SARAH Z. DUNGAN

Portfolio

Medical & Technical Communication

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Sarah Z. Dungan, PhD

I'm a newly certified professional technical communicator (CPTC) with an academic background in the life sciences.

As a biologist turned technical writer, I have a strong appreciation for the highly specialized people who use the documentation I compose. I've experienced the stress of peer-review and the frustration of following a vaguely written lab protocol. I too have frantically searched the manual for that extremely expensive new ultra-centrifuge, desperate to find the meaning of the error code it won't stop displaying.

In other words, I know firsthand how important high-quality scientific and technical writing is.

Each piece of content I produce is bespoke to the user and their context, whether they're graduate students, lab technicians, or principle investigators.

At heart, I am a scientist first and a writer second, but that only means my reverence for knowledge and my affection for the people who create it are central to my production process.

Is there a difference between technical and medical writing?

Yes and no.

Medical writing is an umbrella term that refers to technical and scientific writing in health, medicine, and other life science disciplines. Technical writing is more broadly a set of core production and design competencies that emphasize transforming complex information into usable knowledge.

Though medical writers can have all kinds of audiences, I typically write for other medical, health, and science professionals.

The kinds of writing I specialize in include:

- Peer-reviewed articles and abstracts
- Whitepapers
- Conference posters and slide decks
- UX design for STEM users
- Software and device documentation (print and online)
- Standard operating procedures (SOPs)

Whitepaper

Advocating for ground-breaking DNA sequencing technology

The purpose of this whitepaper is to make a case for using portable sequencers in wildlife forensics. The target audiences include a variety of stakeholders involved in combating illegal wildlife trade. As such, the writing in this whitepaper had to appeal *both* to experts and non-experts. **Appealing to one does not mean alienating the other!**

A typical workflow with the MinION (Figure 2) can take under three hours and consists of four phases:

1. Break open cells to extract genetic material.
2. Attach Oxford Nanopore Technologies' motor proteins to prepare the sample for sequencing.
3. Generate multiple sequence reads in real-time.
4. Analyze the sequence reads to identify the species.

Additional software compiles all sequence reads together to form a "consensus sequence". Comparing this consensus to a reference database allows an investigator to match the sample with species' genetic barcodes (Ogden et al.).

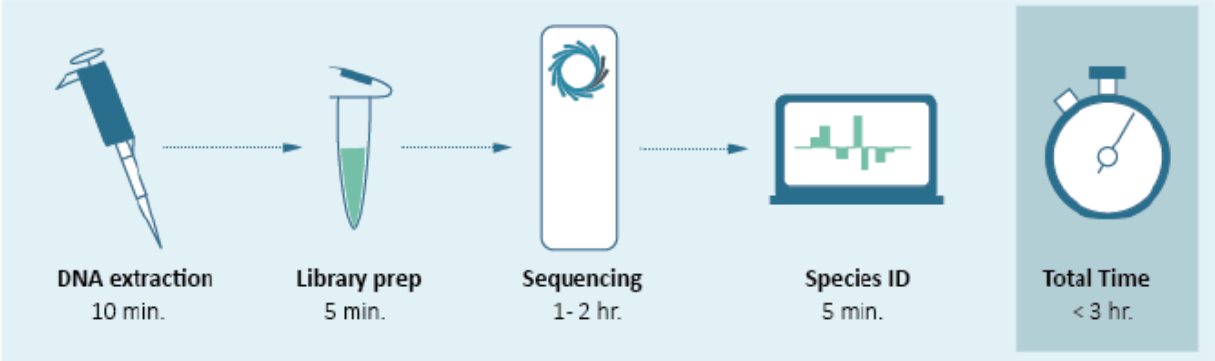


Figure 2. The total workflow of MinION sequencing from DNA extraction to species ID can take under 3 hours!

