Microbial Diversity of Culinary Salts
By Galen Muske and Bonnie Baxter, Ph.D.

Abstract
Extremophiles are exceptional microorganisms that live on this planet in extraordinarily harsh environments. One such extremophile are Halophiles, salt-loving microorganisms that can survive in extreme salinity levels, and have been found to survive inside salt crystals. We were curious about the potential diversity of halophiles surviving in salts harvested from around the world. For this experiment various culinary salts were suspended in a 23 % NaCl growth media broth and allowed to grow for 4 weeks. Afterwards, the individual strains were isolated on 23 % NaCl growth media agar plates. The colonies observed were visually diverse in color and margin. Individual colonies were grown in broth and DNA was extracted. PCR and sequencing were utilized to compare the 16S rRNA gene in each species of bacteria or archaea. We present data on the microbial diversity of the salts that did have media cultures. These salts come from 1) salt pearls from Lake Assal Djibouti, Africa; 2) Fleur De Sel Gris Sea Salt from France, Europe; 3) sea salt from Bali, Indonesia; and 4) salt collected from the lake bed of Great Salt Lake, Utah.

Introduction
Halophiles are extremophile microorganisms which thrive in salty environments. Studies have shown that the habitats of halophiles range from salt lakes to industrial salt ponds (DasSarma et. al, 2012). All of these environments are also prone to desiccation and also high levels of solar radiation. Other research points to the mechanism of overcoming challenges of life in salt. For example when Archaea Halophiles are exposed to extreme radiation they have been seen to up-regulation of an operon containing two single-stranded DNA-binding protein (RPB) genes, VNG1620 (rhoB) and VNG2162 that creates DNA binding proteins (DeVeeuws, 2007). The ability to overcome multiple extremes makes halophiles a key interest in research into possible life forms on planets. Genetic data (e.g. Almeida-Dalmet, 2015) suggests there are many undiscovered halophilic species. There could be a species that can withstand the salty environments of Mars (Hothschuld et. al., 2001). The interest in extremophile life strategies, and the search for uncultured Halophiles led to the testing of culinary salts. We designed an experiment to survey life in the following culinary salt samples: 1) salt pearls from Lake Assal Djibouti, Africa; 2) Fleur De Sel Gris from France, Europe; 3) sea salt from Bali, Indonesia; and 4) salt collected from the lake bed of Great Salt Lake. Samples of each were placed into a salt media growth to incubate. Those mixed-species cultures were plated on agar plates of the same media, and colonies were chosen to isolate individual species for analysis. Colonies were inoculated into fresh broth media, and grown for three weeks. DNA was extracted from each sample that grew, and subsequently cleaned and was PCRd. The target sequence for the PCR was the 16S rRNA gene for Halophiles. The 16S rRNA gene is a good biomarker for relatedness due to the lack of evolutionary change that occurs in this sequence. Small changes occur in families which allow us to determine the families of the unknown microbes that are isolated from the cultures. Therefore the purpose of this project is to see if known species of Halophiles can survive in culinary or environmental habitats, and if a new species of Halophiles exists in these environments as well.

Methods

Results and Conclusion

Table 1. Isolate 16S rRNA gene sequence compared to best match in BLAST Database. Important to note here. Successful growth was limited to only 2 of the 10 different salt samples (Fleur De Sel Gris, and Balinese salt). This calls for further researching and preparing methods of culinary salt as some are sterile, and others are not suitable for cultivation. For growth to occur, successful growth was limited to only 2 of the 10 different salt samples (Fleur De Sel Gris, and Balinese salt). This calls for further researching and preparing methods of culinary salt as some are sterile, and others are not suitable for cultivation. For growth to occur, successful growth was limited to only 2 of the 10 different salt samples (Fleur De Sel Gris, and Balinese salt). This calls for further researching and preparing methods of culinary salt as some are sterile, and others are not suitable for cultivation. For growth to occur.

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References