

Freshwater Bacterial Community Assembly on Model Chitin Micro Particles



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Introduction

For a long time microbiologists believed that aquatic bacteria were roughly evenly distributed throughout freshwater systems, but with the advancement of technology scientists are beginning to learn more about nutrient hotspots that form in the water column. Zooplankton and other particulate organic matter (POM) are said to be drivers of bacterial diversity and dynamics yet, we still lack understanding of the bacterial communities that form around particulate carbon supplies.

Big Question

What is the taxonomic makeup of nutrient hotspots formed by POM and what is the time frame that each bacterial species associates.

Experimental Goals

- Identify primary and secondary degrading microbes in lake systems
- Identify the time frame and order in which bacteria associate with POM
- Obtain pure cultures of various particle-associated bacteria
- Taxonomically identify the bacteria present at each time point

References

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Chitin Particles

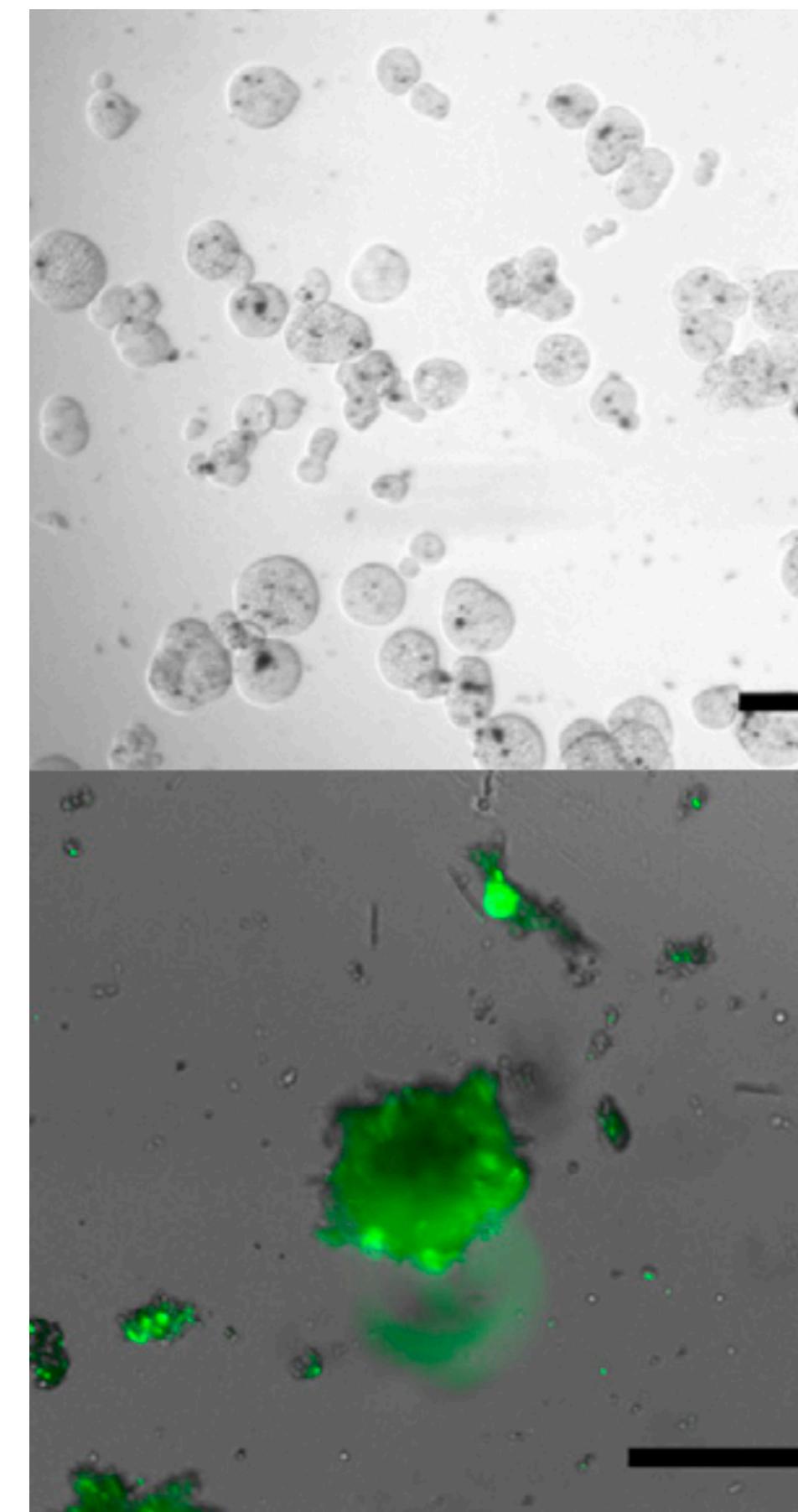
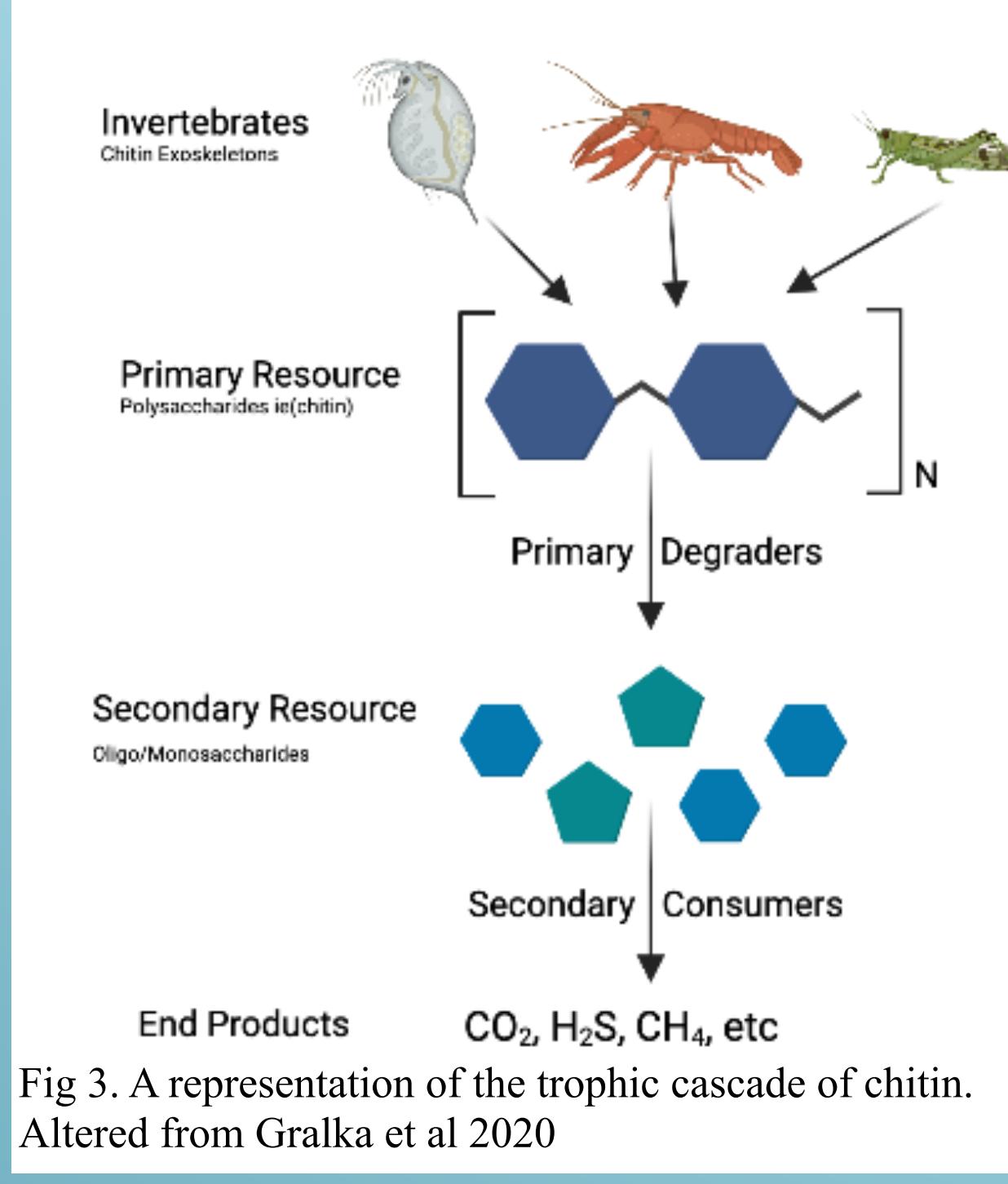


Fig 1. Chitin particles under the microscope. Scale bars represent 100 μ L. Image from Enke et al 2019

