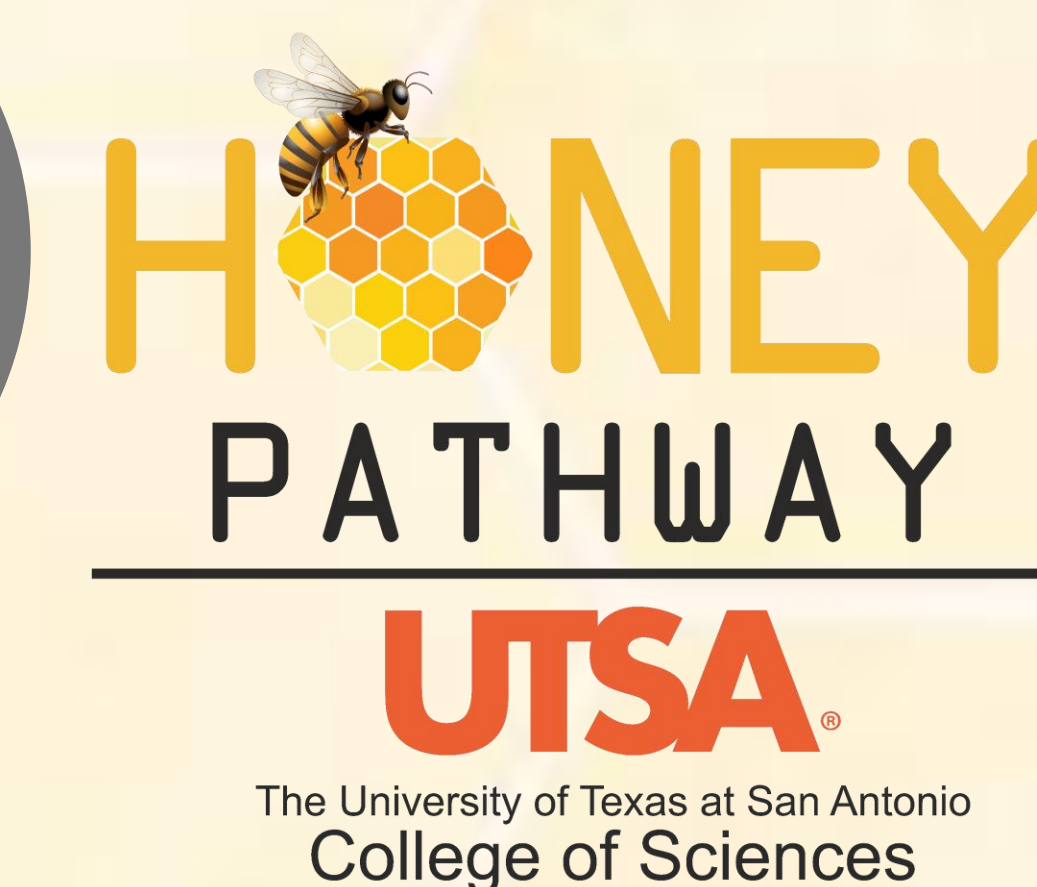




Testing Texas Honey as an Alternative to Formaldehyde in Catfish Preservation

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Abstract

Of the many powers of honey, preservation and antibacterial properties have been accredited for centuries. Formaldehyde has been labeled a known carcinogen by the Occupational Safety and Health Administration (OSHA) and the International Agency for Research on Cancer (IARC). Concerns about formaldehyde use in preserving food products like fish have raised health concerns.

Honey has been studied as a natural alternative to formaldehyde in fixation and preservation methods with moderate success; however, its use in food preparation, particularly fish, remains unexplored. This experiment involves obtaining catfish from a local store, portioning it into five parts: one preserved with formalin, three coated with different Texas honeys, and one left untreated as a control. Fish freshness will be tracked over a week by smell, discoloration, and lipid oxidation.

This study will help evaluate honey's effectiveness as a natural food preservative and its potential as a viable alternative to formalin in various applications.

