

FIELD ACTIVITY: CAULERPA HUNT!!!

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FOR EDUCATORS: This activity can be geared toward any age group and can be adapted to run as a class exercise or as an independent research project. Depending on your location and goals, students can search for *Caulerpa* in coastal areas, in local retail shops, in their family's home/business aquaria or even via e-commerce (E-Bay works especially well for this).

GOAL: To collect *Caulerpa* from as many sources as possible within Florida. The more samples we have, the better the database we will be able to build. DNA from these samples will be sequenced and added to the international *Caulerpa* database. Sequencing is the only definitive way to distinguish some look-alike species of *Caulerpa* and to determine the geographic origin of an individual. For example, *Caulerpa* purchased in an aquarium store in Orlando might have been originally collected in the Florida Keys or it might have come from southern California, where they are still in the process of eradicating *C. taxifolia* - aquarium strain.

MATERIALS NEEDED TO PROCESS CAULERPA:

Plastic zip lock bags with ~1 tablespoon silica gel (one bag for each individual organism collected; if requested, Dr. Walters will provide more bags)

Fresh water

Paper towels

Indelible marker

Forceps (if available)

Algae identification book (if available)

Herbarium paper or watercolor paper (one piece for each individual organism - must label the exact same way same as the bag sample) (Available at Michael's or other craft shops, Dr. Walters can also provide)

Pencil

Wax paper (high quality)

Plastic tub or cookie sheet that will enable you to lay out the paper flat on the bottom and cover with 2-5 cm (1- 2 inches) of water (saltwater preferred, freshwater OK)

Newspaper and cardboard

Herbarium press or heavy books (e.g. phone books)

Additional supplies if collecting in the field: Ziploc bags, bucket, GPS to record collection coordinates or a map to describe collection location

HOW TO PROCESS CAULERPA:

For every individual of *Caulerpa* collected (regardless of species), we need both a bagged sample and a herbarium press voucher. Labels on both need to be identical. *Caulerpa* samples

need to be kept cool and processed as quickly as possible after collection. Once the alga starts to die (especially if in the sun in a closed plastic bag), the DNA may be degraded.

Silica gel bag preservation:

- 1) Remove any epiphytes (attached plants, animals) or other debris from the individual.
- 2) Rinse briefly in freshwater.
- 3) Blot material dry to the extent possible without causing any damage.
- 4) Place 3-5 fronds (upright parts of individuals = leaves if terrestrial plant) in bag with silica gel. Make sure the algal tissue is covered with silica gel. Try to maximize the surface area between the tissue and gel.
- 5) Close bag tightly and shake for about 1 minute (it should feel warm due to the exothermic reaction between the silica and water).
- 6) Label with the indelible marker. Make sure to record the date, exact location, and species if you know it.
- 7) Check after 12-24 hours. If the silica gel is wet (no longer white with royal blue flecks), then replace with fresh silica gel. If the alga is delicate, use forceps to transfer it to a new bag.
- 8) Samples are now ready to ship to Dr. Walters.

Herbarium pressing of voucher specimens:

- 1) Use the rest of the individual from which you created each bagged sample for the herbarium press voucher (or a subset of it if the individual is quite large). Make sure for the herbarium press, the individual includes upright fronds, the rhizome (stolon), and rhizoidal filaments (root-like structures).
- 2) Remove all epiphytes and other debris from the individual.
- 3) With a pencil, in the lower left corner of the herbarium paper, record the date, exact location and species if known. Please make sure the information exactly matches the label on the bag sample. Use identification numbers if necessary.
- 4) Place the paper in tray/tub that is covered with water (seawater if possible).
- 5) Float the alga over the herbarium paper until it looks natural and then lift the paper with the alga on it from the water.
- 6) Place a sheet of lightly crumpled wax paper over this voucher specimen.
- 7) If you have a herbarium press, sandwich the voucher between layers of blotter paper (newspaper) and surround this with a sandwich of corrugated cardboard. After all specimens have been processed, cinch down the wooden press with cotton straps and allow to dry. Change newspaper and blotter paper as necessary.
- 8) If no herbarium press is available, place the voucher + wax paper on a dry surface. Alternate at least 2 layers of newspaper and cardboard on top and underneath the sample. After you have layered all samples this way, place heavy books on top of the stack until dry. Please do not try to remove the wax paper from the sample as this frequently causes the specimen to tear.
- 9) When dry, please match with bag samples and ship to Dr. Walters.

WHERE TO HUNT FOR CAULERPA:

Any of the locations listed below are very appropriate and very helpful for *Caulerpa* data collection. Please search in the areas that are most appropriate for your class.

Field: Subtidal areas up to about 5 meters (15 feet) where sea grass beds or hard substrates (e.g. rocks) are present are excellent places to search for *Caulerpa*. We usually snorkel to find this macroalgae, but wading can also work. Please identify the collection location with a GPS or on a map and include this information on the appropriate data sheet.