Persuasion with facts and evidence, not rhetoric

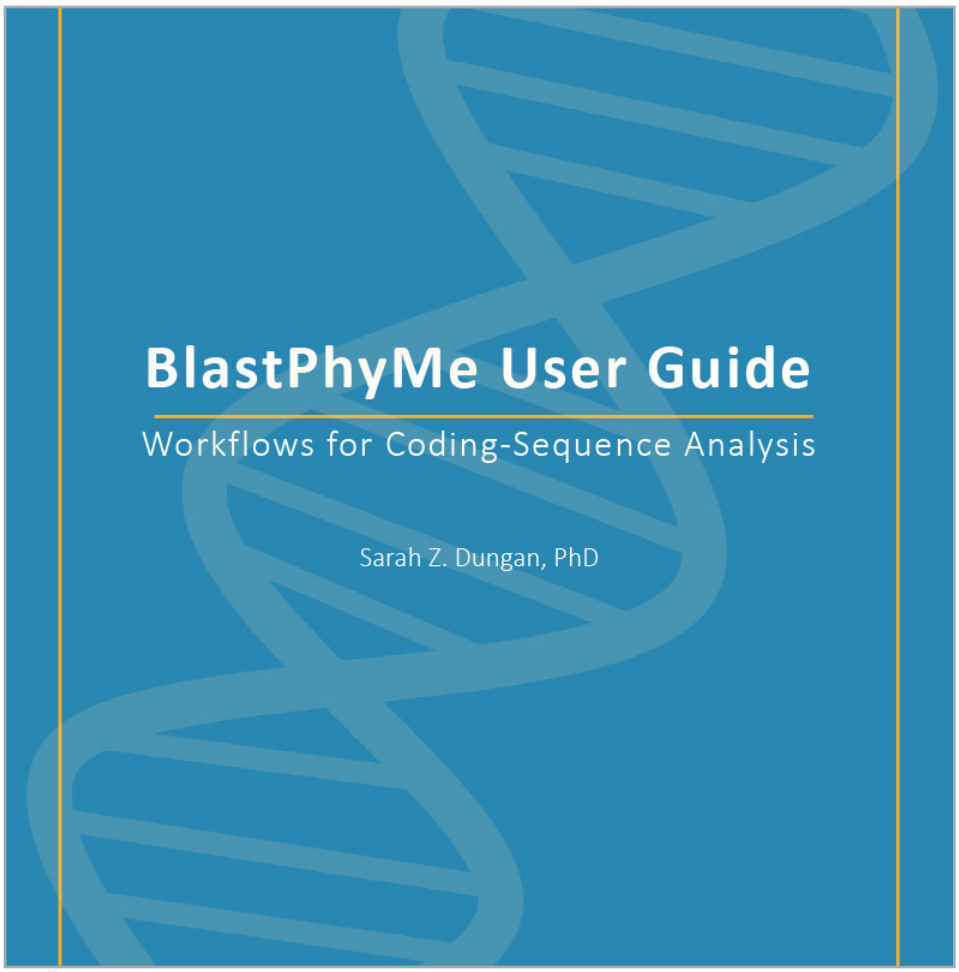
I wrote this piece in a technical communication class to practice a persuasive writing style in a technical context. As a scientist, information accuracy is very important to me.

As a technical writer, my job is to convey complex information *without* sacrificing accuracy.

Result

Precise, information-rich content that can also be appreciated by readers who don't have a genetics background.

Print & Online Manual



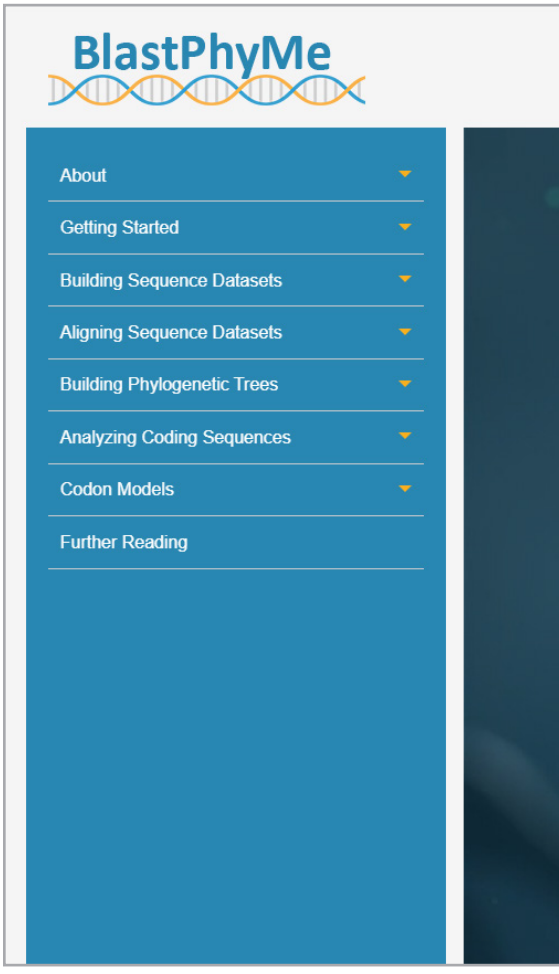
Writing a user manual for open-source bioinformatics software

Two of my former colleagues developed the program, BlastPhyMe, to help with our lab's computational workflows. At the time, all of us were too busy to write a proper manual for it. As such, I was happy to give this program the documentation it deserves as part of a technical writing class.

The challenge was removing myself from my perspective as an expert user and into the shoes of someone who'd never used the software before.

At the same time, my famliarity with the software allowed me to write with an understanding of the kinds of problem-spaces people who use it want to explore.

I now see myself as an expert who writes for other kinds of experts.



CHAPTER 2 Getting Started with BlastPhyMe

In this chapter

To use BlastPhyMe, you will need a Windows desktop computer running Windows 7 at a minimum. Because BlastPhyMe is a workflow tool, you will also need additional 3rd-party software to accomplish specific tasks:

Sequence alignment software—BlastPhyMe uses PRANK, MUSCLE, and MEGA to generate multiple sequence alignments.