Introduction

- Honey has been used in embalming in ancient Egypt and used to preserve meats and fruits in ancient Rome. And has been studied as a natural alternative against formaldehyde in fixation and preservation methods with moderate success.
- Natural compounds rich in flavonoids and phenolic acids, known for their antioxidant and antibacterial properties, have shown promise in preventing lipid oxidation.
- Lipid oxidation in fish is due to the high proportion of polyunsaturated fatty acids and structural lipids.

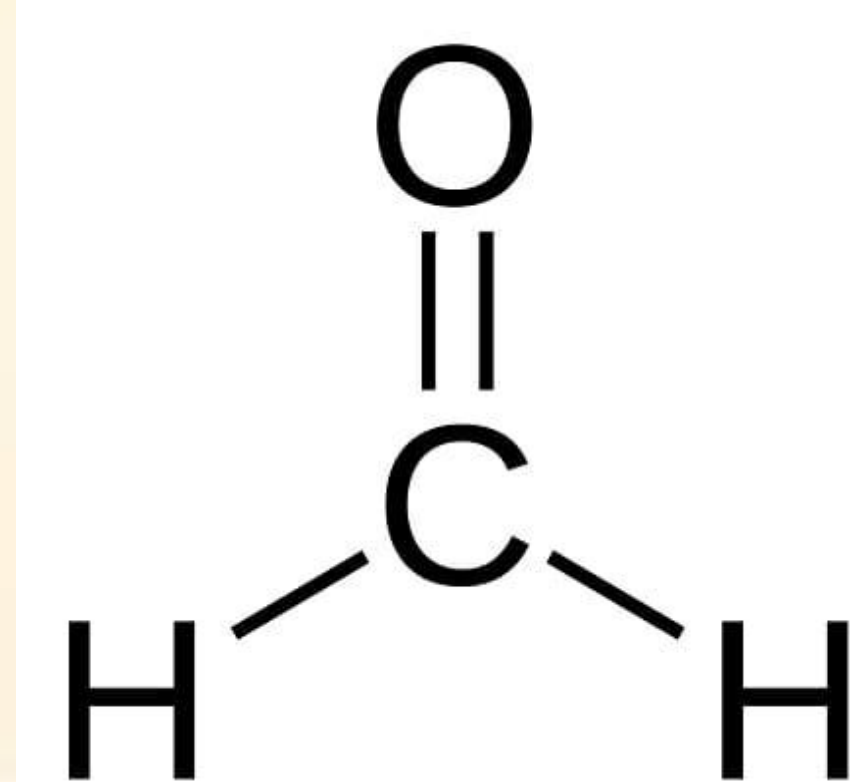


Figure 1. Formaldehyde Chemical Structure

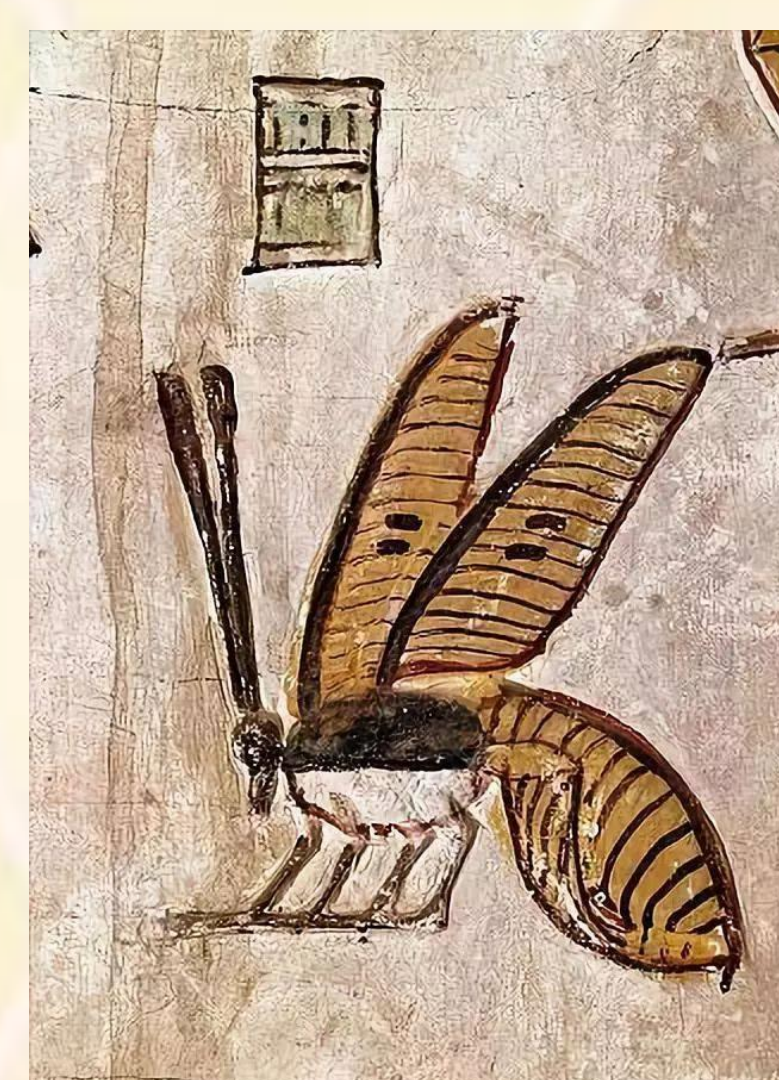


Figure 2. Egyptian Mummy and Tomb Painting

- Formaldehyde (FA) is a colorless gas, widely used in health care and industry applications.
- FA is a known carcinogen.
- To extend the shelf life of fish there has been illegal adulation of adding formalin.

Objectives

This research aims to directly compare formaldehyde and honey's preservation qualities side by side.

1. Analyze the antioxidant and antimicrobial properties of Texas honeys through pH, moisture, total phenolic contents and DPPH values.
2. Compare the extent of lipid oxidation of catfish samples covered in honey, formalin, and an untreated sample.
3. Observe sensory signs of decomposition such as discoloration and smell.
4. Identify any links of preservation effectiveness to antioxidant levels.

Materials and Methods

Three Texas honey samples will be selected based on past analyses. And each honey's pH, moisture and total phenolic contents (TPC) will be remeasured. Moisture and pH will be measured to according to International Honey Commission (IHC) guidelines. While TPC is measured through spectrometer assay.

