Bacteria Associated with Coral Black Band Disease

A Molecular Approach to Bacterial Identification from a Biofilm















NATURAL AND HUMAN-INDUCED DISTURBANCES ON CORAL REEFS

- HURRICANES
- ENSO--THERMAL ANOMALIES
- OVERFISHING
- POLLUTION (SEDIMENT & NUTRIENT LOADING)
- CORAL DISEASES

Coral Diseases

- Sea Fan Disease (Aspergillosis)
 White Band Disease
 Black Band Disease
- Yellow Band/Blotch
- Red Band
- Rapid Wasting

Sea Fan Disease (Aspergillosis)





Airborne dust (brown haze) over the Caribbean Sea. This dust originated in the Sahara Desert of western Africa where it was lifted and carried off the coast by strong winds.



Coral Diseases

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 Black Band Disease
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Black Band Disease

Named for its appearance.

- Attacks (kills) mostly reef-building corals.
- •Caused by biofilm of diverse bacteria.
- Increased incidence in the last 2 decades, peaked
 1998, last El Niño year.
- Correlation between water temperature and
- appearance of disease.
- Previous attempts to isolate bacteria and "recreate" disease have failed.



Microscopy Facilities at Smith College











Formation of a Bacterial Biofilm



ASM Biofilms Collection. Wiencek

ATTACHMENT

OF OTHER

ORGANISMS TO

BIOFILM

(days-months)





Amplified 16S rDNA using universal bacterial primers



Mixture of 16S rDNAs representing the bacteria present in the original samples



Analyzed using gel electrophoresis









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Mixture of 16S rDNAs representing the bacteria present in the original samples



Analyzed using gel electrophoresis

Cloned DNA fragments into pGEM-T plasmid











Preliminary BLAST Search Results

- Marinobacter sp.
- Oceanospirillum sp.
- Beggiatoa sp.
- Desulfovibrio desulfuricans
- Desulfovibrio sp.
- Vibrio sp.
- Cyanobacterial strain
- Various unknown sequences

Summary

- Three clone libraries that represent bacteria associated with dead, disease, and healthy coral have been developed.
- A molecular analysis of these samples may lead to the characterization of bacteria associated with black band disease.
- The characterization of bacteria associated with with the different samples may allow us to construct a model that describes the pathology of BBD.