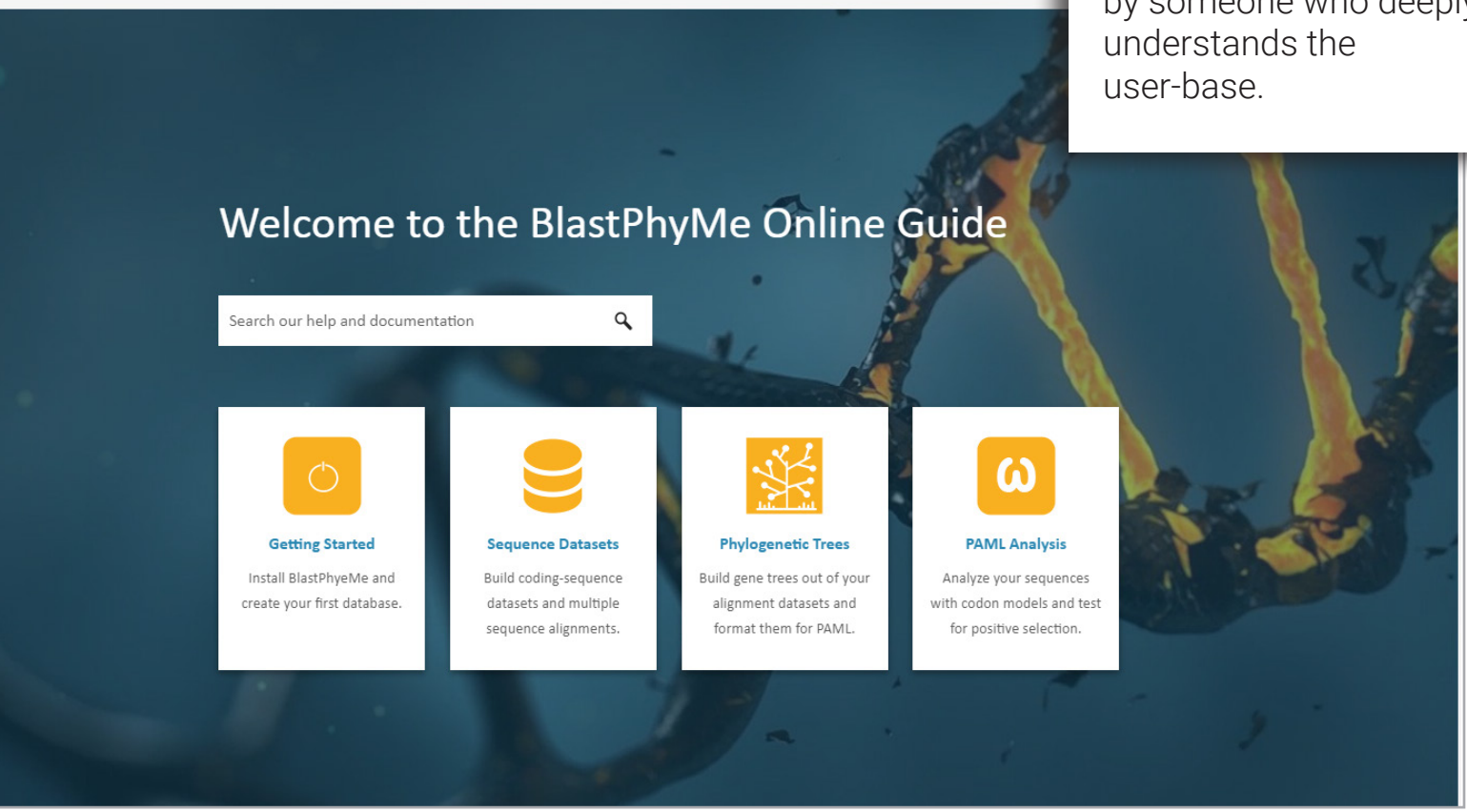
Tree-building and editing software—BlastPhyMe uses PhyML to build gene trees, but you will also need a tree editing program to manipulate tree files. See "Editing Tree Files with an External Editor" on page 24 for recommendations.

Leveraging FrameMaker and MadCap Flare

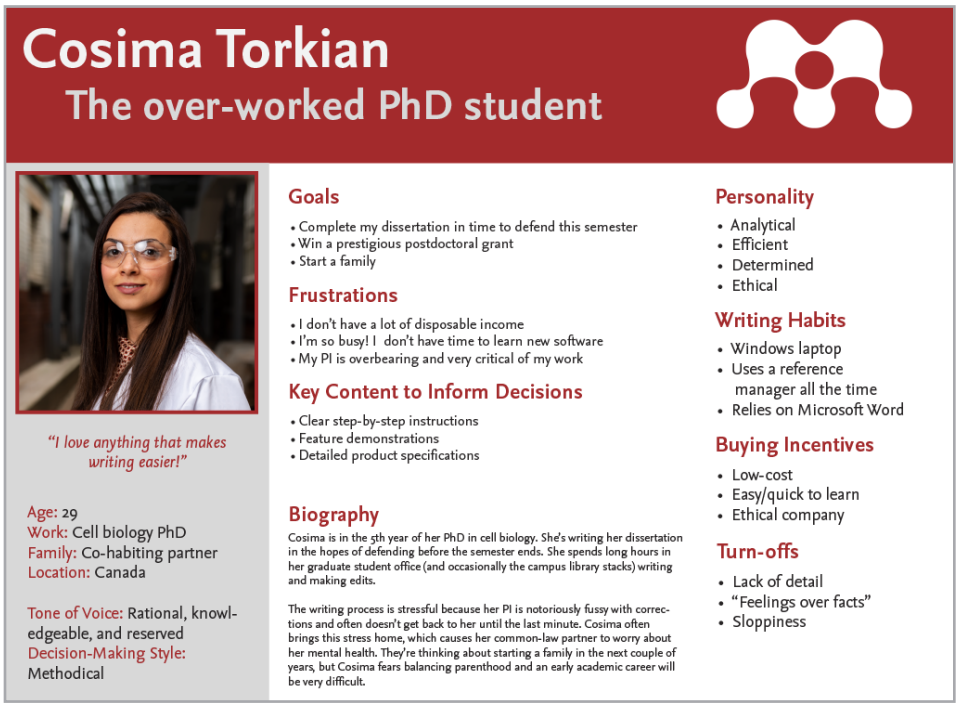
I wrote the print version in FrameMaker and imported the final book file into MadCap Flare to design an online version as well.