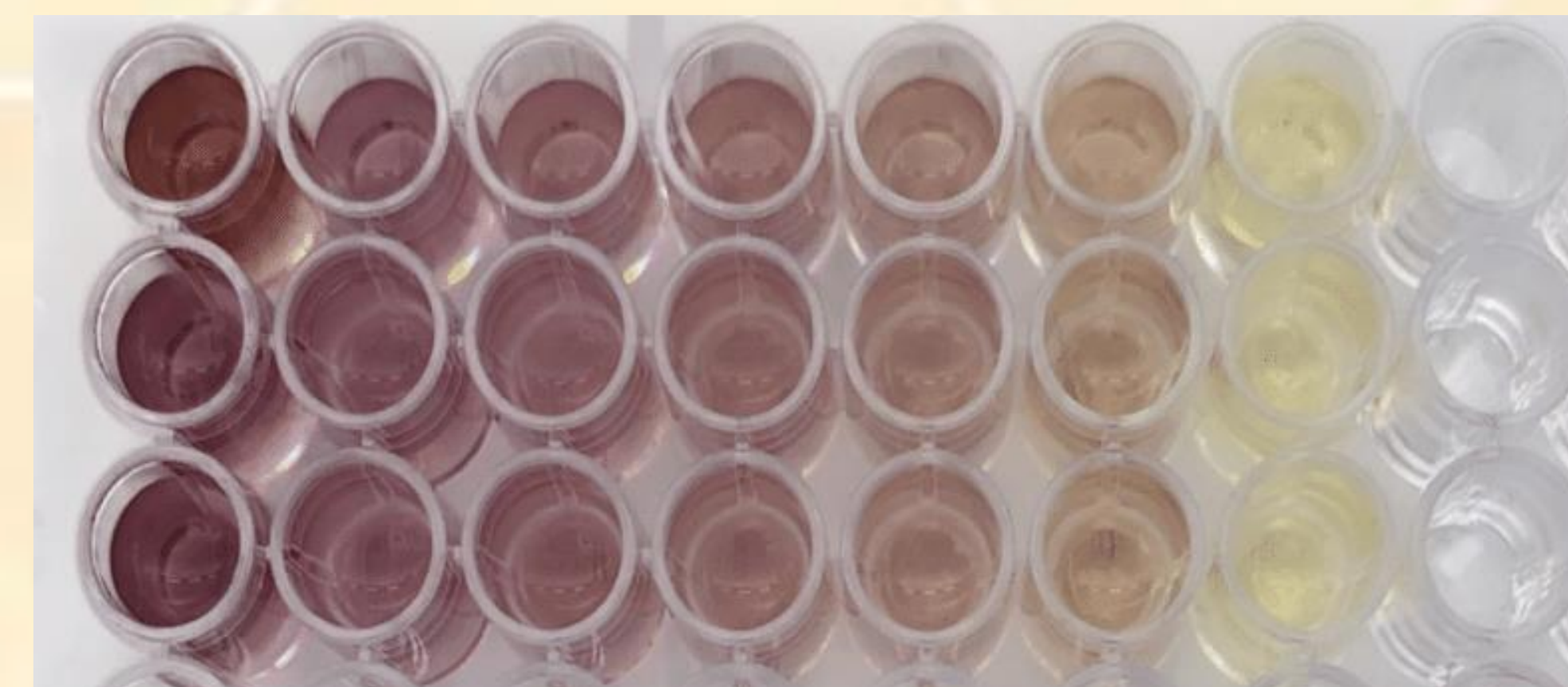


Figure 3. DPPH Reaction Color Change

Antioxidant activity will be assessed through the DPPH (2,2-diphenyl-1-picrylhydrazyl) radical scavenging assay at 517 nm.

