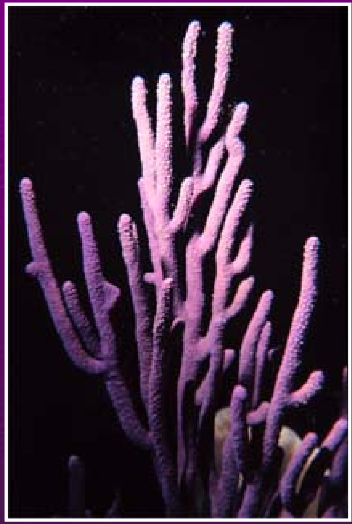
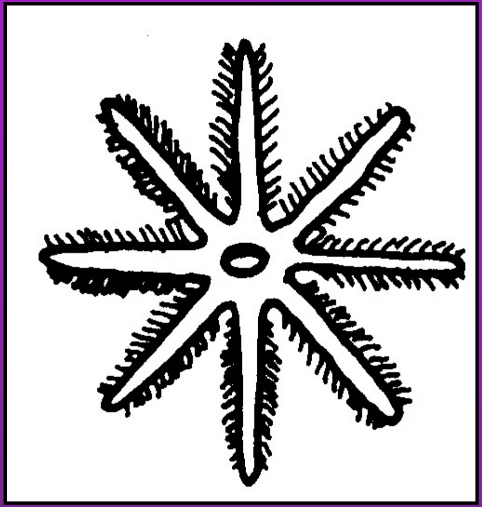
A NEW ERA FOR SEA FANS?

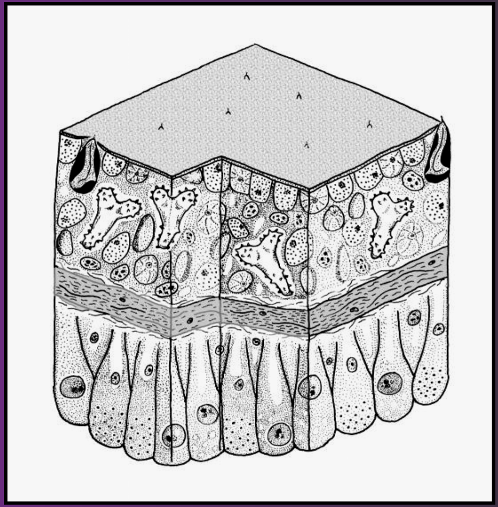
Michael P. Janes

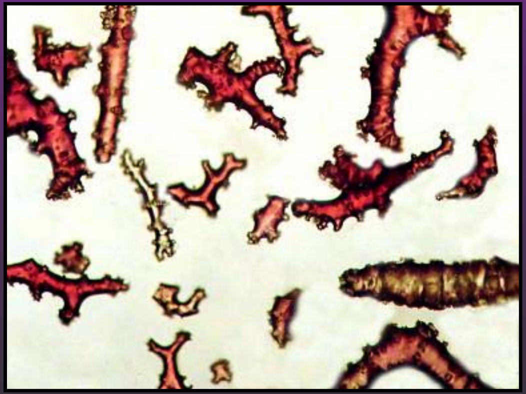


What are Gorgonians?