Trophic Ladder



Growth Media Design

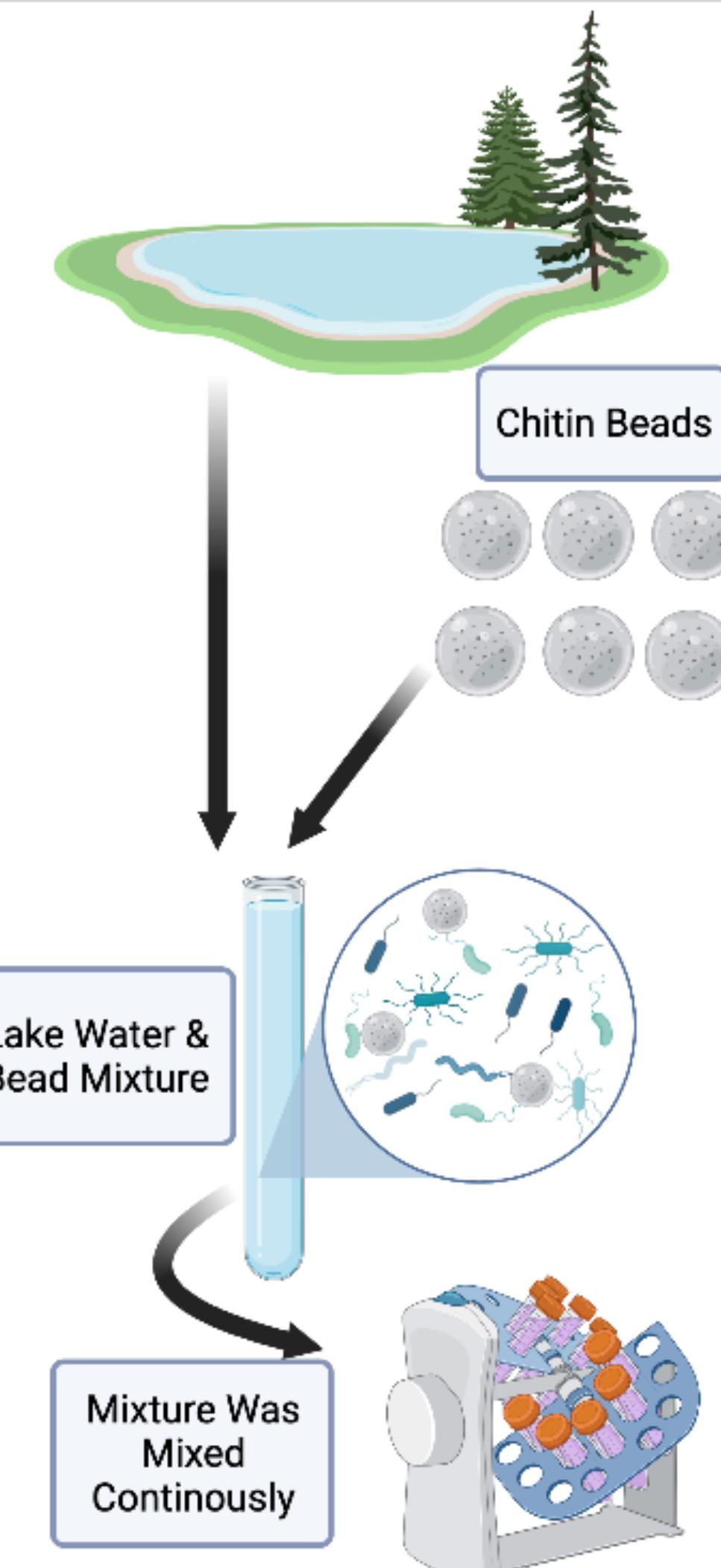
Media #1	
Biotin	409 pM
Ca-Pantothenate	84 nM
CoCl ₂ ·6H ₂ O	500 pM
FeCl ₃ ·6H ₂ O	117 nM
Folic acid	453 pM
KH ₂ PO ₄	10 μ M
MnCl ₂ ·4H ₂ O	9 nM
Myo-inositol	555 nM
Na ₂ MoO ₄ ·2H ₂ O	300 pM
Na ₂ SeO ₃	1 nM
NH ₄ Cl	10 μ M
Niacin	81 nM
NiCl ₂ ·6H ₂ O	1 nM
p-Aminobenzoic Acid	7 nM
Pyridoxine	59 nM
Thiamine-HCl	59 nM
Vitamin B ₁₂	70 pM
ZnSO ₄ ·7H ₂ O	800 pM
Colloidal Chitin	50 μ M

