

Scientific Repertoire

The goal of this document is to transparently showcase my skills in science communication, research methodologies, field work, and projects I've worked on. I will also elaborate on future learning goals. It is not a CV or resume. Contains a colorized proficiency rating system and links to the indicated item.

*Underlined words are clickable links to referred section or website/software.

Proficiency Rating System

- ☉ Knows about it. Used/done once or twice.
- ☉ Amateur: Used/done a few times. Confident but needs more work.
- ☉ Proficient: Easily done with minimum error. There is always more to learn.

Statement of Interests

Field protistology

Exploration, characterization, and interpretation of microbial eukaryotic diversity.

Model organism development

Isolating, culturing, and characterizing novel protist lineages.

There is a significant gap between the actual number of described protist species and the total number of protist species on Earth. Most exploratory research in this area relies on broad systematic sampling of protist diversity highlighting novel species. However, this method only reveals novel specie existence, and it does not characterize their morphology. It is inherently difficult to identify, isolate, and culture free-living heterotrophic cells. Enhancing the discovery process could provide novel model organisms for multiple fields and has potential for interdisciplinary application outside of biology.

Co-interests: Science communication and teaching. Organismal photography and microscopy. Husbandry. Field research and specimen hunting.

Biological subdisciplines: Comparative biology. Eukaryotic microbiology. Field protistology. Molecular biology and biochemistry. Paleontology. Biogeography. Quantum biology.

Science Communication

- ☉ Teaching: Three years of tutoring biology, chemistry, and physics classes. I use tutoring opportunities to practice new ways of teaching complex scientific ideas. In addition, I've been a teaching assistant for three years. Mentored students in science, research methods, and graduate school.
- ☉ Presentation: In both poster and oral formats. Aversion to jargon and strong emphasis on background and significance. Expressing results in a transparent way, highlighting both positive and negative parts. Led many journal clubs talking about exciting research from many fields within Biology. My goal is to make presentation interesting and insightful.
- ☉ [Life Photography/videography](#): Seeing life in action proves fruitful in education. Item exhibition photography. Various forms of photomicrography. Video editing in Davinci Resolve Studio. Photo editing and a bit of graphic design.
- ☉ Writing/Literature: *I could greatly improve my scientific writing*. I have yet to write a scientific paper. I have written several abstracts/proposals/research descriptions.

Research Methods and Techniques

Research via Computer

- 🕒 Probing the frontiers of science and literature. Finding relevant information to the project.
- 🕒 Referencing software: Mendeley, Zotero, Papers App.
- 🕒 Protocol finding and development. Essentially, I can cook well because I adapt the recipe.
- ⌘ Biotechnology
 - 🕒 [NCBI resources](#): BLAST, GenBank, Conserved Domain Search.
 - 🕒 [NEB cloning tools](#)
 - 🕒 [UCSC Genome Browser](#) and VirtualBox
 - 🕒 Benchling, SnapGene
 - 🕒 [I-TASSER](#)
- ⌘ Coding
 - 🕒 html and css
 - 🕒 R for biology. Currently using packages for metabarcoding and phylogenetics.
- ⌘ Comparative Biology and Databases
 - 🕒 [GBIF](#), [ITIS](#), [EoL](#), [WoRMS](#), [OBIS](#)
 - 🕒 [Lifemap](#) (ncbi version)
 - 🕒 [GPLates](#), [PaleoBioDB](#)

In the lab

- ⌘ Husbandry and Model Organisms – Keeping life in the lab.
 - Vertebrate Animals
 - 🕒 Pig models: Some exposure to using pigs in research.
 - Invertebrate Animals
 - 🕒 [Amphioxus/Lancelets](#): Used them as models of ancient chordates.
 - 🕒 Flatworms: [Planaria](#)
 - 🕒 Nematodes – wild and lab strains.
 - 🕒 *Turbo fluctuosa* (Marine snail)
 - 🕒 Antlions
 - Protists
 - 🕒 Algae: *Nannochloropsis*, *Tetraselmis* (Marine)
 - 🕒 *Pyrocystis* (with reversed circadian rhythms)
 - 🕒 Ciliates: *Paramecium*, *Blepharisma*, *Spirostomum*
 - Plants (Currently no lab plants) – Future directions entail a green house.
 - Bacteria
 - 🕒 *E. coli* – For food and cloning.

⌘ Molecular

- 🟢 Cloning and DNA work: PCR, ligation, restriction digests, DNA purification, DNA Precipitation, RNA isolation, cDNA Synthesis, electrophoresis (and making gels), plasmid mini and midi preps, transformation, and bacteria culturing.
- 🟢 Tissue culture: (293T, RAW 264), and transfection (mammalian).
- 🟢 Protein work: Western blotting; dot blot; ELISA
- 🟢 Metabarcoding: Broad 18S sequencing.