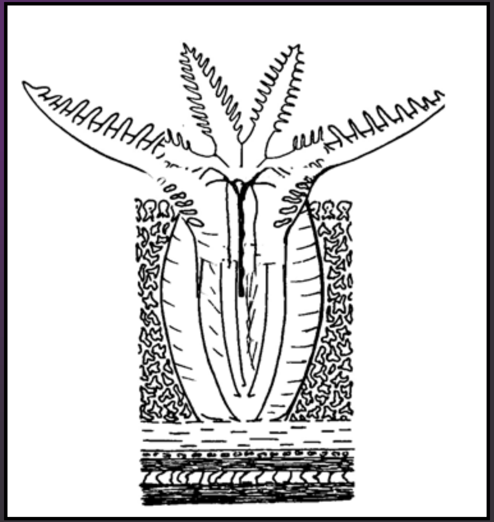


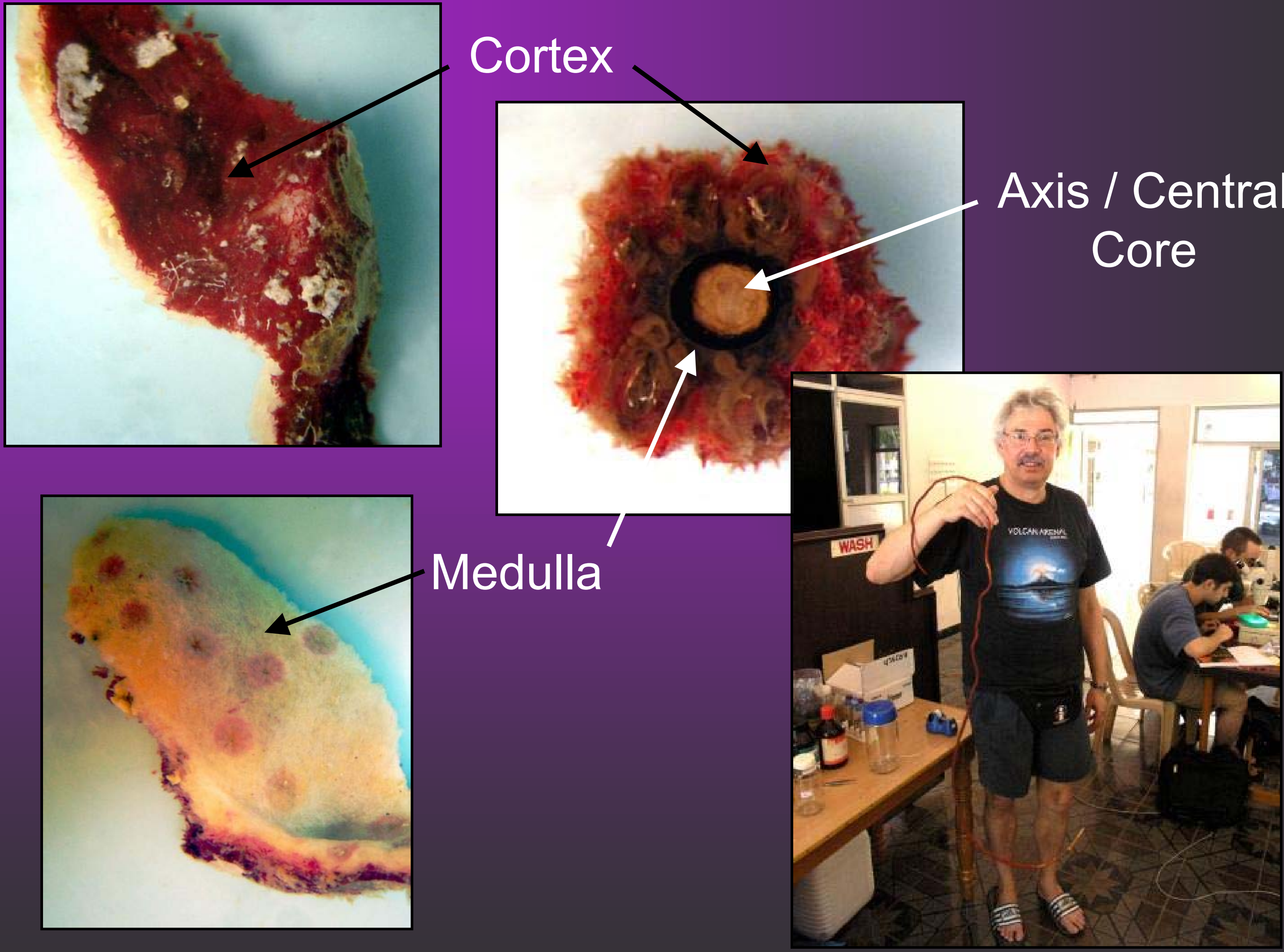
Octocorals





Sclerites



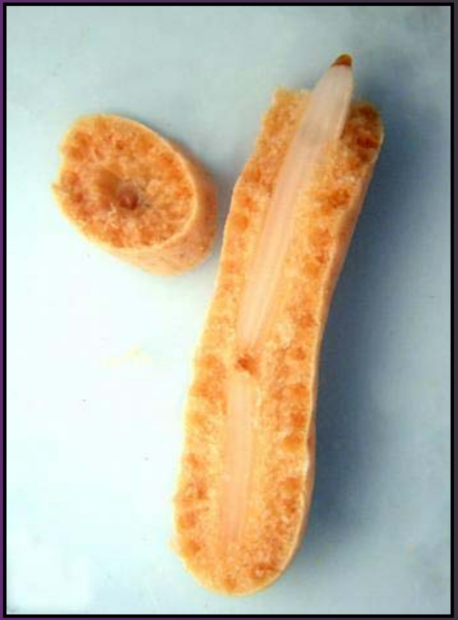

Cortex
Axis / Central Core
Medulla
WASH

Gorgonian Groups

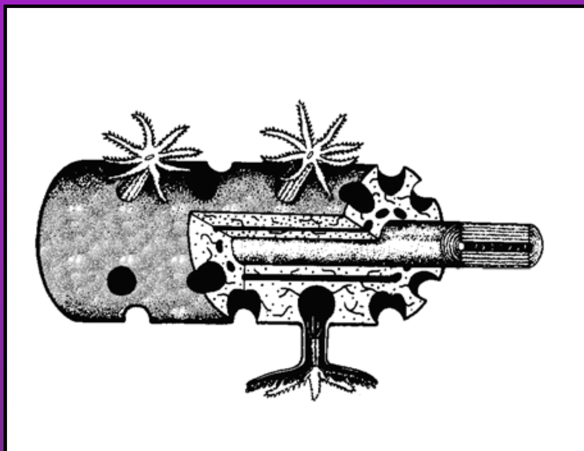
Scleraxonia

Holaxonia
(gorgonin)

