Fishing for Microbes: Developing a screen to isolate PUFA producing Bacteria

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Introduction

Polyunsaturated fatty acids (PUFAs) are essential lipids that are important for human health. We gain most of our PUFAs from the foods we eat, such as omega-3s from a high fish diet.

Another potential source of PUFAs is marine bacteria, which can be found in both seawater and fish. These microbes are of great interest for their underexplored biology and biotechnological potential.

These bacteria use the polyketide synthase (PKS) pathway to produce PUFAs. Therefore, in order to identify possible PUFA producers, we can look for the presence of part of this pathway: the pfaA gene.

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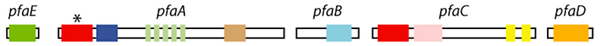


The media used to isolate bacteria may also play a part in identifying PUFA producers. It has been proposed that the ability to reduce the dye triphenyl tetrazolium chloride (TTC) to the red compound triphenyl formazan (TF) may be correlated with the ability to produce PUFAs.

Our project explores the use of TTC as a screen for isolating PUFA producing bacteria.

Goals

- **Evaluate the ability of various media types to screen for PUFA producers**
  - Do PUFA producers prefer minimal media or rich media?
  - Does the addition of TTC to the media screen for organisms with the pfaA gene?
- **Isolate PUFA producers from fish and seawater samples**
  - Do fish gut microbes or seawater microbes have more PUFA producers?
  - Does the presence of the pfaA gene correlate with TTC reduction?
  - What types of species are isolated from these samples?

Findings

We found that a higher percentage of bacteria containing the pfaA gene grew on TTC which leads us to believe that TTC may simplify the hunt for PUFA producers.

We also found that all of the bacteria containing the pfaA gene came from the fish sample which reinforces what we know about the connection between PUFAs and fish in the food chain.

Methods

Collect samples

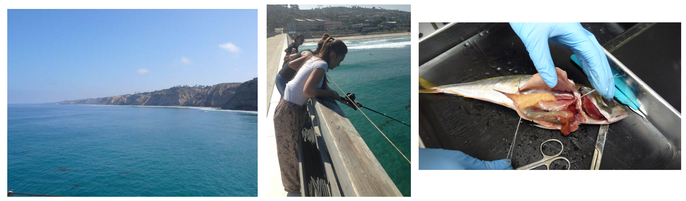
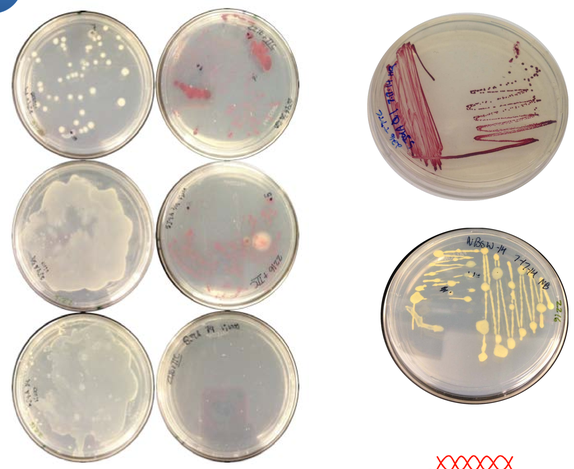
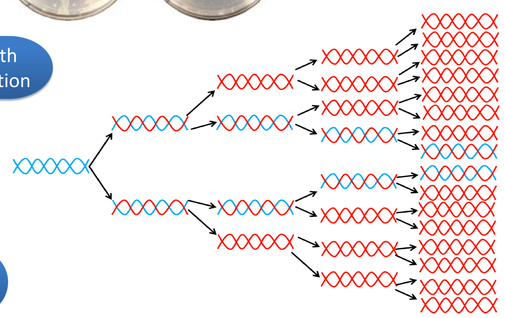


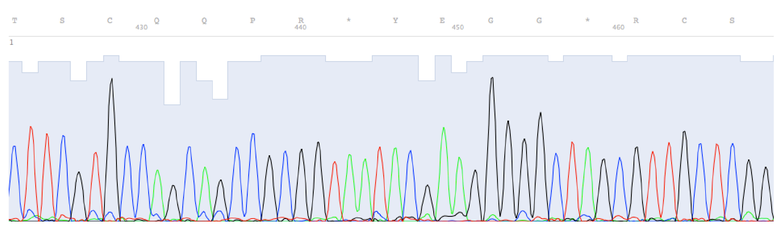
Plate for isolation



Gene amplification with Polymerase Chain Reaction



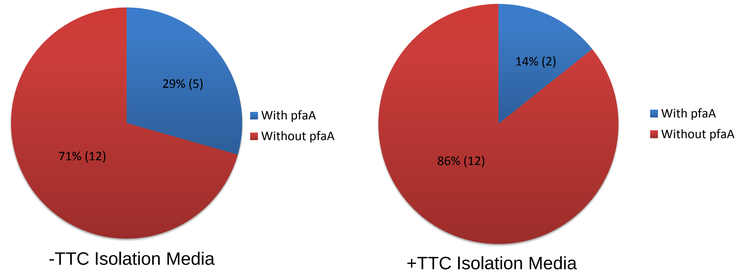
Analyze DNA sequence



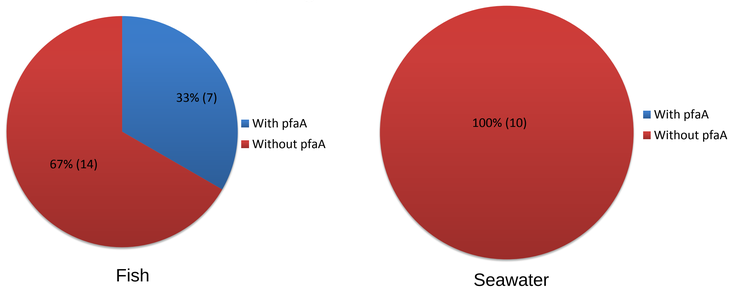
BLAST in NCBI Database

Results

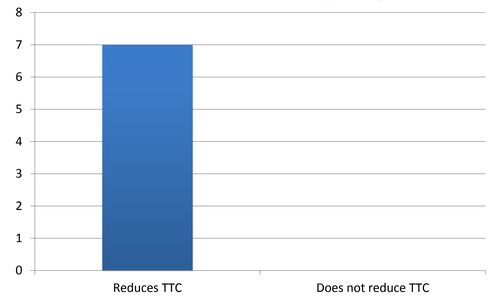
TTC as a screen for pfaA-containing microbes



Presence of the pfaA gene in different samples



Correlation between TTC and pfaA gene



Types of bacteria found