Oyster Restoration……

…..A Molecular Approach

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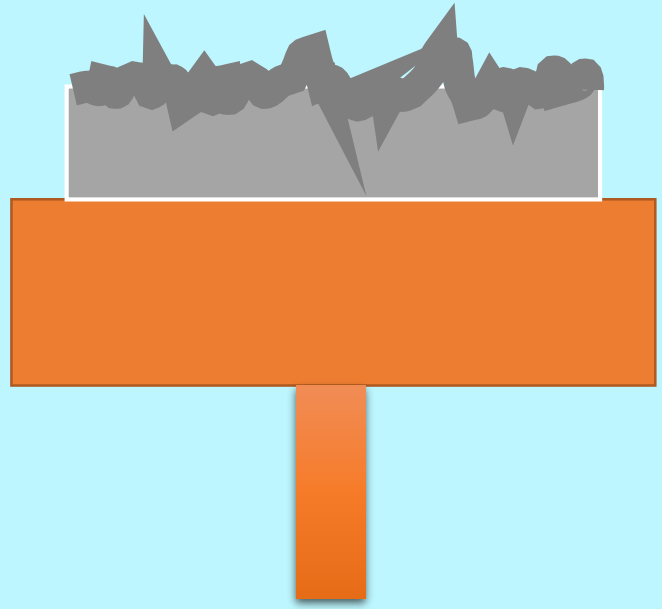
Three Key Processes

- Chemical Cue to Attract Spat
- Bacterial Growth on Surface

  Surface Composition important
- Nutrient for Oyster in early life cycle



WISH LIST

- Wild Diploids ➔ Rapid growth, high density

Marine Bacteria

- Billions ➔ trillions of species
- 99.9% + yet to be discovered
- 99.9% + can not be grown in lab
- New species evolving…….
- 1 tablespoon of ocean water contains 1 million virus (they control marine bacteria, genetics)