Calcaxonia

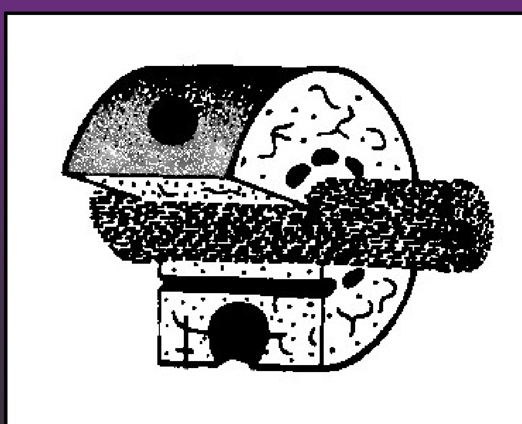


Morphology

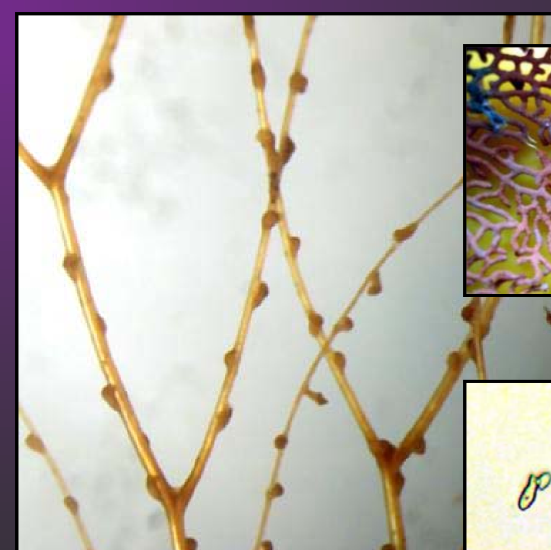


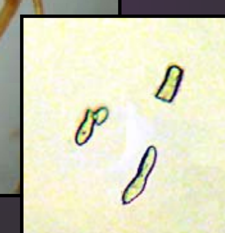
Holaxonia

After Grasshoff & Bargibant 2001

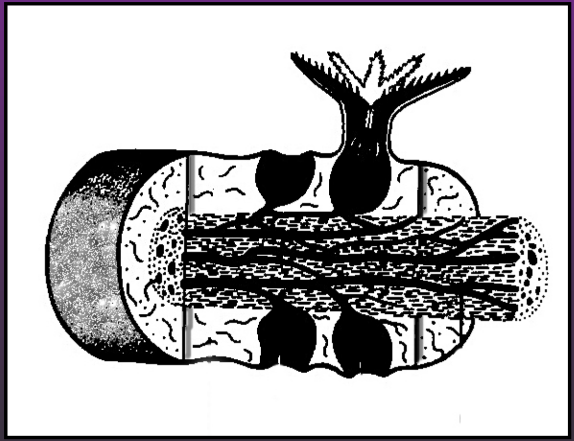


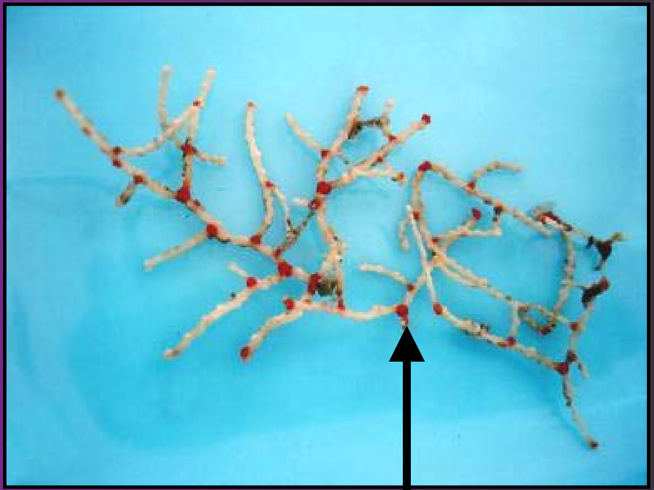
Calcaxonia





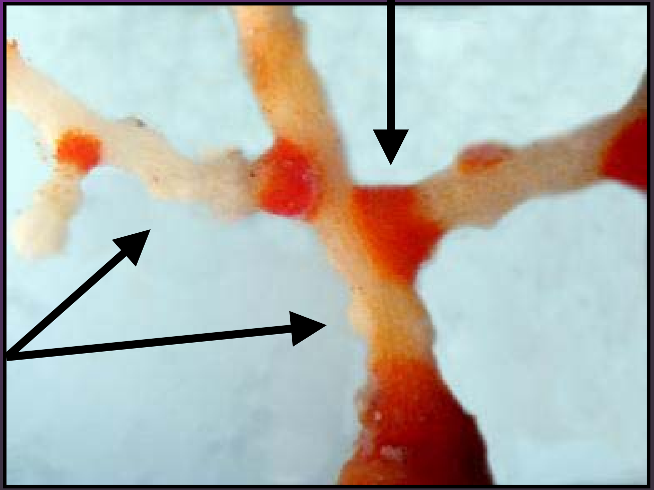
Scleraxonia





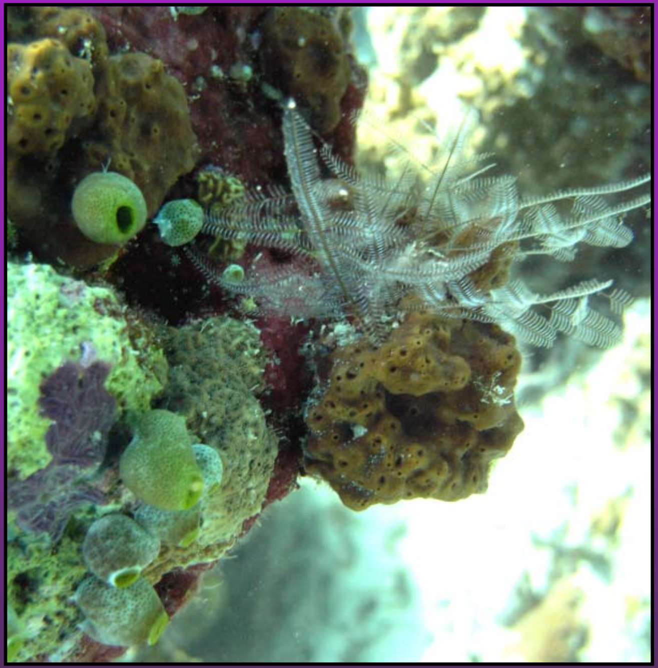
Acabaria sp.

Node



Internode

Similar Invertebrates

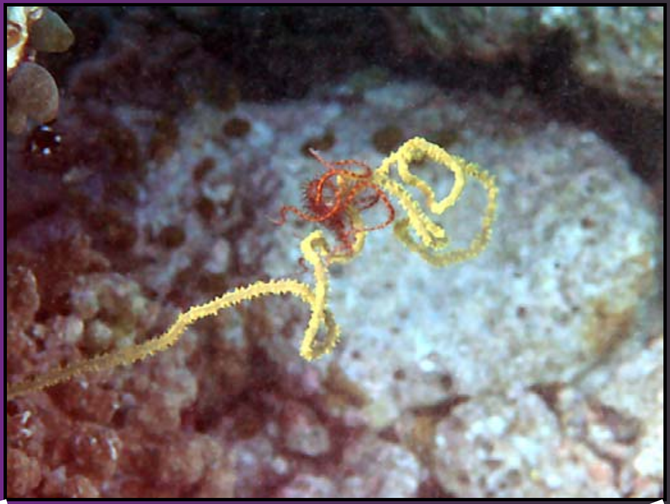


Plumularia sp.
Delicate Hydroid

Carijoa sp.
Clove Polyp Relative

Paratelesto sp.
No Central Axis

Stichopathes sp.
Black Coral Whip



Popular Aquarium Species

Scientific Name		Common Name
Muricea pinnata		Silver Gorgonian
Diodogorgia nodulifera		Yellow / Red Sea Rod

Scientific Name | Common Name

Petrogorgia sp.

Ribbon Gorgonian

Menella sp.

Colorful Sea Fan

Eunicea sp.

Candelabrum

Habitats

Shallow water environments

1. An oscillating water flow.
2. Turbidity / Photosynthetic species
3. Elevated nutrients.
4. Hard and soft substrates.

Deep water environment

1. Laminar water flow.
2. Clear water / Non-photosynthetic species
3. Low nutrient levels.
4. Hard substrates.

Sea Fans in Captivity

- Mounting
- Feeding
- Flow

Mounting

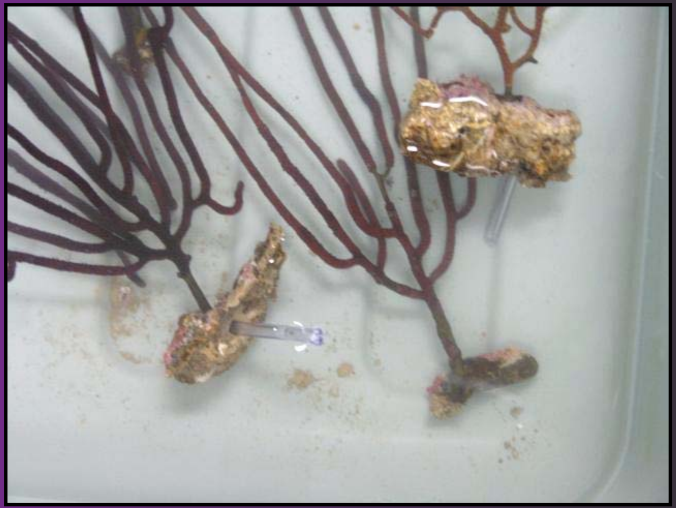
- Secure attachment to substrate
- Least invasive as possible
- Adjustable