Result

The same manual in two different formats, written by someone who deeply understands the user-base.

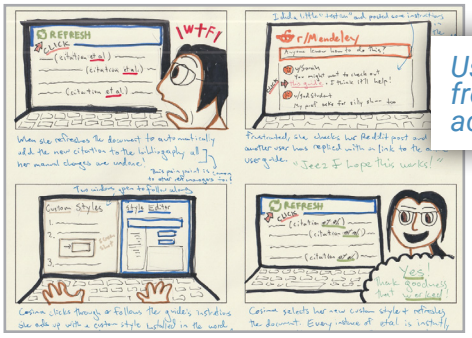


User-Centred Prototype Help Site

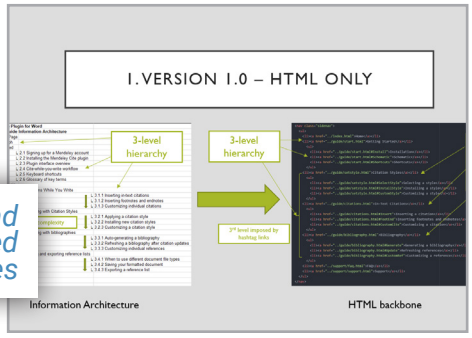


Every design phase informed by user research

Mendeley is a reference manager widely used by STEM academics (including myself!) but its existing documentation is currently bare-bones. For a UX design class, I built a help site for the browser plugin tool.

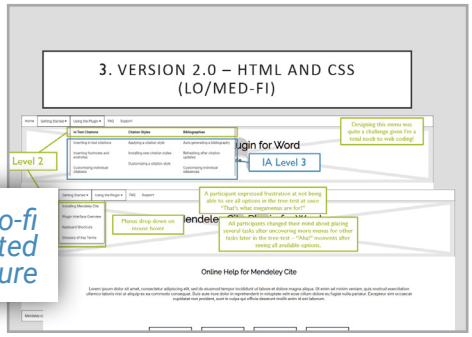


User personas and story maps from surveys and interviews with academic users

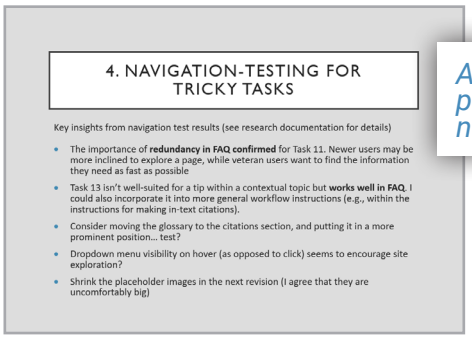


Information architecture and HTML backbone emerged from card-sorting exercises

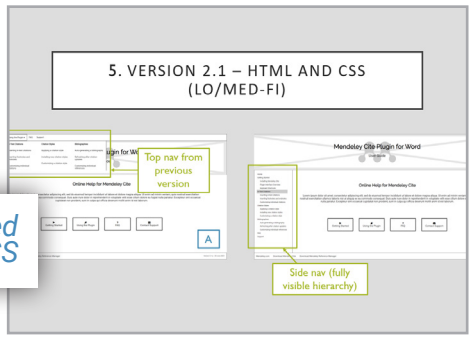
Information architecture validated by tree-testing exercises.



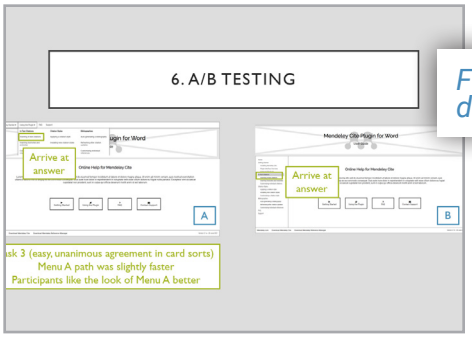
Navigation design and lo-fi wireframes from user-validated information architecture



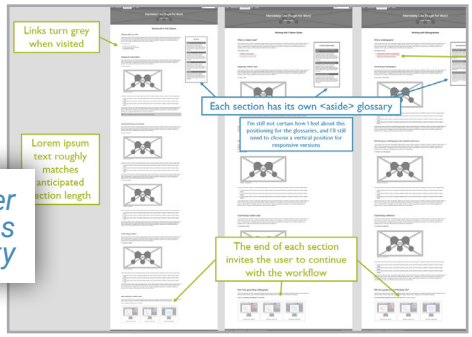
Additional topic placement decided by navigation tests