Media #2	
Peptone	11.8 g/L
Yeast Extract	23.6 g/L
K ₂ HPO ₄	9.4 g/L
KH ₂ PO ₄	2.2 g/L

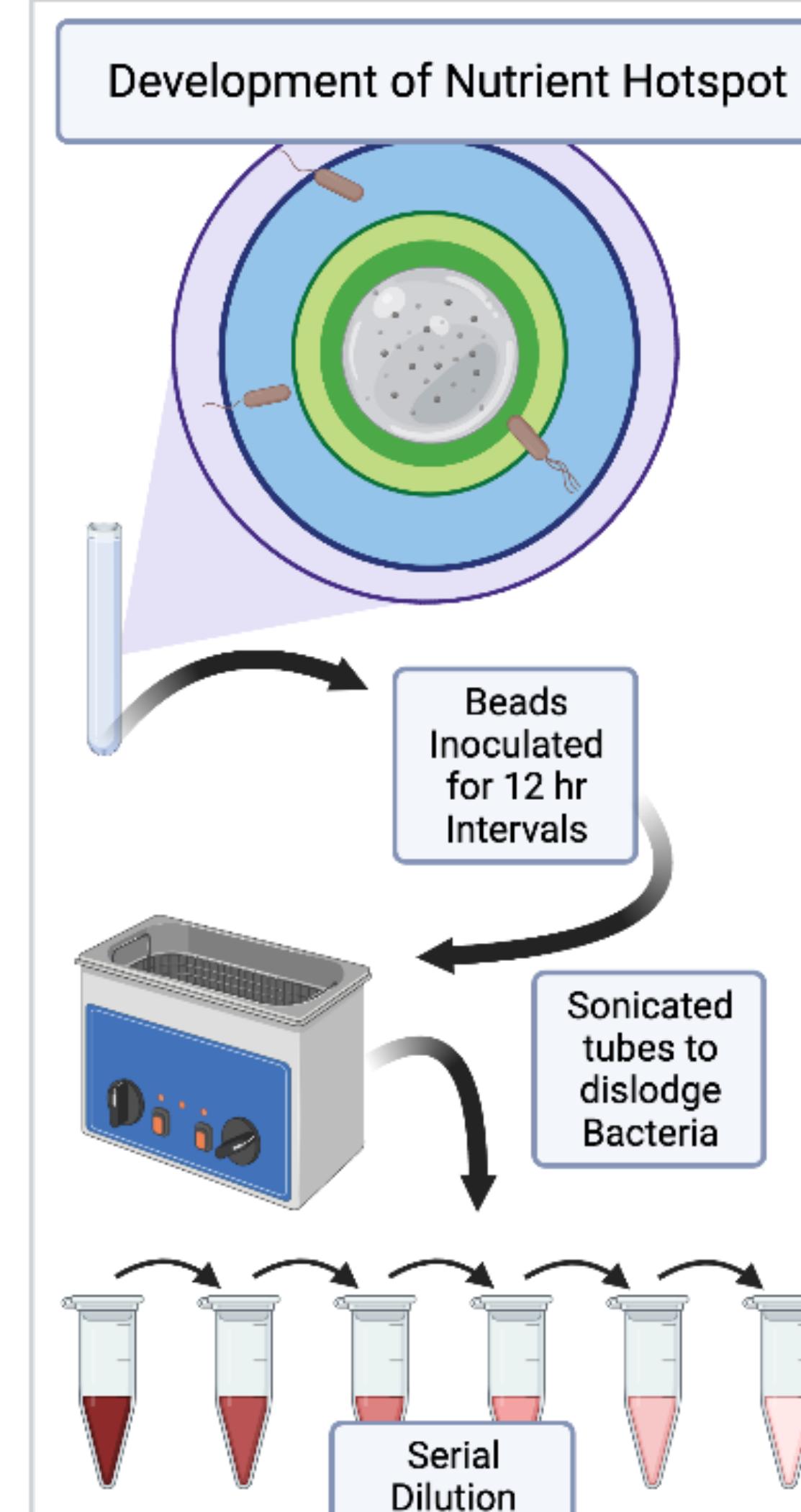
Fig 2. Recipes for both growth media. Media 1 was altered from Kim et al 2019. Media 2 was Terrific Broth (22711022)