Rubber band

Plastic / Rock base buried in substrate

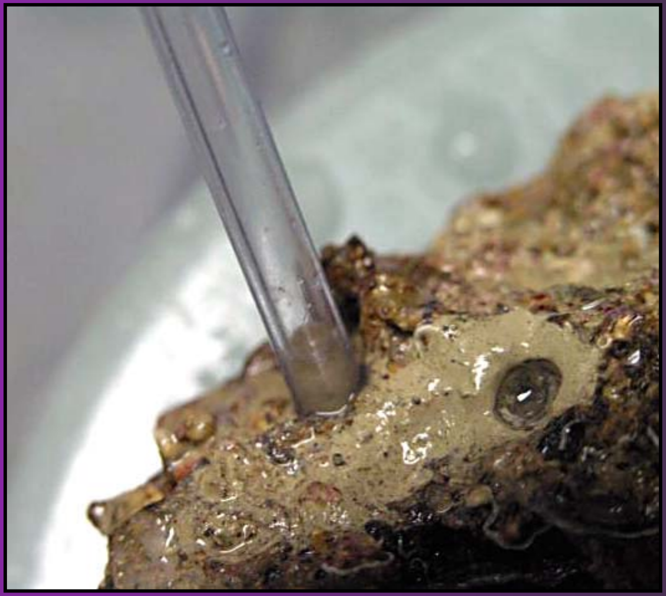
Glued rock base or aquacultured

Peg Method →

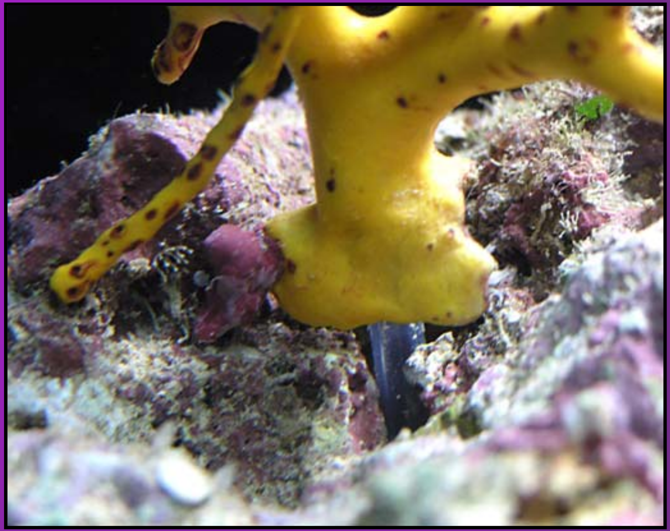


1. Power Drill
2. Wire Cutter
3. 3/16" Rigid Tubing
4. Sea Fans in saltwater

Drill 3/16" hole in sea fan base

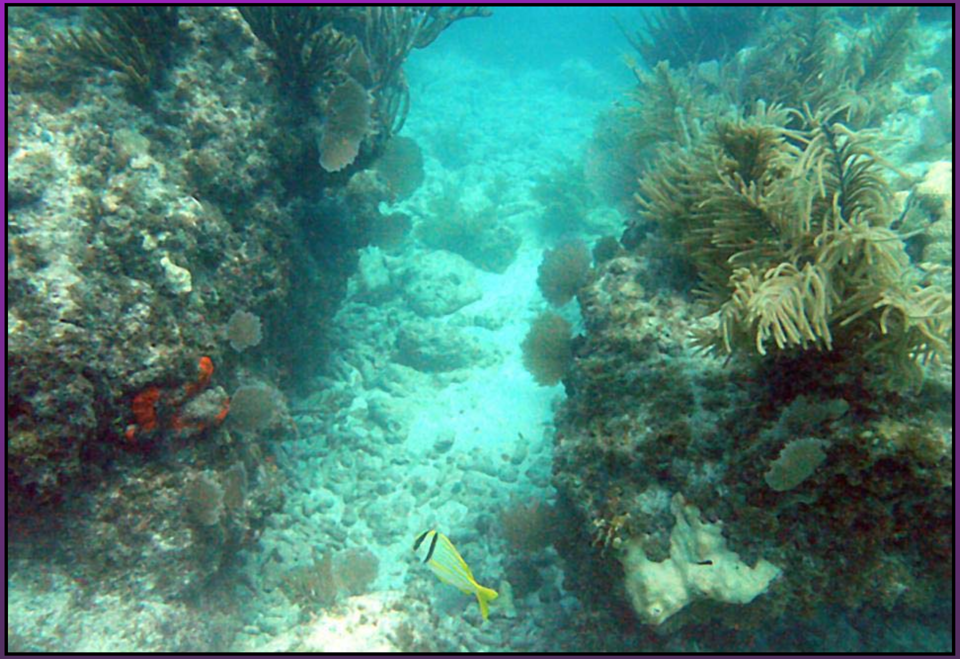


Drill same size mounting holes in live rock for placement



Peg coral in place

Flow



To determine water flow velocity

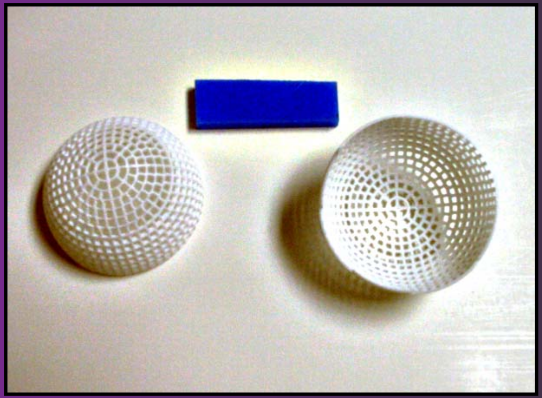
d = Distance (cm)

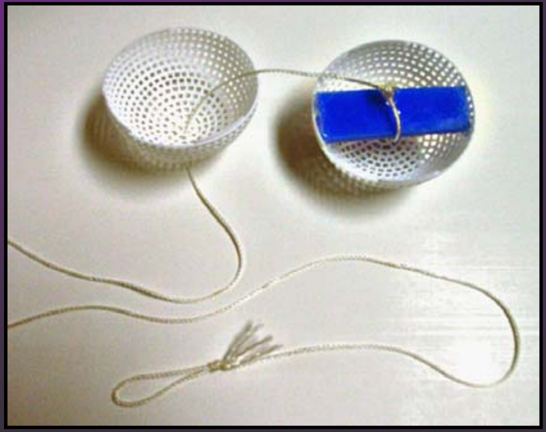
t = Time (sec)

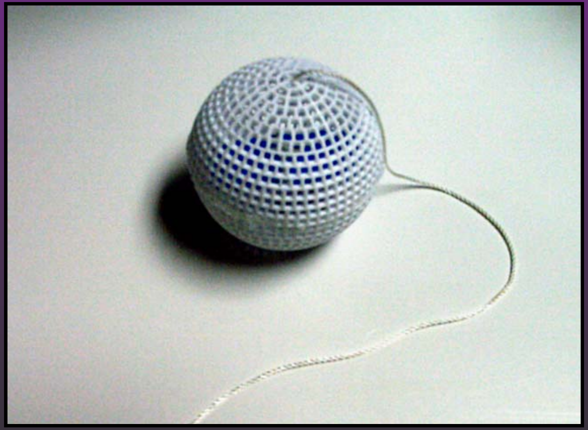
v = Velocity

d / t = v (cm/s –1)