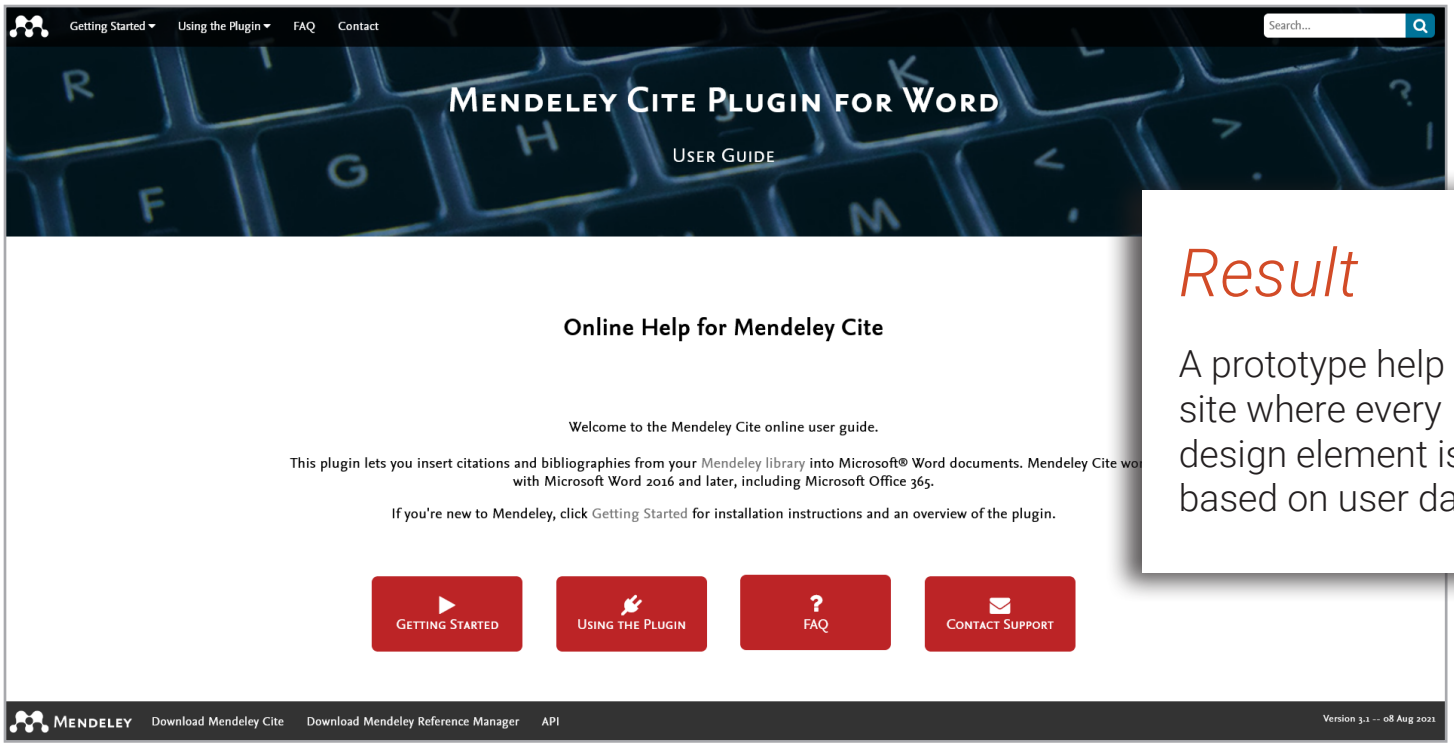
Med-fi wireframes designed with HTML and CSS



Final navigation scheme decided by A/B testing



Hi-fi wireframes with filler text, placeholder images and Javascript interactivity



Result

A prototype help site where every design element is based on user data.

Built from scratch in HTML, CSS, and Javascript

A major challenge in this project was learning UX research methods at the same time as learning to code. As such, the final design is constrained by my technical abilities.**If I could do this project over again, I'd create a more modern design with the coding and design skills I've continued to develop.**

Standard Operating Procedure

From messy lab notebooks to clean standardized protocol

Many of the molecular biology protocols I once used were cobbled together through trial and error and shadowing senior lab members. While learning to write instructions using technical writing principles, I decided to give my old bacterial transformation protocol a proper SOP overhaul. **I believe even complex protocols should be easeful, not intimidating.**

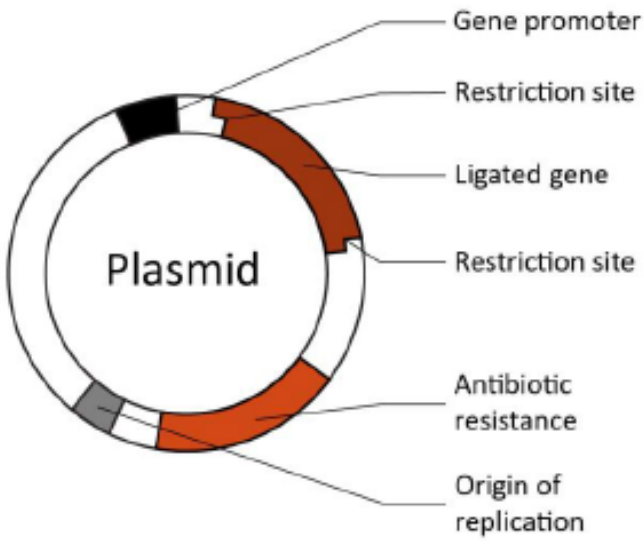


Figure 1. Key components of a recombinant plasmid

Preparing the Plating Station

While the cells are incubating in the shaker, prepare the plating station by disinfecting all surfaces and arranging all supplies and equipment near the Bunsen burner sterile field.