Method

Step 1: Preparing The Samples



Step 2: Isolating The Microbes



Step 3: Cultivation and Identification

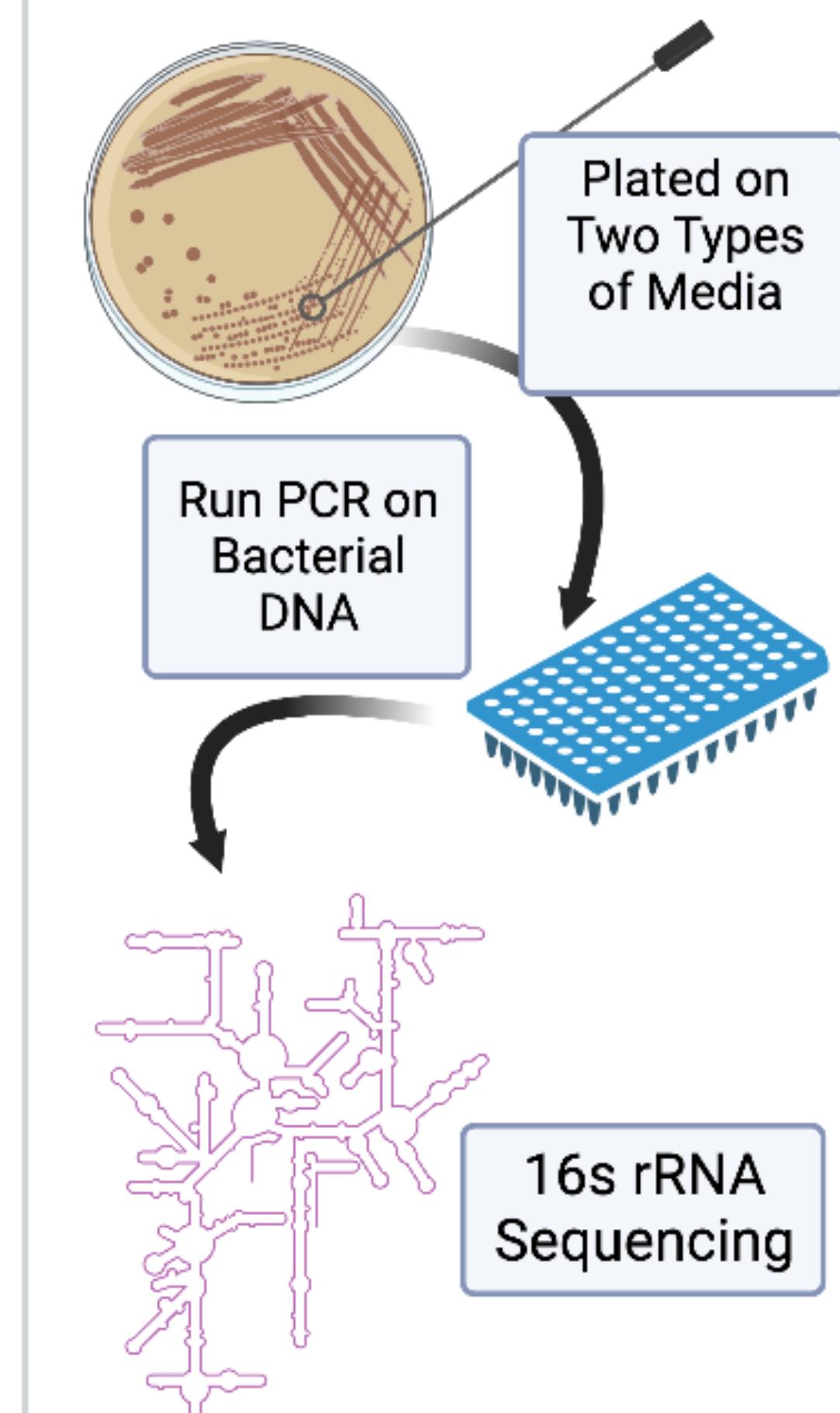


Fig 5. The methods of the experiment showing water collection through analysis

Sonication Optimization



Fig 4. Sediment was sonicated for various amounts of time, 30s x2, 30s x4 and not sonicated at all. The massive difference in bacterial diversity shows the effectiveness of sonication being able to dislodge cells from the particle with which they are associated.

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