Flow Measurement





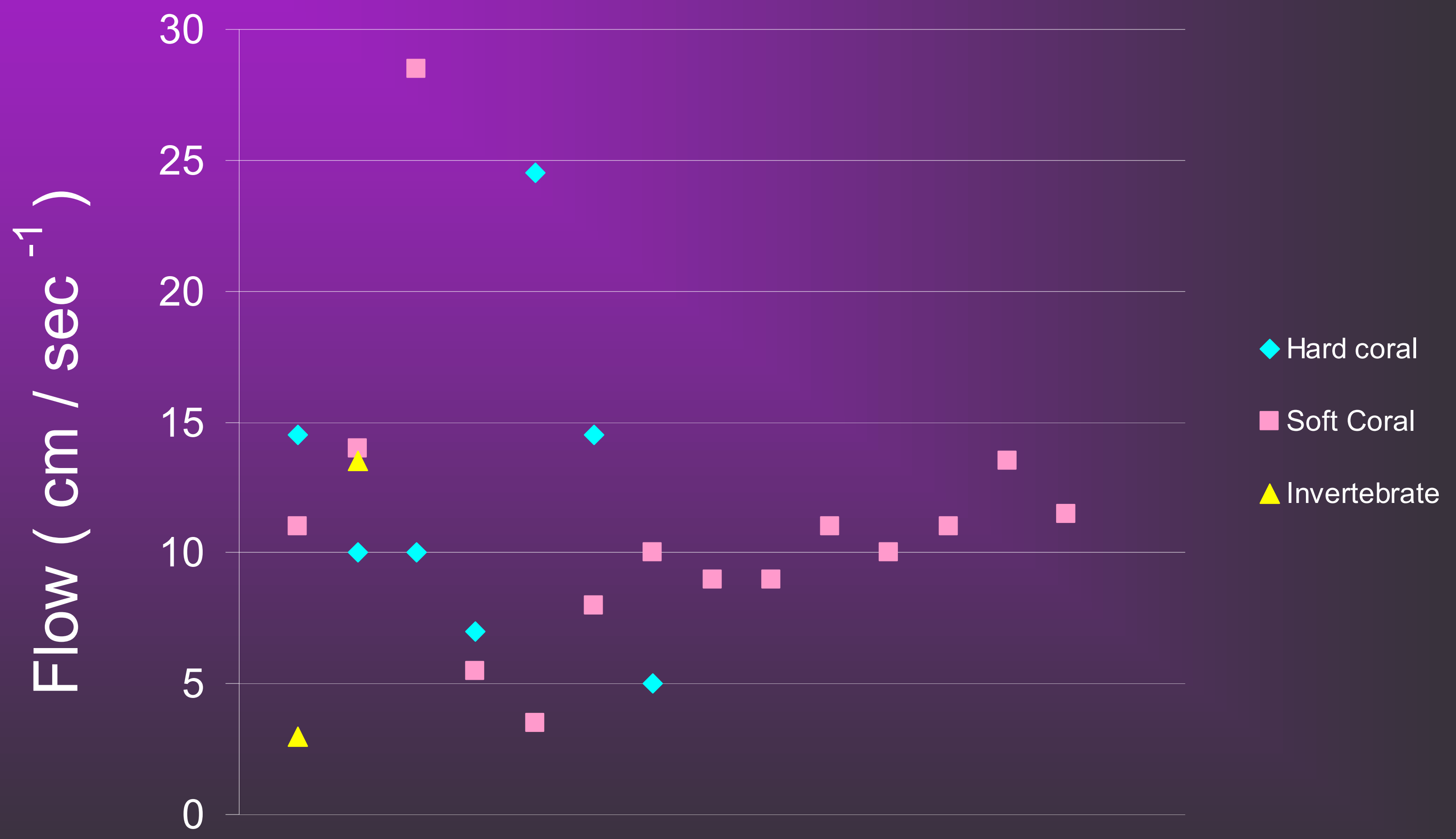


Small version of the Flow Meter for Aquariums

Water Flow Values for Selected Corals

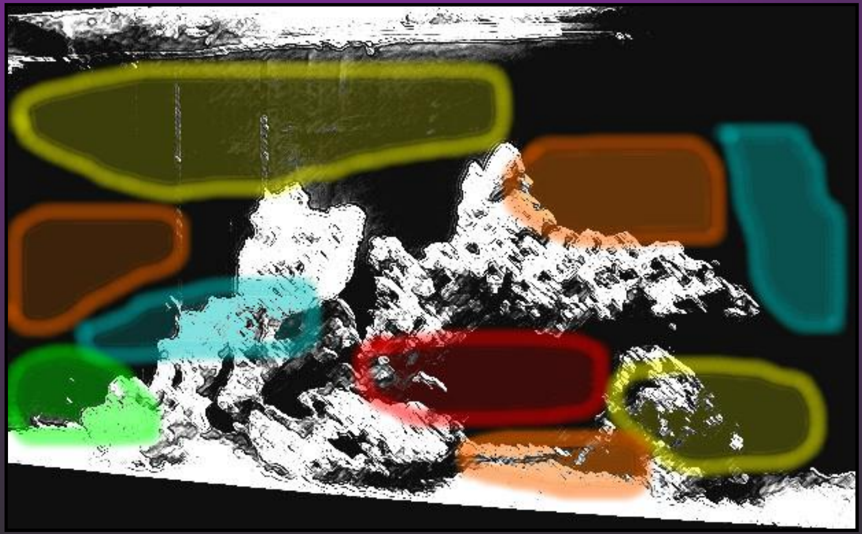
SPECIES		FLOW RESPONSE cm / sec^{-1}	
Hard Coral			
Favia favus		10	15
Porites porites		9	11
Meandrina meandrites		6	10
Madracis decactis (massive/encrusting)		6	8
Madracis mirabilis (wild)	Branching	15	30
Madracis mirabilis (tank)		10	15
Montastrea cavernosa		4	6
Soft Coral			
Alcyonium siderium		10	12
Dendronephthya hemprichi (polyp number)		12	16
Dendronephthya hemprichi (polyp size)		25	32
Xenia sp.		4	7
Anthelia sp.		3	4
Klyxum sp.		5	9
Briarium asbestinum		6	12
Acanthogorgia vegae		8	10
Plexaura homomalla		6	10
Plexaurella dichotoma		6	12
Eunicea tournefortis		6	12
Psuedopterogorgia americana		6	12
Melithea ochracea		6	15
Subergorgia suberosa		6	15
Invertebrates			
Electra pilosa (bryozoan)		2	4
Metridium senile (anemone)		10	17