Retail shops: As retail aquarium suppliers sell merchandise from around the globe, we are very interested in sequencing DNA from any purchased (or donated) *Caulerpa*. Please fill one of the attached data sheets for each retail shop visited. Please look for both loose *Caulerpa* and *Caulerpa* attached to live rock (cultured rocks/coral chunks).

Personal/family/business aquaria: Many individuals have saltwater aquaria in their homes or businesses (especially restaurants). If these aquaria contain *Caulerpa*, we would be very interested in sequencing the DNA from these samples. If the aquaria owner knows the history of the *Caulerpa* (where acquired, time spent in tank), please include that information on one of the attached data sheets, as it is very valuable data. I would be happy to provide fact sheets to anyone owning a personal aquarium, so they can learn how dangerous aquarium dumping can be!

E-commerce: If your students search the web for *Caulerpa*, please have them e-mail me the sites where they find it on the web. We can then order it directly from the company. Make sure to try many different key words for your searches. In addition to *Caulerpa*, consider trying marine plants, saltwater plants, feather algae, green algae, etc. You may want to have some students look for live rock on the web as it may harbor many, many genera including *Caulerpa*. Please fill out one of the attached sheets for each e-commerce site discovered (including each E-Bay vendor) selling *Caulerpa* or live rock with *Caulerpa* on it.

Data Sheet: *Caulerpa* Collected from Home/Business Aquaria

Please submit a separate data sheet for each aquarium visited even if *Caulerpa* is not found

Collector's name:

Date:

Email address:

School:

Teacher's name:

Course name:

Circle one:

Home aquaria

Business aquaria

Street address of aquaria:

City, State, Zip:

County:

Phone Number of Owner:

Email address of owner:

Size of aquaria (in gallons or length x width x height):

Circle all that are present in this aquarium:

freshwater species

saltwater fishes

saltwater invertebrates

saltwater algae

saltwater *Caulerpa*

saltwater live rock (cultured coral or rocks that harbor all sorts of organisms from the place of origin)

If *Caulerpa* is available, record where the alga was obtained and how long it has been in the tank:

Was the *Caulerpa* loose or attached to live rock?

If live rock is available, record where the live rock was obtained, its county of origin, if it was wild-collected or cultured, and how long it has been in the tank:

List all additional organisms in tank (be as specific as possible):

Please remember to bag and press your *Caulerpa* samples as quickly as possible!

Data Sheet: *Caulerpa* Found via E-Commerce

Please submit a separate data sheet for each *Caulerpa* website

Collector's name:

Date:

Email address:

School:

Teacher's name:

Course:

Source of *Caulerpa* (circle one): E-Bay (answer Parts A and C)
Commercial Distributor (answer Parts B and C)

Part A:

Seller's ID:

Seller's address (if available):

Is seller distributing from their home aquaria or for a commercial distributor?

Reason for selling on E-Bay, if listed (e.g. moving, dismantling aquarium, too much in tank, etc.):

Photo included? (If yes, please print out and include with this data sheet):

PART B:

Name of Company:

Address:

Email address and phone number:

Web address:

Circle all that are appropriate for this distributor:

- Sells freshwater aquarium supplies
- Sells saltwater fishes
- Sells saltwater invertebrates
- Sells saltwater algae
- Sells saltwater *Caulerpa*
- Sells saltwater live rock (cultured coral, rocks that harbor all sorts of organisms from the place of origin)

PART C:

List the common and scientific names of *Caulerpa* for sale as well as the unit price for each species (or attach pages from web site):

Origin of live rock plus unit price for each type:

Does the live rock have green algae pictured on it or listed as a possible inhabitant of this live rock? Please attach web photo or description if appropriate.

Shipping and handling costs:

Data Sheet: *Caulerpa* Collected from Retail Shops

***Please submit a separate data sheet for each retail shop visited, whether or not it sells *Caulerpa* ***

Collector's name:

Date:

Email address:

School:

Teacher's name:

Course:

Name of Retail Shop:

Address of Shop (attach business card if available):

Phone Number of Shop:

Email Address of Shop:

Circle all that apply: Would you describe this shop as: Large Small
Chain Non-Chain (Mom & Pop store)

Circle all that are appropriate for this store: Sells freshwater aquarium supplies
Sells saltwater fishes
Sells saltwater invertebrates
Sells saltwater algae
Sells saltwater *Caulerpa*
Sells saltwater live rock (cultured coral, rocks that harbor all sorts of organisms from the place of origin)

If live rock is available, please list the country of origin of the rock, the cost/pound, and if the live rock was wild-collected or cultured:

If *Caulerpa* is available, please list the species by their scientific and/or common names:

List the amount of *Caulerpa* for purchase and the cost:

Was the *Caulerpa* loose or attached to live rock?

Please bag and press your *Caulerpa* samples as quickly as possible!