- 1 cm^3 of organic rich marine sediment

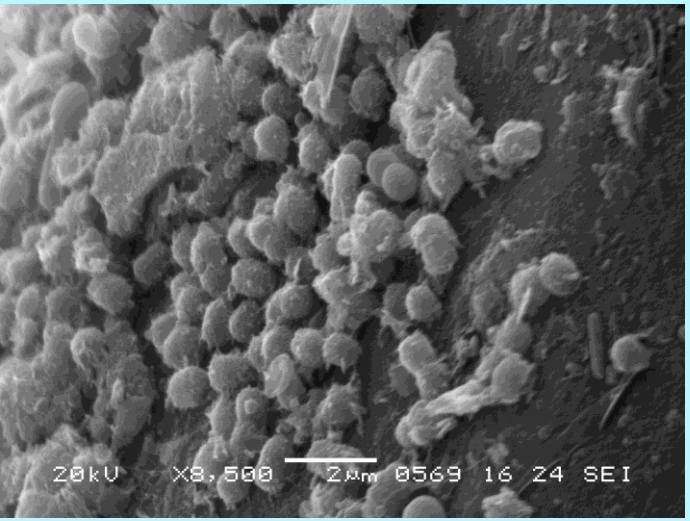
  10 billion bacteria

  10,000 species

Bacterial Mats

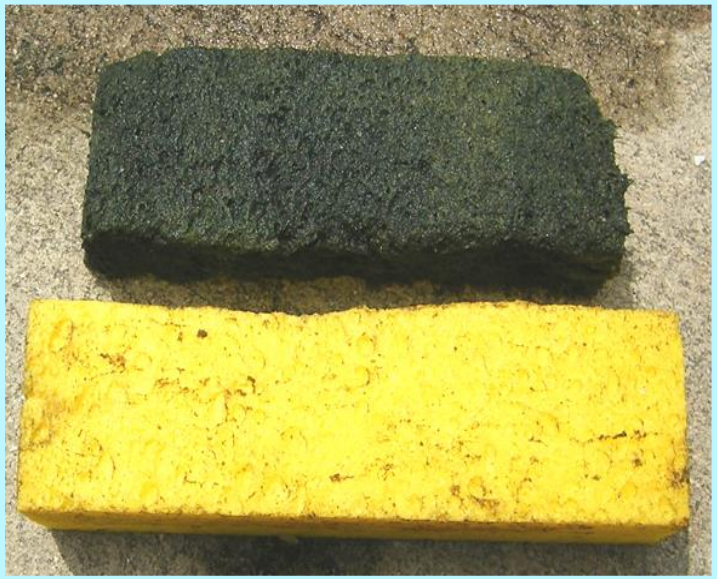
Cues
Settlement
Growth

History



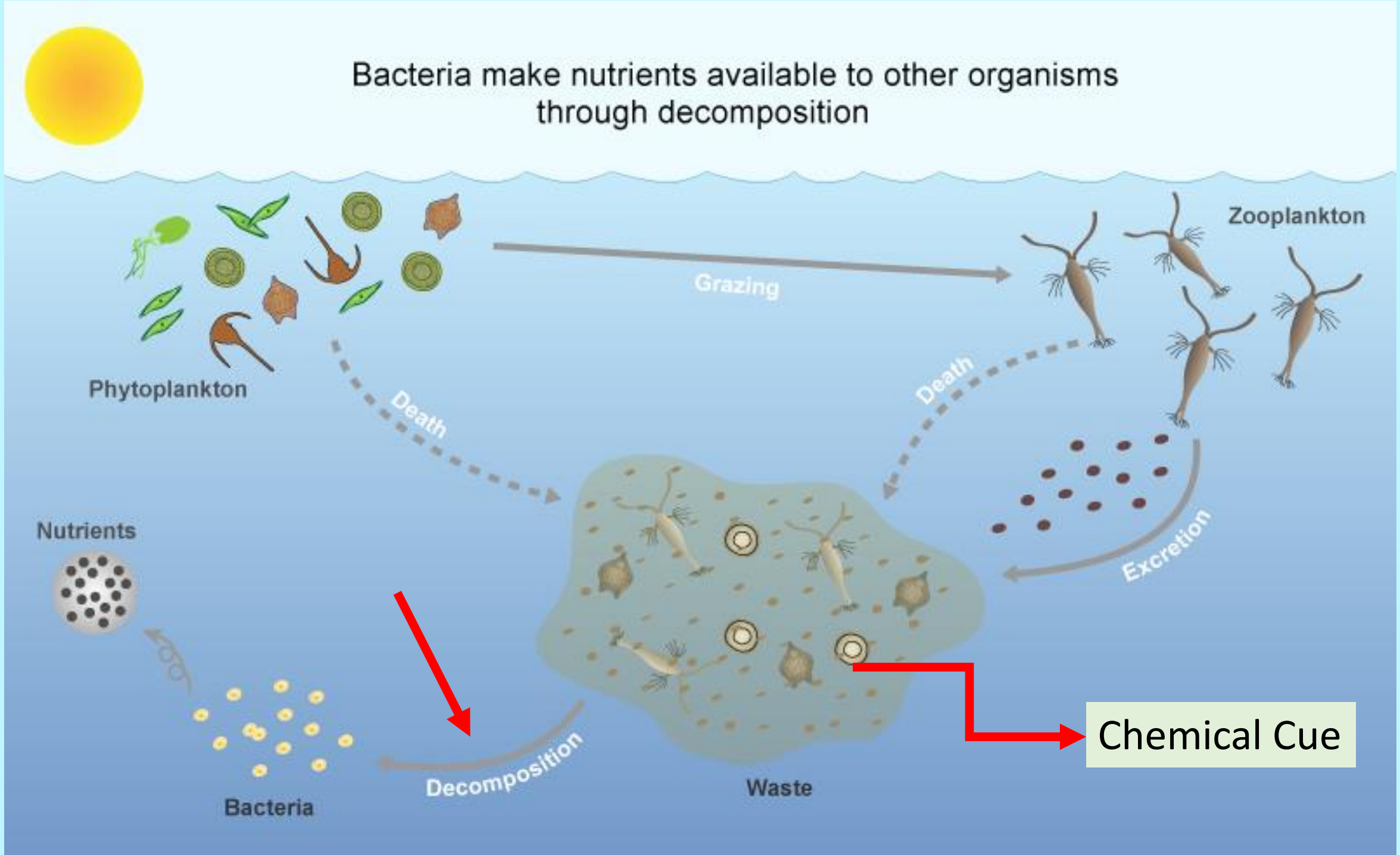
1. Untreated cellulose sponge

2. Treated Cellulose sponge >100 chemicals



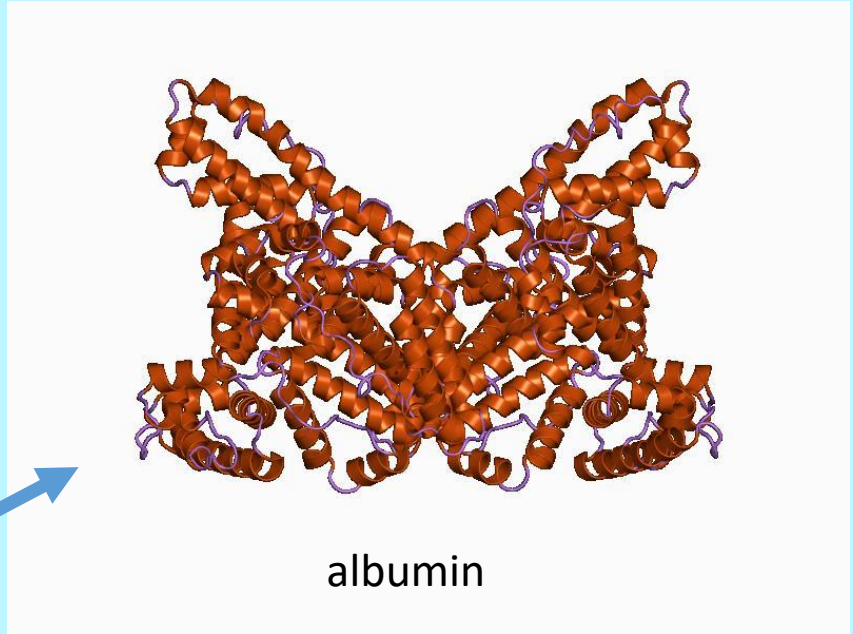
3. Treated sponge in Gulf of Mexico for 30 days

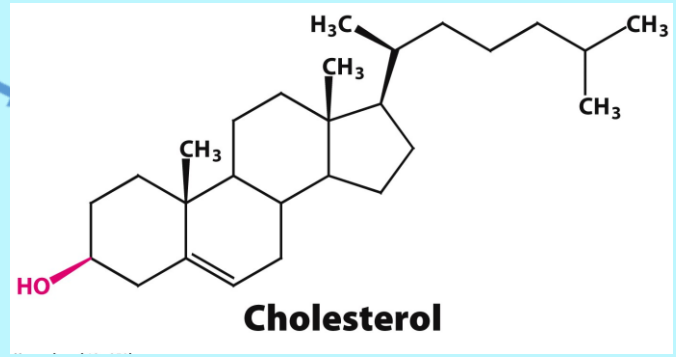
4. Untreated sponge in Gulf of Mexico for 30 days


Bacteria make nutrients available to other organisms through decomposition
Zooplankton
Grazing
Phytoplankton
Death
Death
Nutrients
Excretion
Chemical Cue
Decomposition
Waste
Bacteria

Complex collection
Evolution decided

Precipitate





Low water solubility

- Amino Acids
- Peptides
- Protein
- Steroids
- Vitamins
- Nutrients…

Green Tech. scale up, biodegradable

For example ➔

Deployed last weekend in March

July: 1/8 to ¼ oysters colonize surface

Larvae in water column in mid-May

Late August:
Oysters up to 1 inch
On surfaces

Plate in late August

Oysters will compete for space
As they grow.