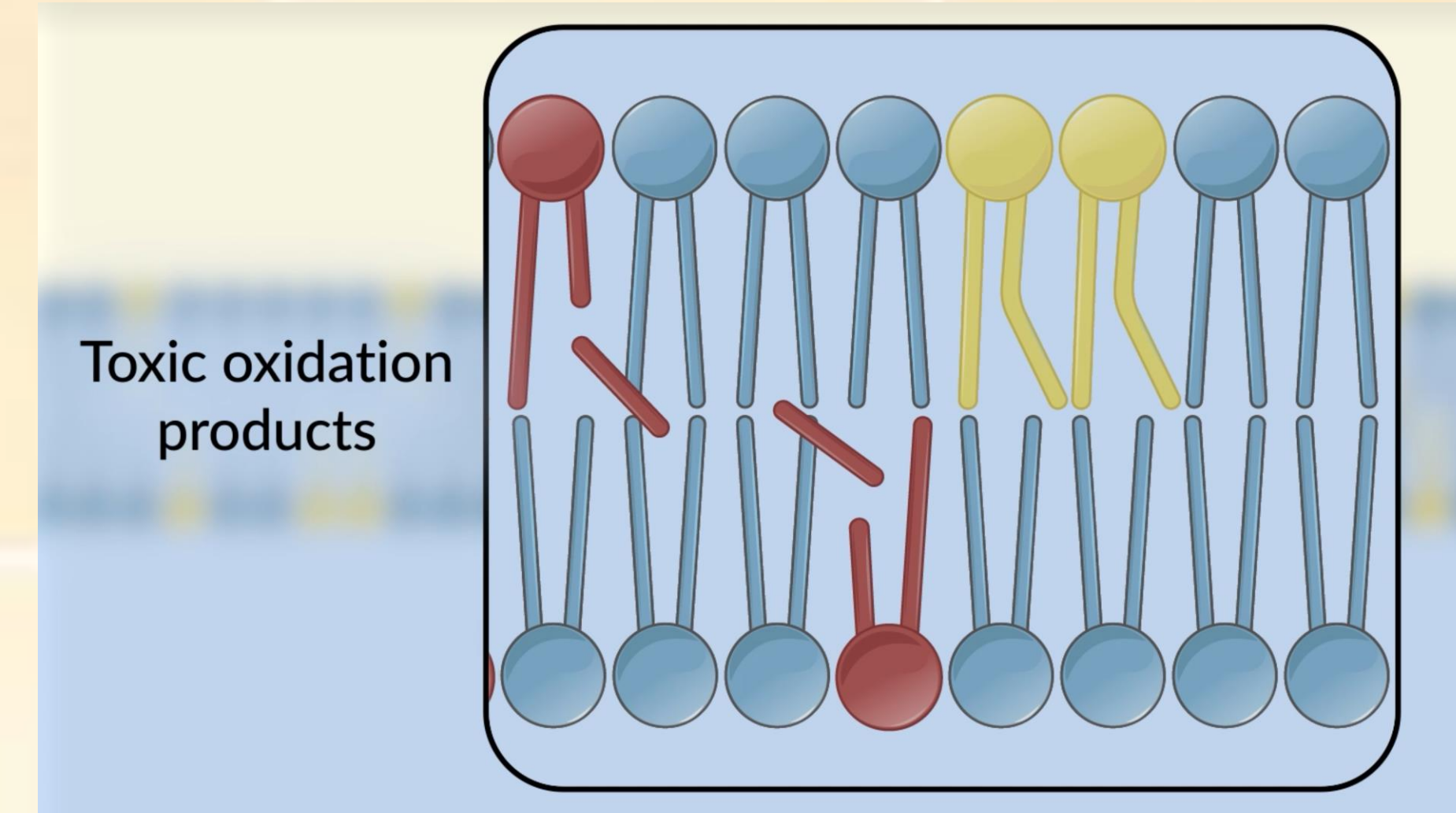


Figure 4. Oxidation Products

The formalin will be ordered for the commercial comparison, and catfish will be bought from a local fish market. While lipid oxidation will be measured through Thiobarbituric Acid Reactive Substances (TBARS) assay.

Expected Results

- Honey-preserved catfish samples are expected to show less discoloration and lipid oxidation compared to untreated sample.
- Honeys with higher free radical scavenging activity are anticipated to perform better in preservation.
- Formalin-preserved samples will likely exhibit the least amount of spoilage.

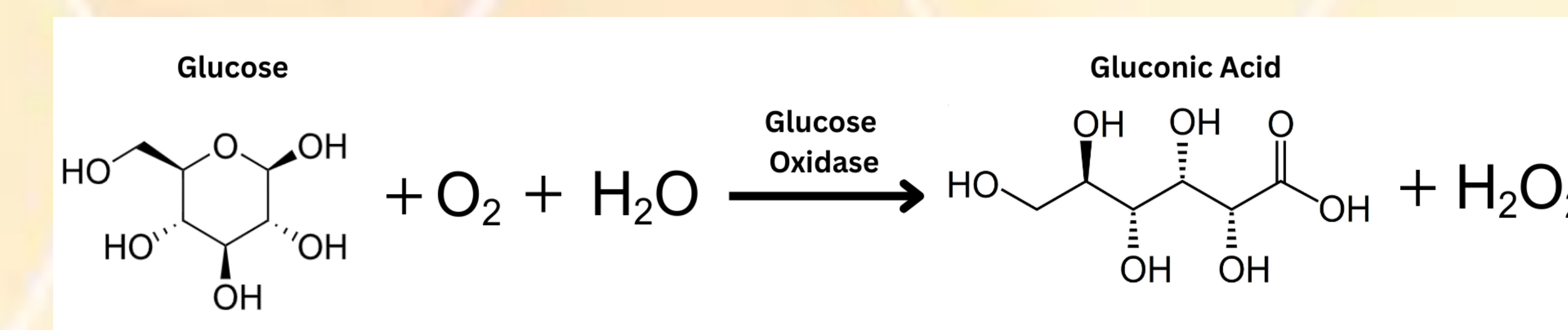


Figure 5. Peroxide Reaction Within Honey

Future Applications

The comparison will give insights on alternatives to formaldehyde which has numerous uses in the global market.

If successful, this research could support the notion of honey as a natural and safer alternative to formaldehyde for fish preservation. While expanding on the preservation nature of honey and its possible ties to free radical scavenging activity.

Possibly leading to more extensive preservation solution development that could be included in applications in the embalming process for dissections.

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