Average Flow Rates for Selected Corals

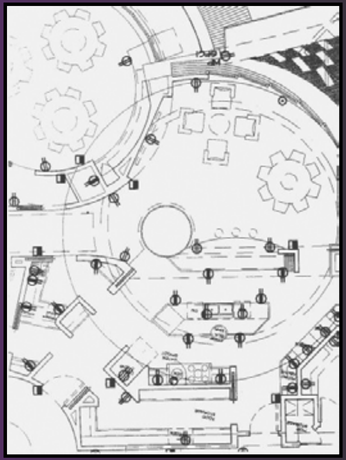


Flow Regions (cm/s^{-1}) Supreme Mag 12	
Red	19.0
Yellow	12.7
Orange	10.0
Blue	7.6
Green	6.3

Flow Regions (cm/s^{-1}) Supreme Mag 7	
Red	12.0
Yellow	9.5
Orange	7.6
Blue	4.7
Green	4.2



Aquarium Design

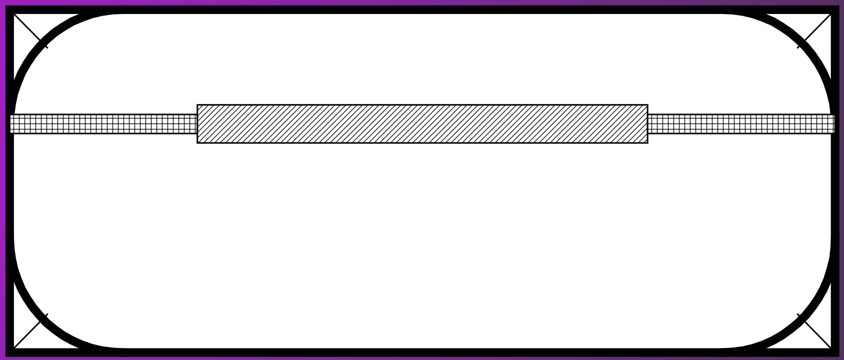


Flow Criteria

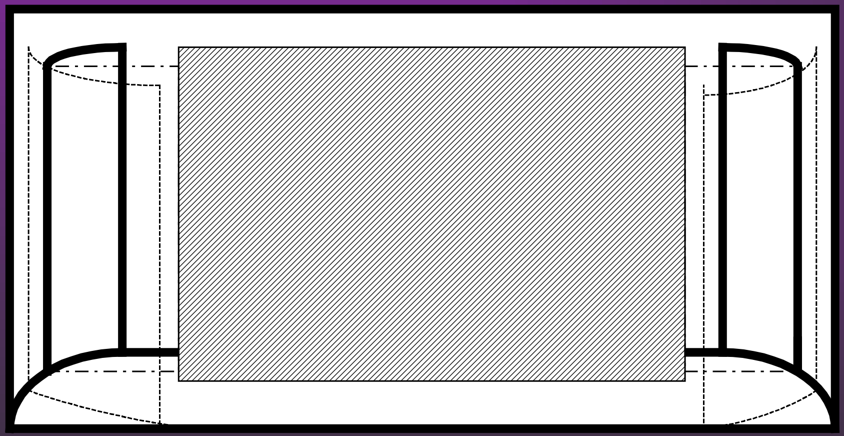
- Provide flow type necessary for specific gorgonian groups.
- Substrate surface access for mounting and orientating gorgonians.
- Limit obstructions for measuring flow.

