[Some Title]

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Abstract

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Contents

1 Introduction

Native to the freshwater rivers of South America, the *Electrophorus electricus*, or more commonly referred to as the electric eel, is known for its ability to generate high voltage shocks, formally known as electric organ discharges (EOD); these EODs can be classified into low-voltage EODs and high-voltage EODs. Low-voltage EODs are expressed at lower frequencies of about 10Hz to 20Hz [4], reaching about 10 V [5]. Therefore, they are more practical for communication and determining the presence of organisms in their environment through a process called electrolocation: monitoring changes in a particular electric field [1]. On the other hand, high-voltage EODs are used as an attack or defence mechanism, the largest recorded voltage discharge being 500V [5]. However, whether the emitted EODs are expressed as low or high voltages, they are produced from a specific cell that makes up 80% of the eel's body: electrocytes [3]. These electrocyte cells are arranged in series and in parallel and are located in the electric eel's three most prominent organs: Sach's organ, the Main organ, and Hunter's organ [5]. [cite this figure (Figure 1.)] This arrangement allows for the entire eel to be viewed as a battery, with the positive and negative poles at the head and tail respectively, allowing for the variety of EOD voltages mentioned above. Although electric eels have the potential to release high-voltage EODs, the current produced remains nonetheless quite minimal (1 A) [5]. This is a result of the high resistance of the freshwater where these eels are found, or more precisely, the lack of ions to maintain the electric current [2]. Consequently, to optimize the battery potential of the electric eels EOD, research was conducted by Lina Guezi [6], a collegue of ours, to produce a synthetic replication of the electric eel's electrocyte cells in ionized water. Our experiment aims to test their research findings by making our own battery prototype based off of their work with a few modifications in order to explore the potential uses of this biological battery. To do so we used a dialysis membrane to isolate positive sodium ions (Na^+), similarly to how the electric eels do in their electrocyte cells, which creates a potential gradient across our synthetic electrocyte cell. This process generates a voltage difference which then produces an electric discharge.

2 Material and Methods

3 Results

4 Discussion

References

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Appendix A: Raw Data

Appendix B: Calculations