Controls: One of our controls ➔ cinder blocks made of limestone, sand, Portland cement.

Oysters cookies show settlement while the block surfaces had little or no settlement. Oyster cookies are glued to the cinder blocks.

Settlement in June on cookies

Late August pictures

Red Circles – cookies with settlement

Note: Significant preference for cookies Verses cinder block (carbonate based)

Settlement and growth selective for NEC (nutrient enriched concrete).

Conditions that are critical:

a. Underwater at least 75% of time (near or below low tide mark).

b. No smooth surfaces! (can be face up with ridges)

c. At least three inches above muck.

d. Attached/no movement

Work with Corals

Bahamas Microfragmentation

- Blueberry extract
- Potatoe Extract
- Inorganic Mix
- Orange Extract
- Egg Extract
- Controls

Florida Keys: Attract Wild Larvae

Coral Spawn : August/September

Algae

New Pharmaceuticals:

Cancer, Antibiotics, HIV, Alzhimiers

Nutrients inserted for slow release in wood

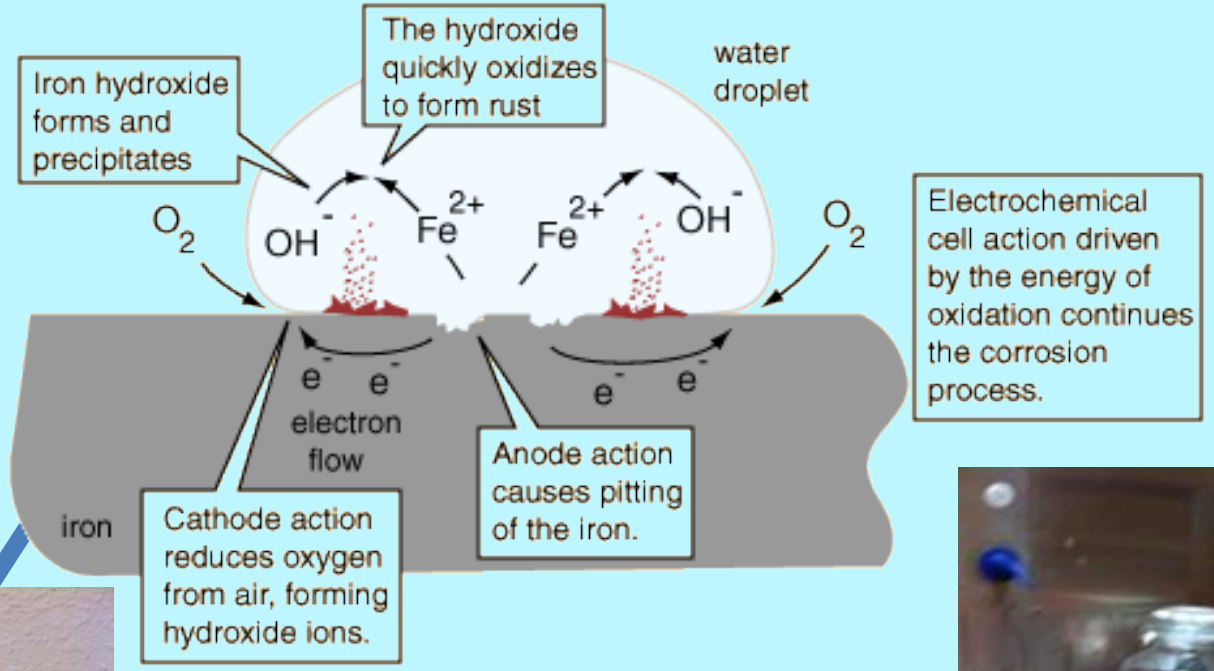
Also tried for corals

Iron Oxide

Copper Oxide

Sugars, amino acids, vitamins,
proteins, citric acid

Generates volts/amp



Oysters on nutrient enriched (hard) wood

Acknowledgements

- **Georgia SeaGrant**
- **Schmidth Marine**
- **National Science Foundation ICORP Program**
- **University of Georgia Marine Lab**
- **Valdosta State University**