Pseudo-Kreisel provides laminar flow

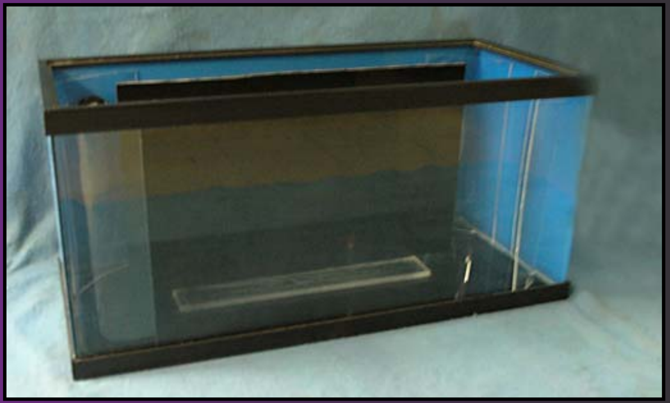
Top View



Laminar Flow Tank Design



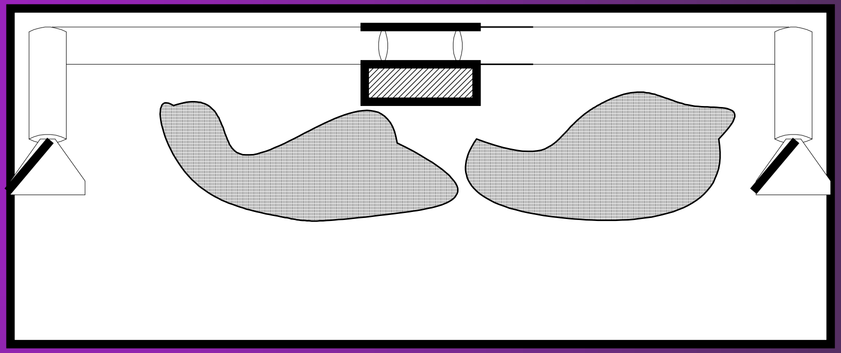
Front View

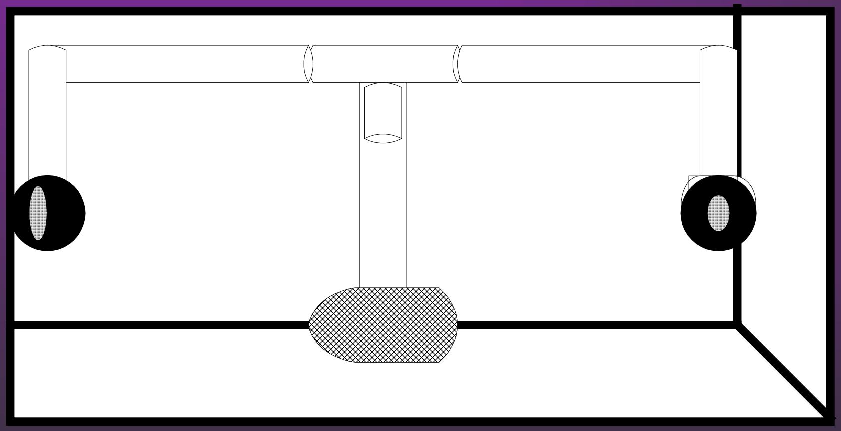

Laminar Flow Tank

Add a Protein Skimmer, Sea Fans and Fish

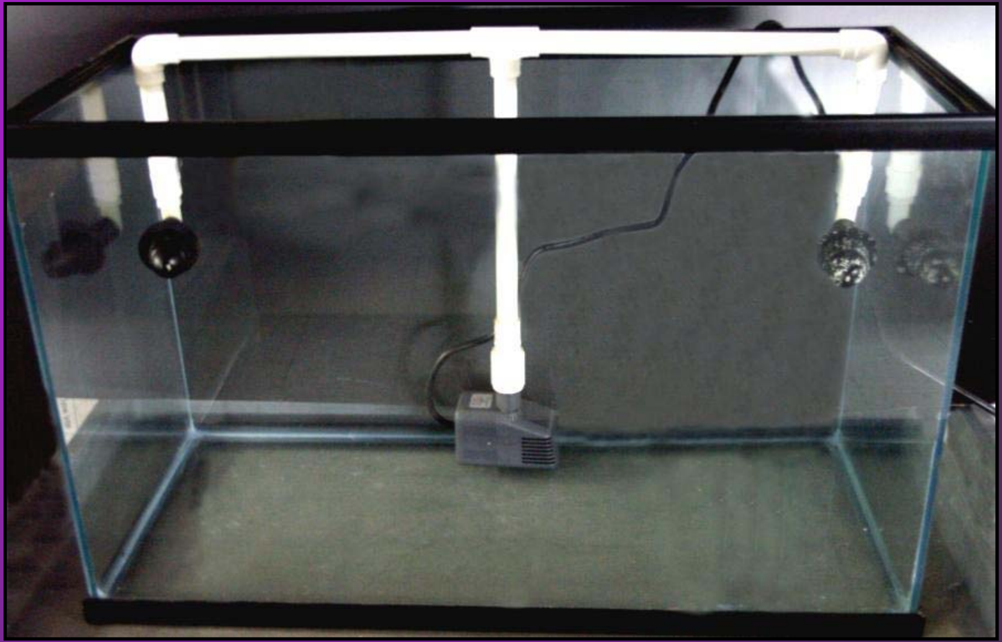
Top View

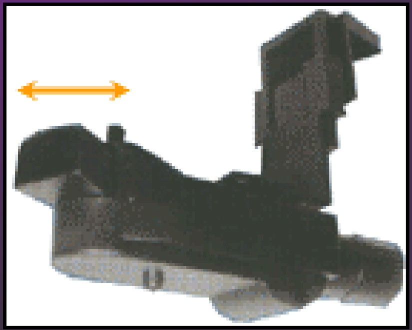


Oscillating Flow Tank Design



Front View





Feeding

Cyclop-eeze frozen copepods work well for larger polyp gorgonians

800 ųm

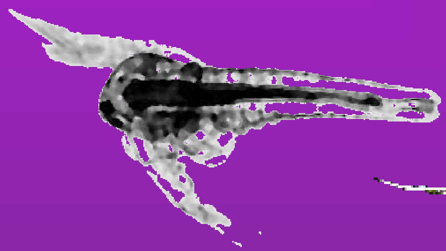
Smaller foods are necessary for most non-photosynthetic gorgonians

Rotifers
90-240 ųm

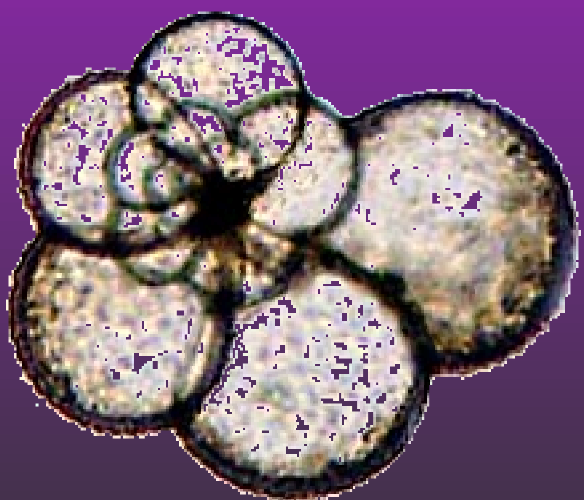
(What We Have)

Oyster Eggs
25-50 ųm

What's Missing



Meiofauna 100-1000 ɥm



Foraminifera

Nematodes

Gastotrichs

Isopods

Turbullarians

Clam Larvae

Phytoplankton

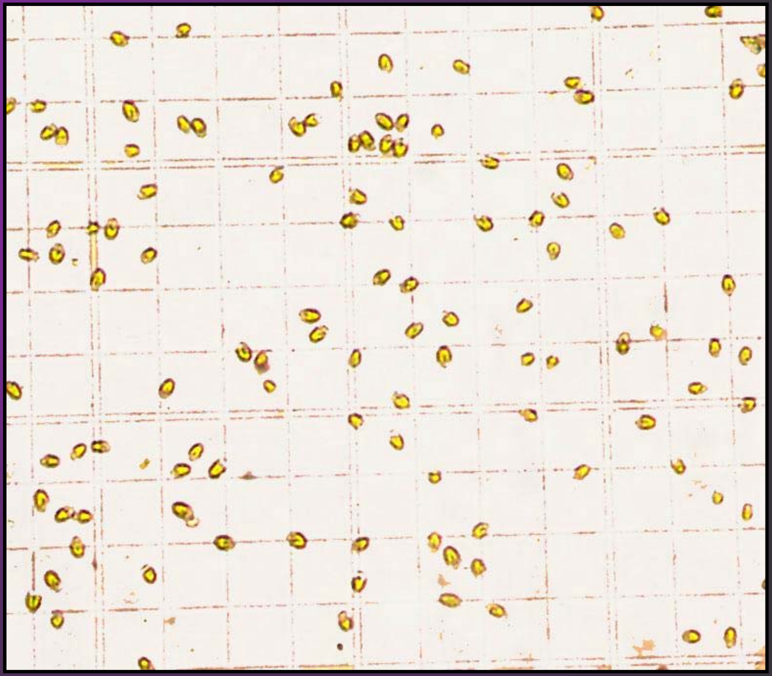
Microfauna <100 ɥm

Nanoflagellates < 10

Ciliates 10-50

Dinoflagellates 8-20

Diatoms 20+



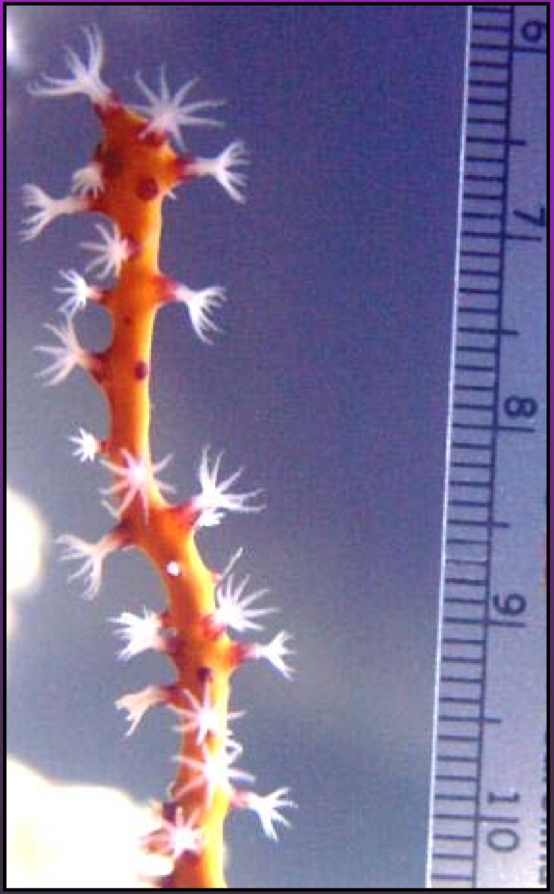
Drip Feeding

Combine foods.

