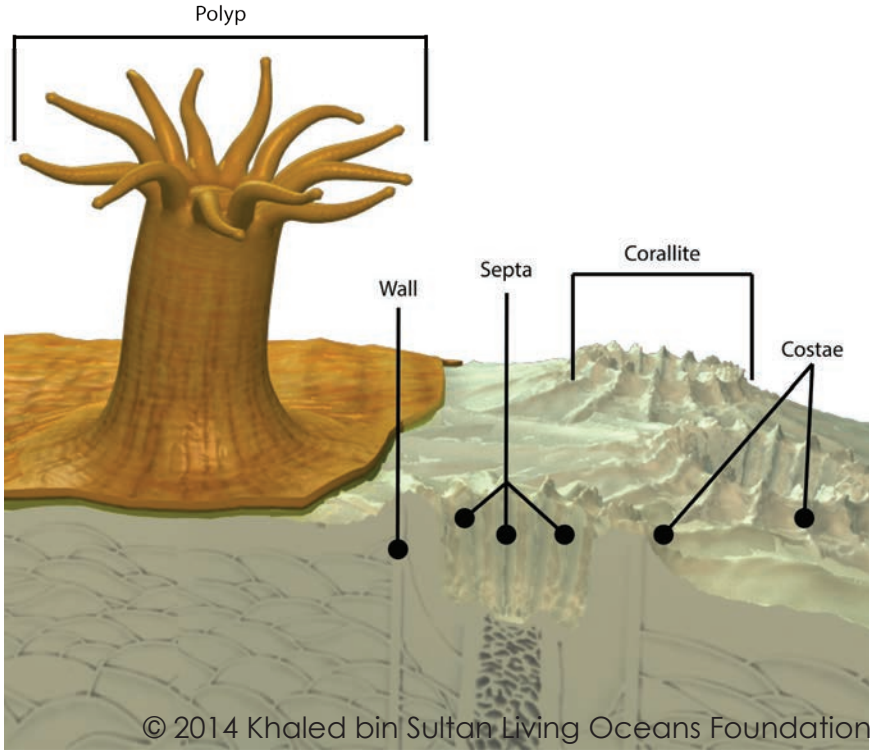
HOW TO IDENTIFY CORAL

Identifying corals is a tedious task. There are several methods that allow scientists to identify corals. Here is an overview of the methods that coral ecologists use:

1. Corals can be *solitary* or *colonial*. An individual is called a coral *polyp*. A solitary coral is an individual polyp, while colonial corals have more than one polyp. Depending on the size, a single colonial coral can have hundreds or even thousands of polyps. All but one of the corals in this activity are colonial corals. See the answer key for more details.

2. Corals possess certain shapes called *growth forms*. These growth forms help scientists to identify corals. Growth forms include branching, columnar, encrusting, foliose, free-living, massive, phaceloid, and plating. The growth forms for each coral are listed in the answer key. For more information, see *Unit 9: Coral Growth*.

3. Stony corals can be identified by their *corallite*. Before you understand how to identify corals, you must first learn some coral terminology. Please refer to the graphic below.
   - Corallite: cup-like skeleton that is made of calcium carbonate ($CaCO_3$).
   - Septa: vertical blades that are inside the corallite. When septa cross the wall outside the corallite, they become costae.
   - Costae: vertical blades on the outside of the corallite. When costae cross the wall to the inside of the corallite, they become septa.
   - Wall: the raised part of the skeletal structure. Separates corallites from each other. It also separates the septa from the costae.



The shape, size, and pattern of the corallite can help to identify corals. Scientists do not identify corals by their color. Here are some examples below:

- The septa, costae, and walls all have different spacing, size, and structures that help scientists to identify corals. For example, septa can have *septal teeth* (projections on the septa). These teeth can be used to help identify coral species. For example, *Ctenactis* spp. have large, spiky septal teeth, whereas *Trachyphyllia* spp**.** have small teeth.
- The walls can also help to identify corals. Here are some examples below:

Separate Walls	Common Walls	Indistinct
 CREDIT: ANDREW BRUCKNER	 CREDIT: ANNELISE HAGAN	 CREDIT: ANNELISE HAGAN
Each corallite has its own wall.	Corallites share a wall.	Corallite walls are not present or they are indistinct

There is an extra step when identifying branching corals. These corals have two types of corallites:

- *Axial corallite*: a single corallite that is located at the tip of a branch. NOTE: not all branching corals have axial corallites.
- *Radial corallite*: corallites that are typically smaller than the axial corallite that occur on the sides of branching corals.

This is just the tip of the iceberg. There are many other structures that help scientists to identify corals. For more information, check out the resources below.

RESOURCES

- Kelley, R. (2009). The Australian Coral Reef Society Finder, Indo-Pacific. Published by BYOGUIDES, Townsville, Australia.
- Veron, J.E.N. (2000). *Corals of the World. Volumes 1-3.* Townsville: Australian Institute of Marine Science.