# Title

Insect electroretinograms for a new kind of citizen science

Simple electrophysiology to expand the arthropod corpus

Multi-disciplinary citizen science with insect electrophysiology

Beyond *Drosophila*: ERGs for everyone.

Beyond *Drosophila*: ERGs for everybuggy.

Beyond *Drosophila*: electrophysiology in the hands of the citizen

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# Abstract

Not yet

# Introduction

## Objectives & justifications

Motivate this approach to participatory science (ERGs and image classification)

* Gap in scientific fluency, leads to innocent and not-so-innocent ignorance about science
* This ignorance is bad for the world
* Increase fluency, make people invested by making them *involved*
* Being involved in science makes people invested and fight for it

To describe a simple and affordable procedure for insect ERGs (Capture, Anesthesia, Setup, Experimentation)

## Background

### Neuroentomology is ~~pitiful~~ limited but expanding

It’s just Drosophila, Melanogaster, and some bees

### Electrophysiology is ~~inaccessible~~ becoming more accessible

* ERGs are becoming more accessible
* Limitations/constraints/factors lowering accessibility in historical ERGs AND modern education version (Vilinsky)

### ERGs reflect retinal activity

* Case study for the ecology hidden in CFFs (University of Lund South American wasp story with 1 photon per second navigation)
* Response curve assay
* Adaptation assay
* Modeling approaches

### Learning objectives for participants and the academia

* Ecology & biodiversity
* Evolution
* Neuroscience
* Anatomy & Physiology (what’s the difference exactly?)
* Mathematical modeling
* Python analysis

### ERG citizen science can influence the individual, academia, and democracy

Good this can do on three levels: the individual, the scientific world, and the democratic world

## Guidance to the Reader

Extremely simple electrophysiology can change our understanding of electrophysiology for the public and for scientists as well

A new kind of participatory science: **hands-on** **neuro** participatory science. Usually they’re counting birds or some shit (double check this claim.) *Distinguish ERGo from those motherfuckers at Eyewire.*

## Summary/Conclusion

Simplified electrophysiology can finally begin to expand our large-scale understanding of insects and change minds by bringing people into the club. This is open source and open ended: allows ANYONE to go ANYWHERE with these techniques: biodiversity/ecology, anatomy/physiology, evolution, computational neuroscience.

# Methods

## Procedure for setup and acquisition of honeybee ERGs

* Capture
* Anesthesia
* Setup (rich illustration of restraint and setup)
* Experimentation
* Analysis

# Results and Discussion (organized according to major topics)

## Novel methodology for electrophysiology

It works. No faraday cage, no reference electrode. This is a game changer for how ephys is done in the modern world; so usually constrained by conventional wisdom about “how it needs to be done”

## Discovering questions about entomology

This technique has revealed the following insights about honeybee ergs. If we successfully challenged this part of the conventional wisdom, then other assumptions we’ve made about insects must be reexamined.

# Conclusions