Feed for a period of hours.

Polyp extension increases.

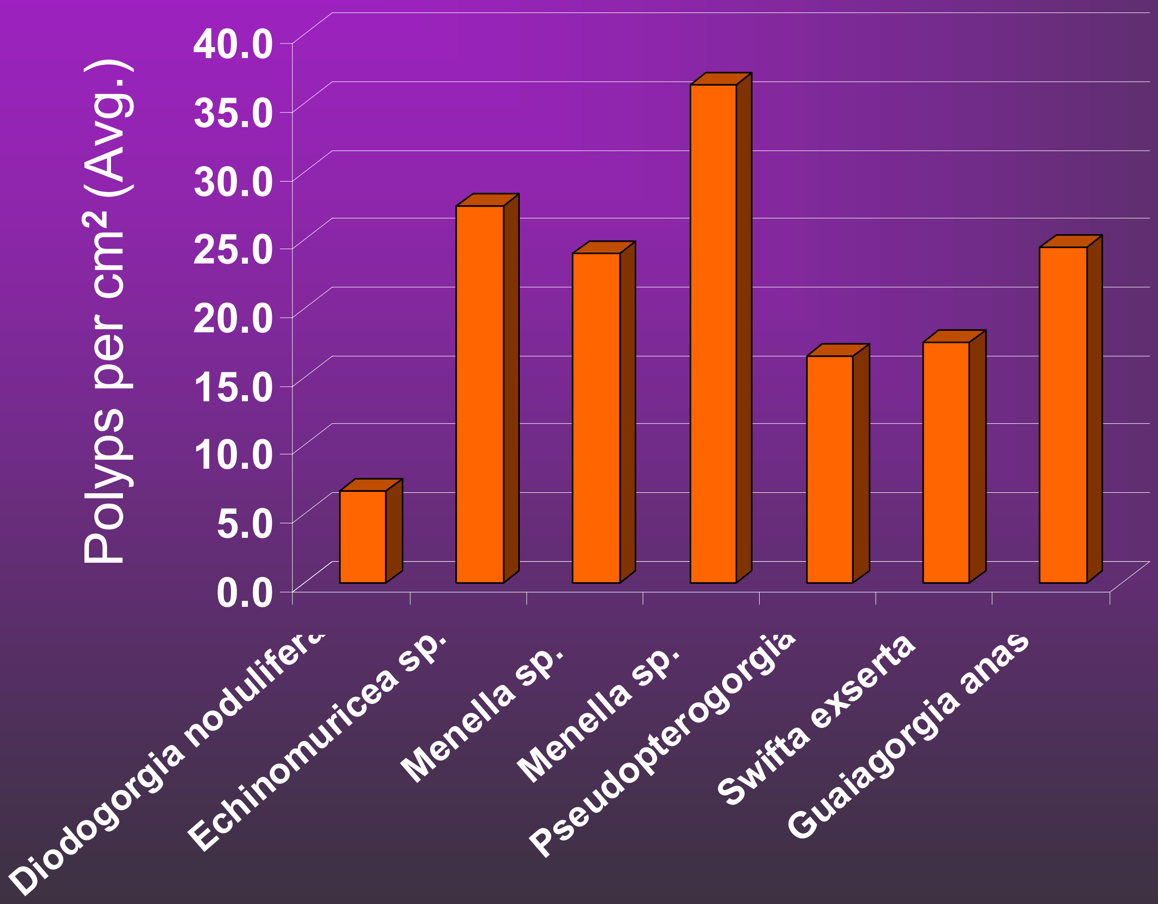
Polyp Density



How many mouths to feed?

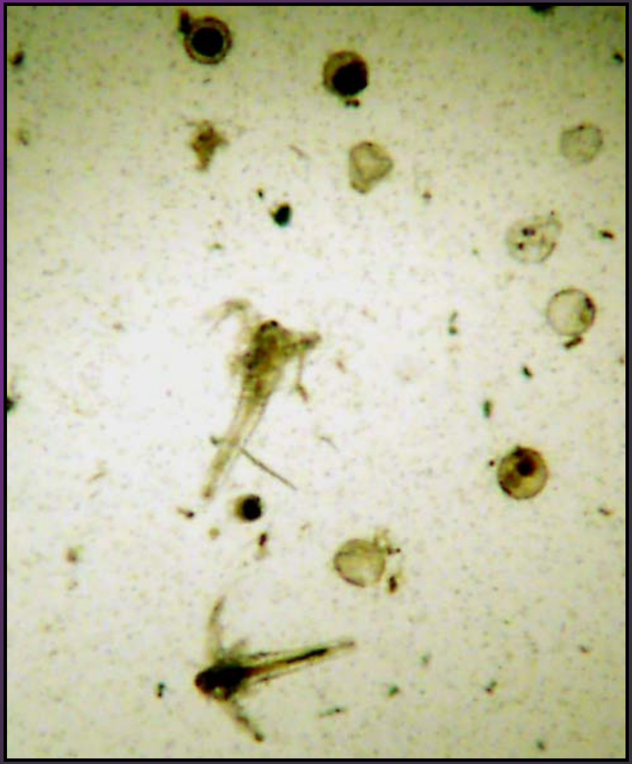
When is enough food enough?

How Many Mouths to Feed? A Lot!



When is Enough Food Enough?
Unknown!

Feeding Trial "A"	
Phytoplankton	250 cells / ml
Zooplankton	25 pc. / ml
Feeding Trial "B"	
Phytoplankton	500 cells / ml
Zooplankton	50 pc. / ml
Feeding Trial "C"	
Phytoplankton	1000 cells / ml
Zooplankton	100 pc. / ml



Feeding / Polyp Count Results

- Take into account polyp densities when developing a husbandry plan.
- Larger polyps can be sustained on fewer 800+ ɥm food particles.
- High food densities may impact water quality without regular water changes.

Summary

Typical reef tanks can house photosynthetic large polyp gorgonians. Provide both zooplankton & phytoplankton foods.

A simple flow measuring device may (*should*) be used to determine flow rates around sessile invertebrates &

Most gorgonians can be categorized into laminar flow or oscillating flow environments. House accordingly with new flow devices.

Food particle size, nutrition and density appear to be the <u>most important</u> limiting factors in successfully maintaining non-photosynthetic gorgonians.


Project updates available at
www.aquatouch.com