1. Wipe down the counter-top and turntable with 70% isopropyl alcohol
2. Rest the glass spreader inside a clean 250 mL beaker
3. Fill the beaker with a few mL of 95% ethyl alcohol, just enough to submerge the spreader arm
4. Get the agar plates from the incubator and label each with the date and your initials
5. Turn off the mini-shaker and bring the cell tubes to the plating station
6. Turn on the gas and start the Bunsen burner with a modest flame

***Danger – Explosion and Burn Risk:** Ethyl alcohol is flammable. Keep the ethanol beaker away from the open flame and do not put an ignited spreader in the beaker!*

Plating Transformed Cells

While plating, keep the turntable and glass spreader within the sterile field of the Bunsen burner.

For each plate and cell tube

1. Place the plate on the turntable
2. Aspirate the cell sample (about 300 µL, but set pipette to **350 µL** to ensure you aspirate the whole sample)

BestBio Labs
Standard Operating Procedure

Bacterial Transformation Protocol with BioLine™ Gold Competent Cells

Revision: 01
Effective Date: 18-Jun-2021
Author: Sarah Dungan
For: Lab technicians and students

Lab Safety and Aseptic Technique

Before performing laboratory work, please review BestBio Labs safety guidelines and material safety data sheets (MSDS) for all reagents used in this protocol.

To work safely, you should

- Keep your work areas de-cluttered.
- Wipe down your work areas with 70% isopropyl alcohol.
- Keep all supplies within or near the Bunsen burner's sterile field while plating cells (Figure 2).
- Loosen reagent screw caps for easy one-handed opening.
- Wash your hands thoroughly with antibacterial soap before and after working with bacteria.
- Wear personal protective equipment (PPE).

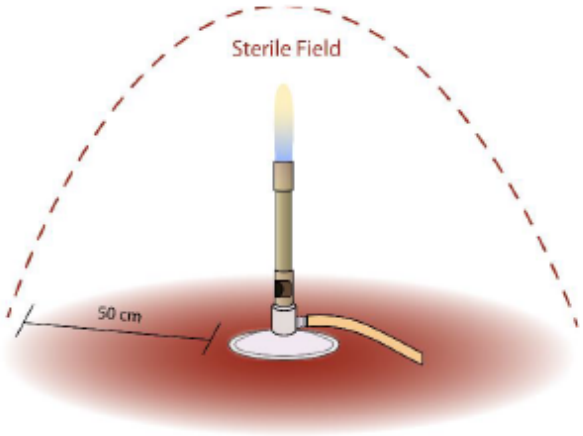


Figure 2. The sterile field created by the flame updraft has a radius of about 50 cm around the Bunsen burner

Graphics are for medical writers too

As I began to draft the protocol, I thought about the concepts that were difficult for me to grasp until I'd actually been physically at the bench for awhile—small things like the easiest way to hold something and tips for making steps more efficient or less error-prone. **But certain concepts simply require visual clarification**.

For this protocol, I designed simple illustrations to clearly convey critical concepts that are difficult to describe solely in words. For example, conducting a bacterial transformation safely and successfully depends on visually understanding the Bunsen burner sterile field.

