

# Talking Planimals! Identifying Genes Associate with Coral Bioacoustics

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## Introduction

Soundscape ecology is starting to be given more importance in the scientific world as it is seen that various coral reef organisms use sound as a settlement cue. Understanding more of the soundscape-guiding behavior could become a central tool for proper management since larval replenishment in marine population is critical. Many organisms in the Phylum Cnidaria have been recognized to receive, produce, or respond to sound in different stages of their lives. Learning a new perspective on how corals might be able to communicate with each other will provide insight into their world, which is very much in need of help. The overall goal of the project is to try to recognize genes that might be associated with coral bioacoustical communication. By helping corals, we are parallelly helping all sorts of marine organisms and humans, as both benefit from the richness of coral reefs.

## Question and Hypothesis

Does the coral specie Cyphastrea have upregulated sensitive genes associated with reception or emission of sounds?

If Cyphastrea corals' DNA is extracted and analyzed, then at least one of the sound sensitive genes to be tested (FOLH 1, WAKL 2, Otof, and TRPV) will be present.



Figure 1: Experimental Setup in lab

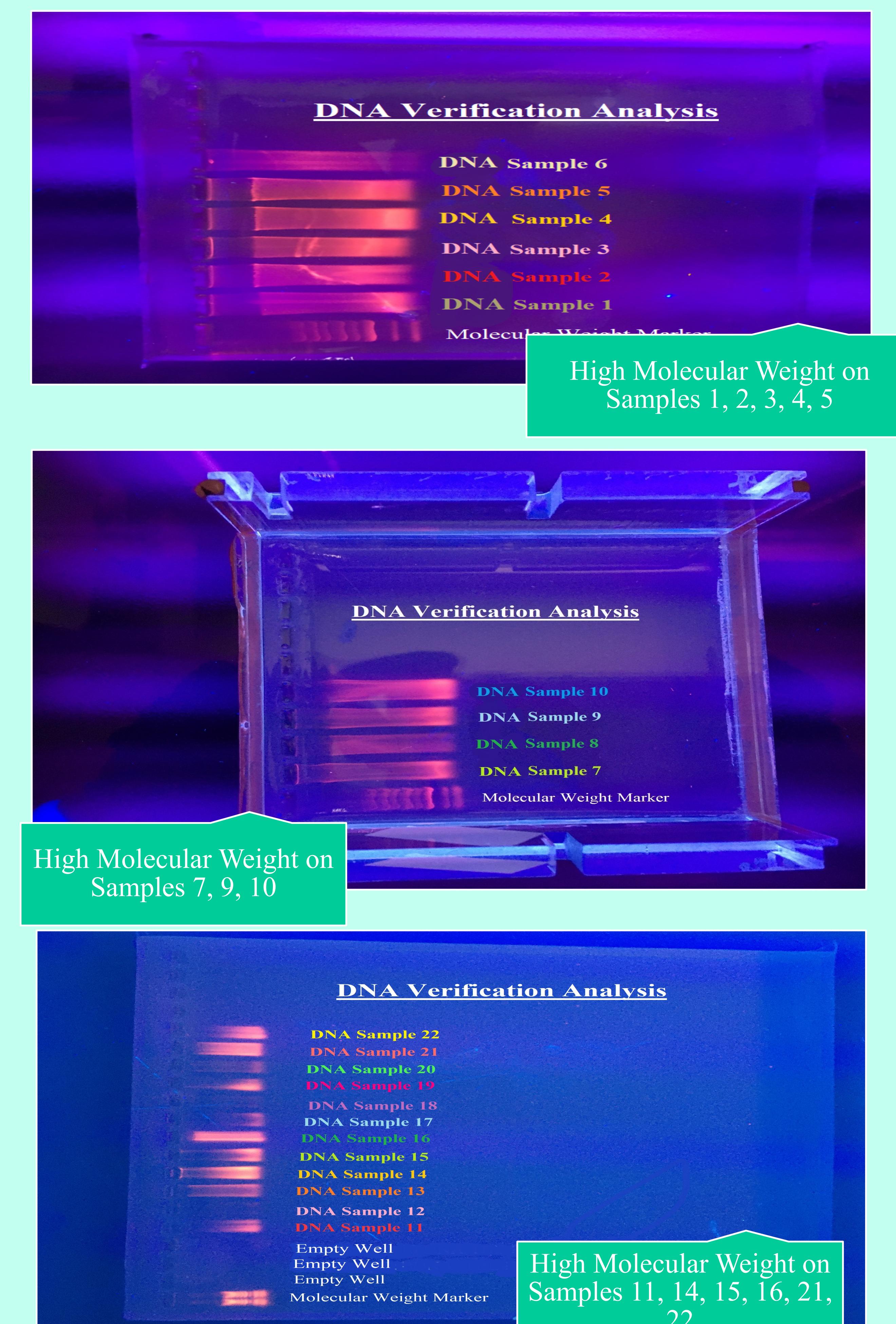
## Method and Materials

This experimentation included several steps, all of which needed to be analyzed in order to move on to the next step; starting with the coral DNA extractions. After successfully following the procedures to extract the coral DNA an agarose gel was conducted to confirm that the desired high molecular weight DNA was present in the DNA samples extracted from the coral fragments. Only then would selected DNA samples undergo PCR experimentation with the different gene primers.