⌘ Microscopy & Imaging

- 🟢 Inverted, light, dissection scopes.
- 🟢 Fluorescent Microscopy
- 🟢 Confocal Microscopy: Leica SP8 w/LasX.
- 🟢 **Software:** AxioVision (for Zeiss cameras). ImageJ. Image Pro. MyoVision. Helicon focus.
- 🟢 Adept at photoshop and making images look presentable or publishable

⌘ Histology

- 🟢 [Immunohistochemistry](#): *In muscle tissue* – Cryosectioning, staining, confocal microscopy.
- 🟢 Fungal staining

⌘ Organic Chemistry

- 🟢 Chromatography – Paper and column
- 🟢 NMR and data interpretation
- 🟢 IR Spectroscopy
- 🟢 Some synthesis and isolation techniques

⌘ Chemical Use and Handling

- 🟢 Experienced in organizing, disposing, and handling chemicals. Especially if they are from the 70s.

Field Research

- 🟢 *Lacking in mentored field research experience.*

- 🟢 Identification, collection, husbandry, and visualization of certain organisms [\[go to: Husbandry\]](#).

⌘ Marine environments

- Currently conducting research in the Gulf of Mexico for the search of peanut worms. Hopes to isolate Holozoan protists.
- Worked with and cultivated amphioxi. Sourced from the shores of Florida.
- **Licensed in advanced open water diving. Experienced in boating.**

⌘ Rivers

- Metabarcoding and isolation techniques in Texan rivers. Holozoan protists.

Goals for Learning and Future Experience

Writing and literature

- ⌘ Funding: How to write grants and proposals.
- ⌘ Publishing: How to write and put together research articles and reviews.
- ⌘ Clarity: Make writing readable and avoid jargon as much as possible.
- ⌘ Data: Easily understandable graphical design.

Biological subdisciplines

- ⌘ Ecology, oceanography
- ⌘ Marine microbiology
 - Focused on culture and isolation of microbial eukaryotes
- ⌘ Nutrient cycling

Field research

- ⌘ Large scale sampling for microbes.
- ⌘ Sequencing in the field. Perhaps technology from Nanopore.

Instrumentation

- ⌘ Interference and electron microscopy.
- ⌘ Flow cytometry and cell sorting
- ⌘ Mass spectrometry.
- ⌘ Computed microtomography.

Programing

- ⌘ Interested in learning R and python for data visualization. Primarily in working with large genomic datasets to create accurate phylogenetic models.
- ⌘ Python/Drawbot in visualizing data with pleasing graphics.

Brief review of projects I've worked on

Independent research projects:

(Current) Developing a [system](#) for locating, isolating, and characterizing novel protist lineages. A start by sampling holozoan protist diversity in Texas rivers and developing isolation methods. Aiding research in the origin of animal multicellularity.

(Past) Developed a [crude tool](#) to explore the locations of ancient Chordates through time and space on Earth by tracing coastlines. Paleobiogeography of amphioxii. Used GIS software.

Exploration of natural amphioxus GFP in reproductive behaviors and partially cloned bfGFP genes. Potential discovery of two GFP splicotype products. Amphioxii encode the largest known family of fluorescent proteins with some having near perfect quantum yield. I also found potential sexual dimorphisms in amphioxii dependent on fluorescent proteins. However, this needs to be explored by quantitative experimentation.

Collaborative and mentored projects:

Baylor College of Medicine SMART | Children's Nutrition Research Center | [Davis Lab](#)
United States Department of Agriculture | Texas Children's Hospital | (Summer 2019)

A highly competitive NIH funded program providing students with experience in medical research as well as mentorship when applying graduate schools.

One goal of the Davis lab is to figure out how to enhance muscle growth in preterm infants to prevent developmental problems and metabolic disease. I was involved in analyzing muscle samples of preterm piglets from a study about how feeding schedules affect growth.

*Was accepted to the University of Iowa evolution REU to do research on beetle antennae diversification before it was canceled. A project termed "Beetlemania." The pandemic got in between me and beetle antennae. Quite disappointing.

Houston Baptist University | Agnieszka Czopik, Ph.D. | (2017-2019)

Developed the amphioxus as a model organism for ancient chordates and the evolution of adaptive immunity. Husbandry and breeding protocols for the amphioxus and two saltwater algae species. Protocol development to culture and transfect amphioxus tissues with the goal to make immortal cell lines. Lots of cloning. Fluorescent and qPCR experiments geared to locate a site in the gut dedicated to immune system activity.