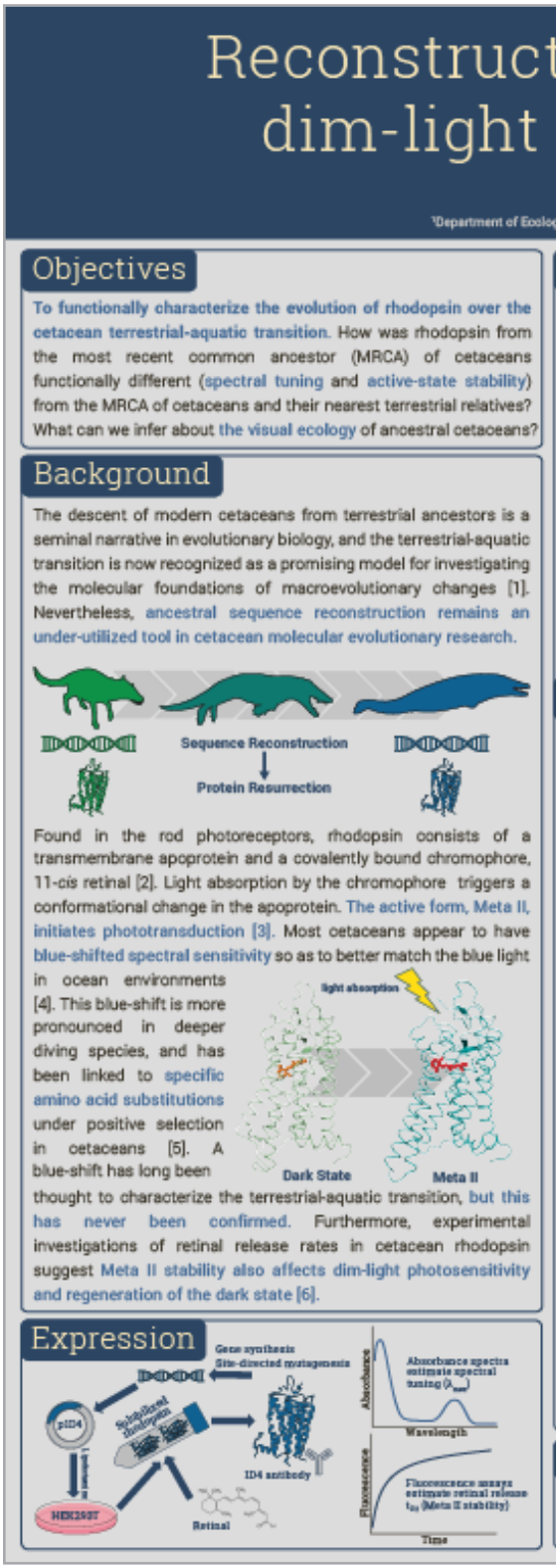
Result

A visually pleasing, easy-to-follow laboratory protocol written by someone who's actually done the procedure before.

Conference Poster

Sharing feedback to design effective science graphics

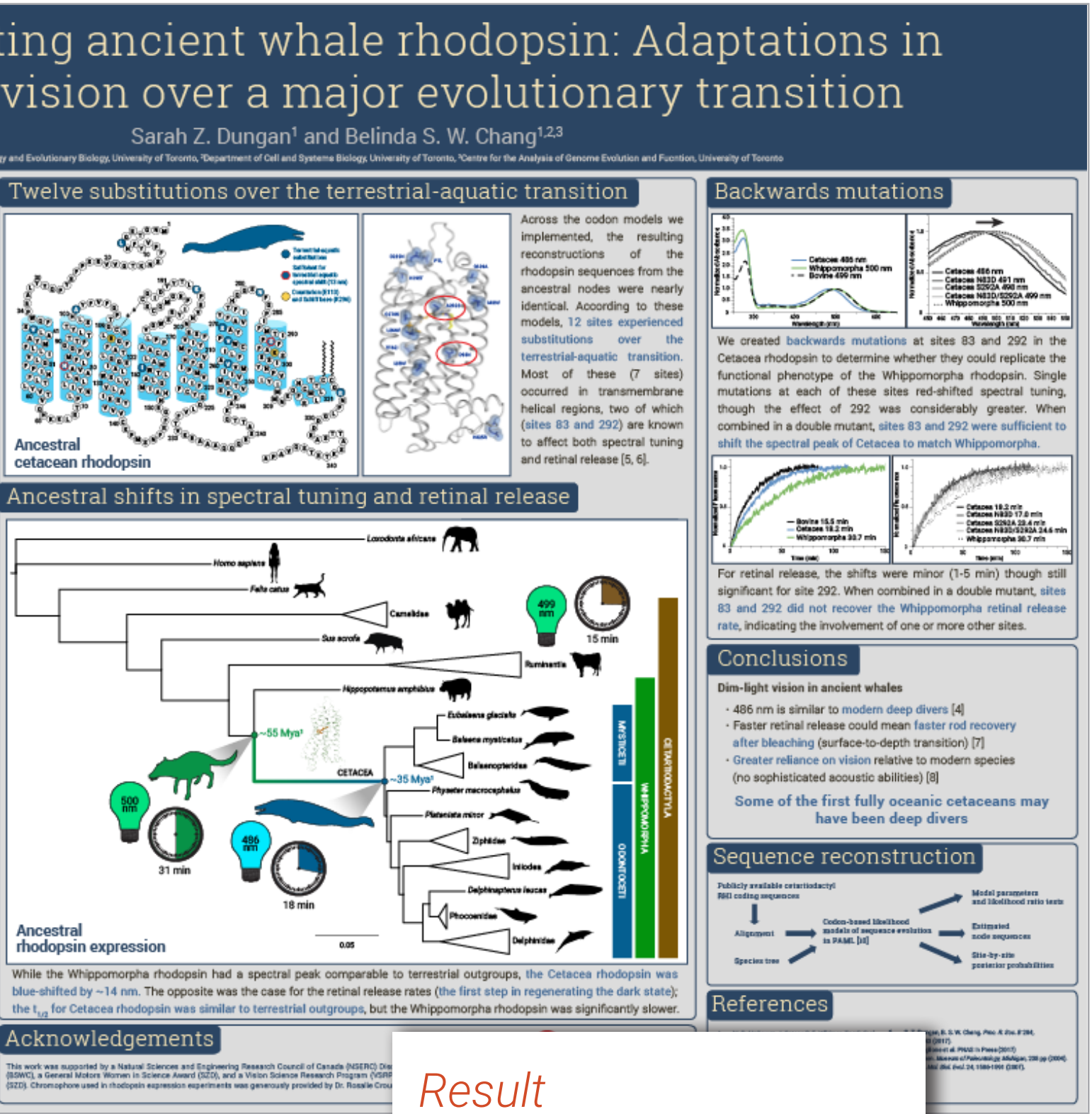
I was lucky to work with some excellent people as a scientist. We had a habit of getting feedback from each other on most everything. Until recently, I had no training in graphic design, but I learned a lot from other graduate students who had a talent for it. **I believe that where you have weaknesses, collaboration with others who complement your strengths is especially critical**. I presented this particular poster covering my favourite dissertation chapter at Evolution 2017 Portland, Oregon.



