



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Adam C. Currie	Project Number S1902
Project Title Electric Communication in African Mormyrid Fish	
Abstract Objectives/Goals The objective of my project was to find out how African elephant-nose (mormyrid) fish react to each other and to my artificial electrical stimulus through their electric organ discharge (EOD) signals. Methods/Materials I obtained two Peter's elephant-nose fish (<i>Gnathonemus petersi</i>) from a pet store and put them into a fish tank together. I sought to discover what happens to an elephant-nose's EOD frequency during (1) aggressive encounters with other fish and (2) stimulation with an artificial EOD signal (1 volt, 300 microsecond pulses) produced by an electronic stimulator. In one set of experiments I tested whether or not fish would respond to a series of low-frequency (0.2 Hz) artificial stimulus pulses by generating an echo. During an echo, fish respond 1:1 to some of the artificial stimulus pulses with a latency of about 8-10 milliseconds. I was able to elicit such responses. In a second set of experiments, I presented fish with short high-frequency trains of artificial stimulus pulses (5-50 Hz) in order to mimic the EOD buzz that these fish display during aggressive encounters with other fish of the same species. Results My results showed that fish responded to the artificial stimulus with two different behaviors also exhibited during encounters with other fish: echoes and buzzes. Weakly electric fish will respond to an artificial electrical stimulus as it would to the EOD of another fish. Fish only responded with an EOD buzz to specific patterns of artificial stimuli with pulse-frequencies and train-durations that were near those of real fish. Conclusions/Discussion My hypothesis was correct. Elephant-nose fish responded to an artificial electrical stimulus as they would to another fish. They even displayed physical aggression towards the stimulating electrodes in some cases, which I was able to videotape. The dominant fish reacted to stimulating electrodes as if they were another fish in its territory, and sometimes actually attacked the electrodes. I think the fish did that because the stimulating electrodes felt like another fish electrically.	
Summary Statement I recorded and described two types of electrical communication in weakly electric "elephant-nose" fish and showed that these fish will also respond to an artificial electrical stimulus as if it was another fish.	
Help Received Father acted as co-advisor with Dr. von der Emde. Used lab equipment at UC Riverside under my Father's direction.	