## Gene Selection

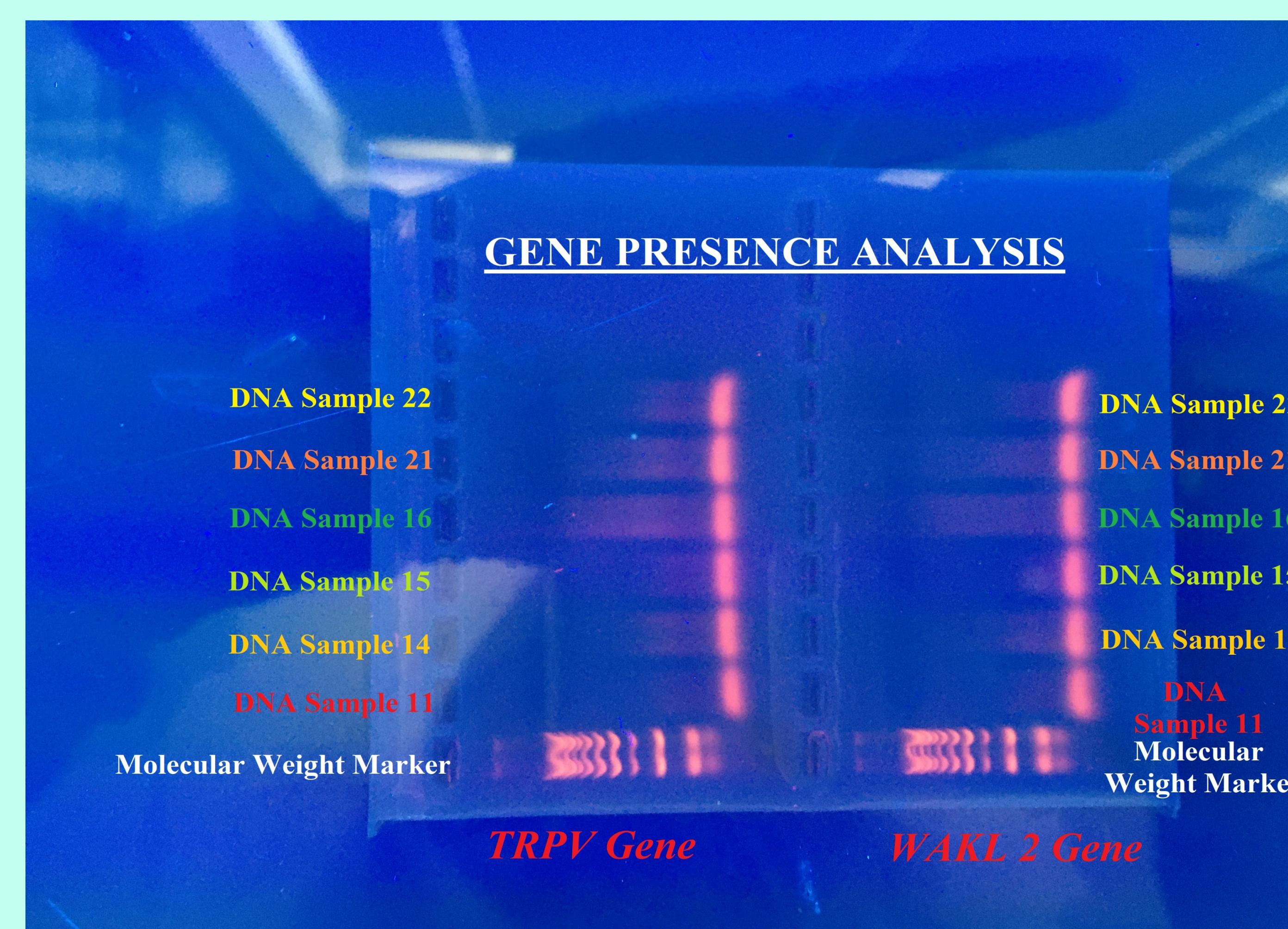
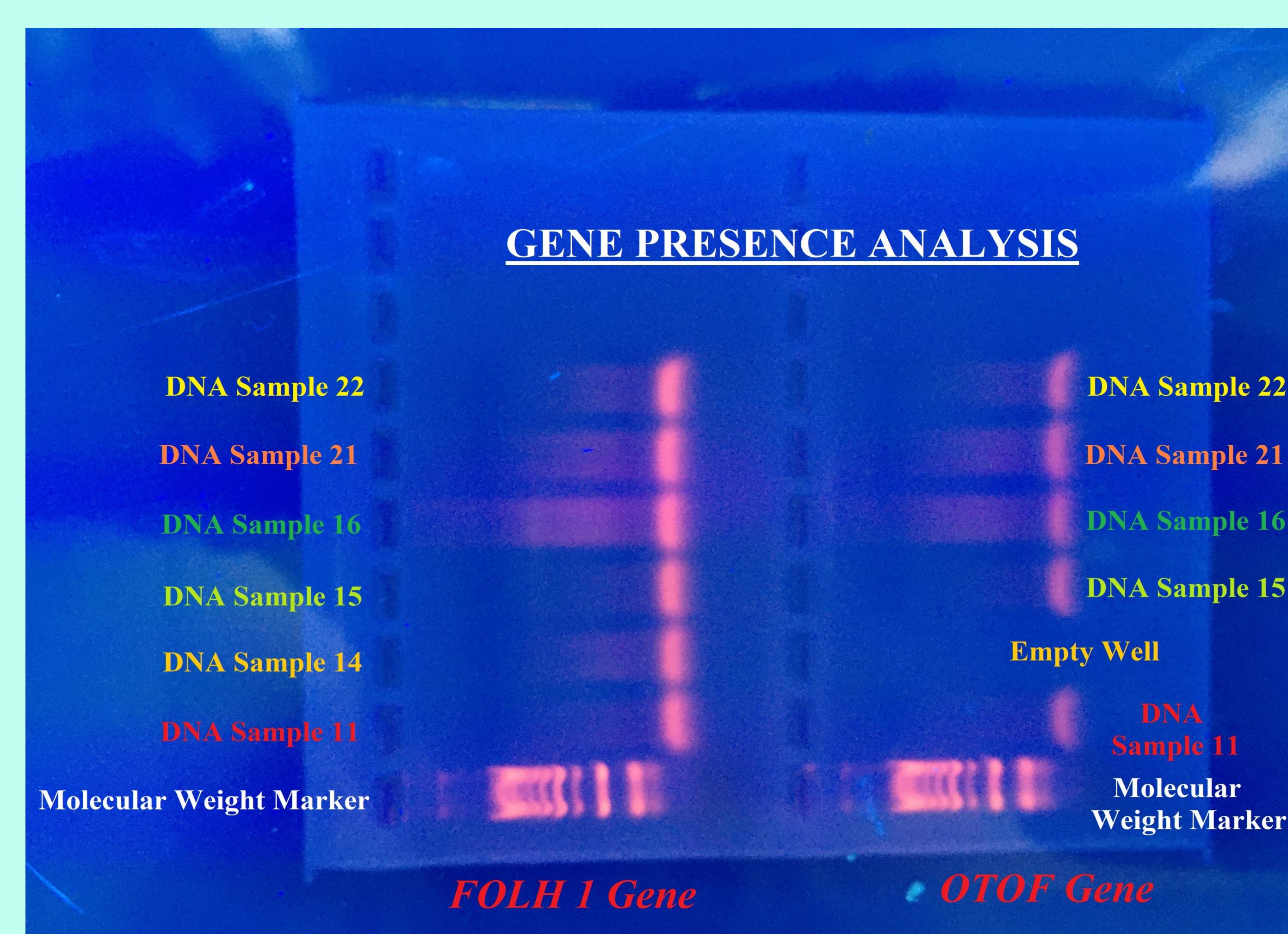
Gene	Organism(s) Found in correspondence to the sequences used in the experiment	Role
rRNA Control	Exaiptasia Pallida (sea anemone)	Codes for ribosomal protein
Transient Receptor Potential Channel (TRPV)	Nematostella (starlet sea anemone)	Expressed in apical organ of Nematostella which have long cilia with mechano-chemo sensory functions.
FOLH 1	Coral larvae & Hydra vulgaris (fresh-water polyp)	Regulates excitatory neurotransmission through hydrolysis of the neuropeptide
Otoferlin (OTOF)	Myotis ricketti (bat) & Balaenoptera musculus (blue whale)	Responds to nerve signal transmission in the auditory inner hair cells; releases neurotransmitters to nerves.
Wall Associated Kinase-like 2 (WAKL 2)	Arabidopsis thaliana (thale cress) & Brassica napus (rapeseed)	Signaling receptor of extracellular matrix component

## DNA Verification



## Results

Although PCR results for DNA Samples 1- 10 displayed constant smearing (due to non-specific amplification) several changes were made to PCR conditions and clear observations can be seen for DNA Samples 11-22. One of the prominent changes to mention is that genes were separated into two PCR experimentation groups based on their annealing temperatures.



## Conclusion

The TRPV and FOLH 1 genes displayed faint bands in at least half of the DNA samples tested, which is a great sign. Although the faint bands are not the correct base pair length of the gene that should have been amplified with PCR. This could indicate that corals do have the genes but, it is a different length than in other species.

In regards as to why the OTOF and WAKL 2 were not seen, their primers were designed from organisms not related to corals and although degenerate primers were developed only one possible sequence was picked in this investigation.