

# Digging up the Dirt on Microbes



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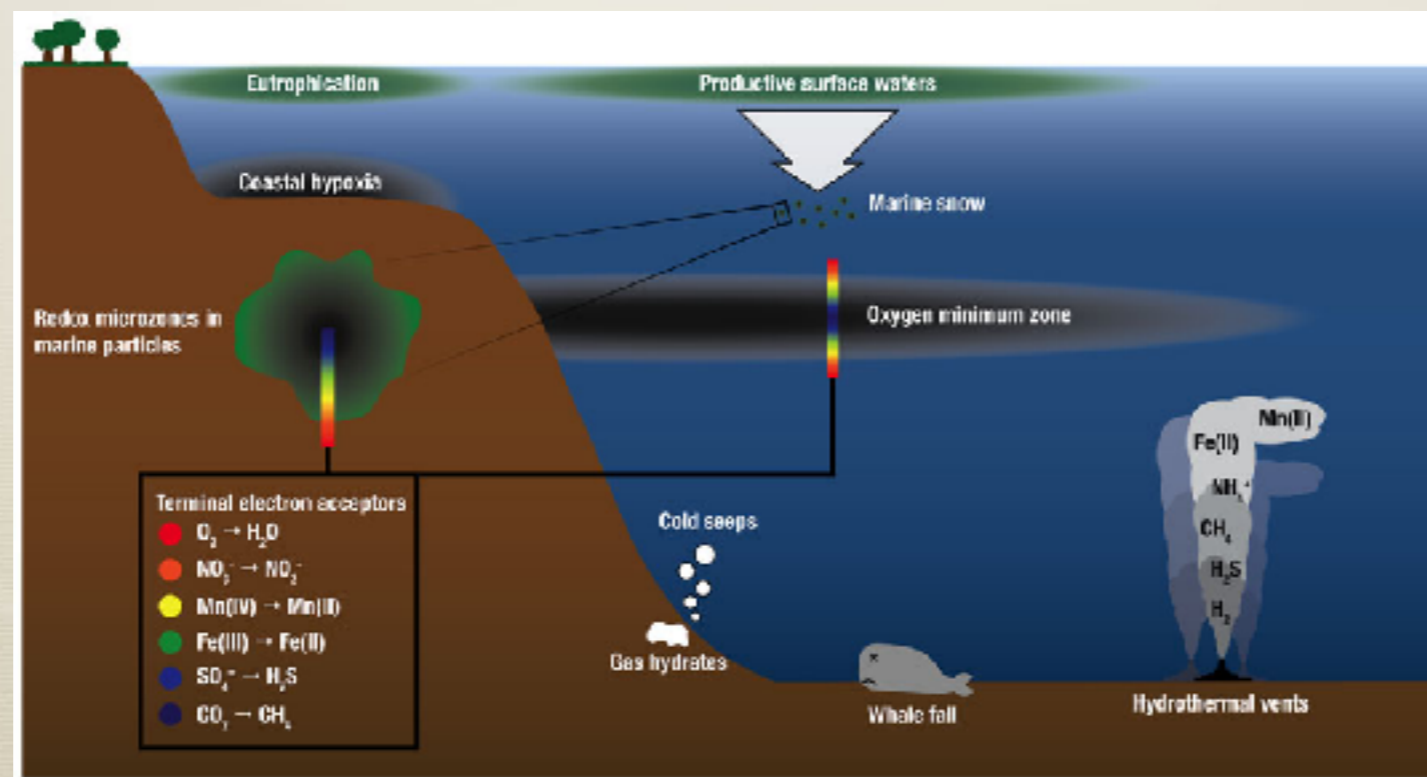
# Key Concepts

- ❑ Microbes are found everywhere
- ❑ Microbes are important in cycling of nutrients
- ❑ Soil characteristics can help identify microbe types
- ❑ Microbes can be identified through their genomes



# Background Information

1. Students will have a general understanding of Microbial life
2. Students will have an understanding of soil and sediment characteristic
2. Students will have prior knowledge of pH and the importance of nitrogen for life
3. Students will have prior knowledge of the base pairs in DNA



# Activity 1

## Sub-sea floor Sediment

- \* Create a Winogradsky Column for the Classroom
  - \* Layer 1-sediment, pebbles and fertilizer
  - \* Layer 2-sediment, iron filings
  - \* Layer 3-sediment and sand
  - \* Layer 4-sediment and newspaper
  - \* Layer 5-sediment



# Digging up the Dirt on Microbes: Winogradsky Column Observations

Directions: Observe the Winogradsky Column below. For each layer of sediment in the column, record your observations. Your observations should include an explanation about what is seen in that particular stratum.

**Stratum 1:**  
Observations:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
I think this layer contains...  
\_\_\_\_\_  
\_\_\_\_\_

**Stratum 2:**  
Observations:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
I think this layer contains...  
\_\_\_\_\_  
\_\_\_\_\_

**Stratum 3:**  
Observations:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
I think this layer contains...  
\_\_\_\_\_  
\_\_\_\_\_

**Stratum 4:**  
Observations:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
I think this layer contains...  
\_\_\_\_\_  
\_\_\_\_\_

**Stratum 5:**  
Observations:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
I think this layer contains...  
\_\_\_\_\_  
\_\_\_\_\_

# Activity 2

## Testing for Life

- \* Students hypothesize where the most microbes will be found in the column and test for them using agar plates
- \* Students test the sediment levels
  - \* Sample 1-Control-test pH and presence of  $\text{CaCO}_3$
  - \* Sample 2-Layer 5-test pH
  - \* Sample 3-Layer 2-test for presence  $\text{CaCO}_3$
  - \* Sample 4-Layer 1-Extract DNA



# Activity 3

## Bacterial genome

- \* Students are given an unknown genome that they will copy and paste into Blast
- \* AAGGCTTGACATCCCACGAATTTTG
- \* The resulting DNA segment will be associated with Cyanobacteria