Not just an article copy-pasted into PowerPoint

How many times have you seen a poster that was clearly just a copy-pasted paper, abstract and all? Written content for conference posters must be easily scanned and visually striking. Remember, many of your viewers will be making good use of the conference open-bar!

These design principles were impressed upon me by my professors when I was a young graduate student. However, I only fully appreciated them as a conference attendee myself. I can't count the number of times I've been excited by a poster title only to have my eyes glaze over walls of text and overly dense graphics. **Your science won't make an impact if even other experts find it a chore to learn about!**



Result

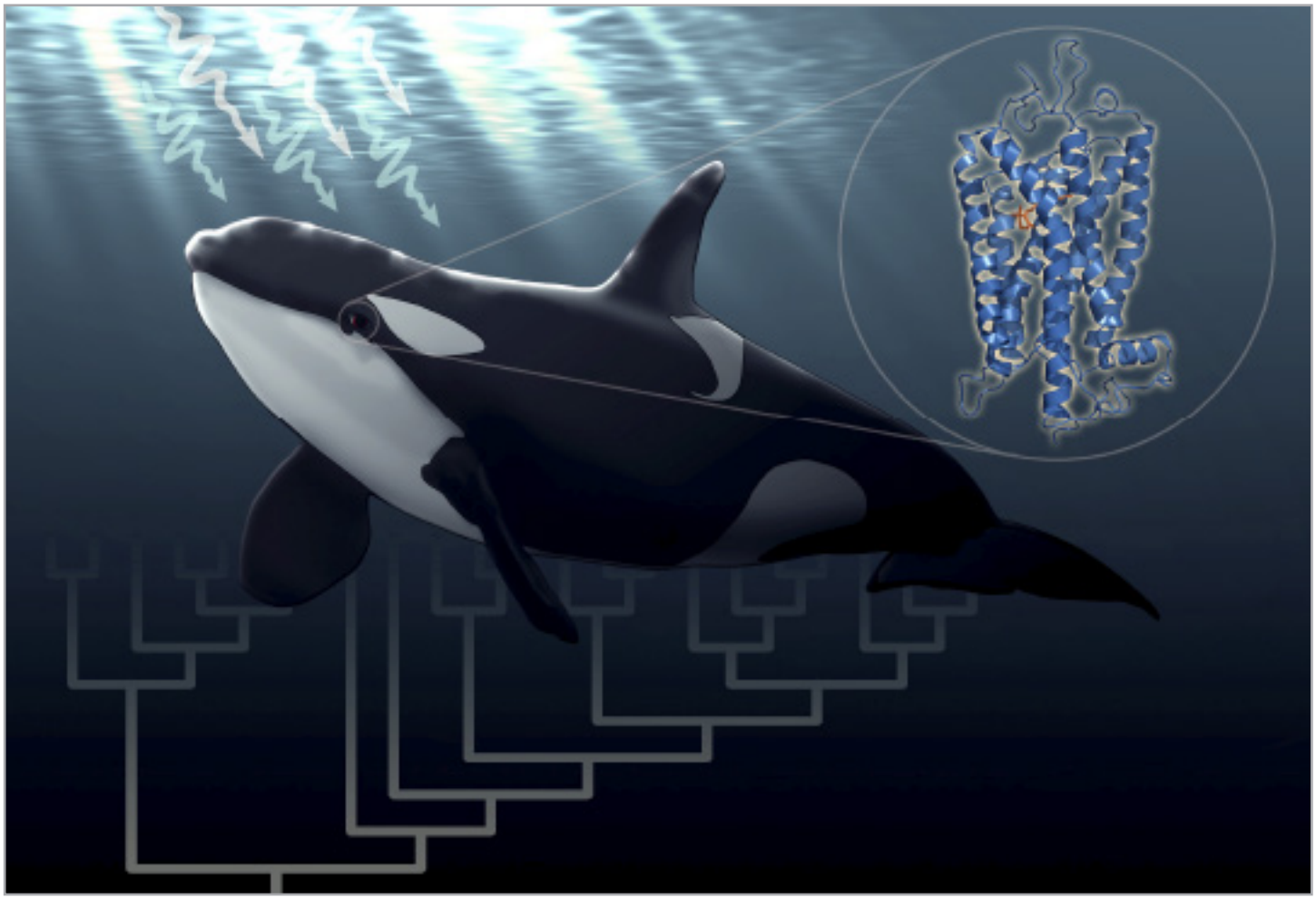
A visually-pleasing and information-rich poster you can be sure viewers will remember key points from.

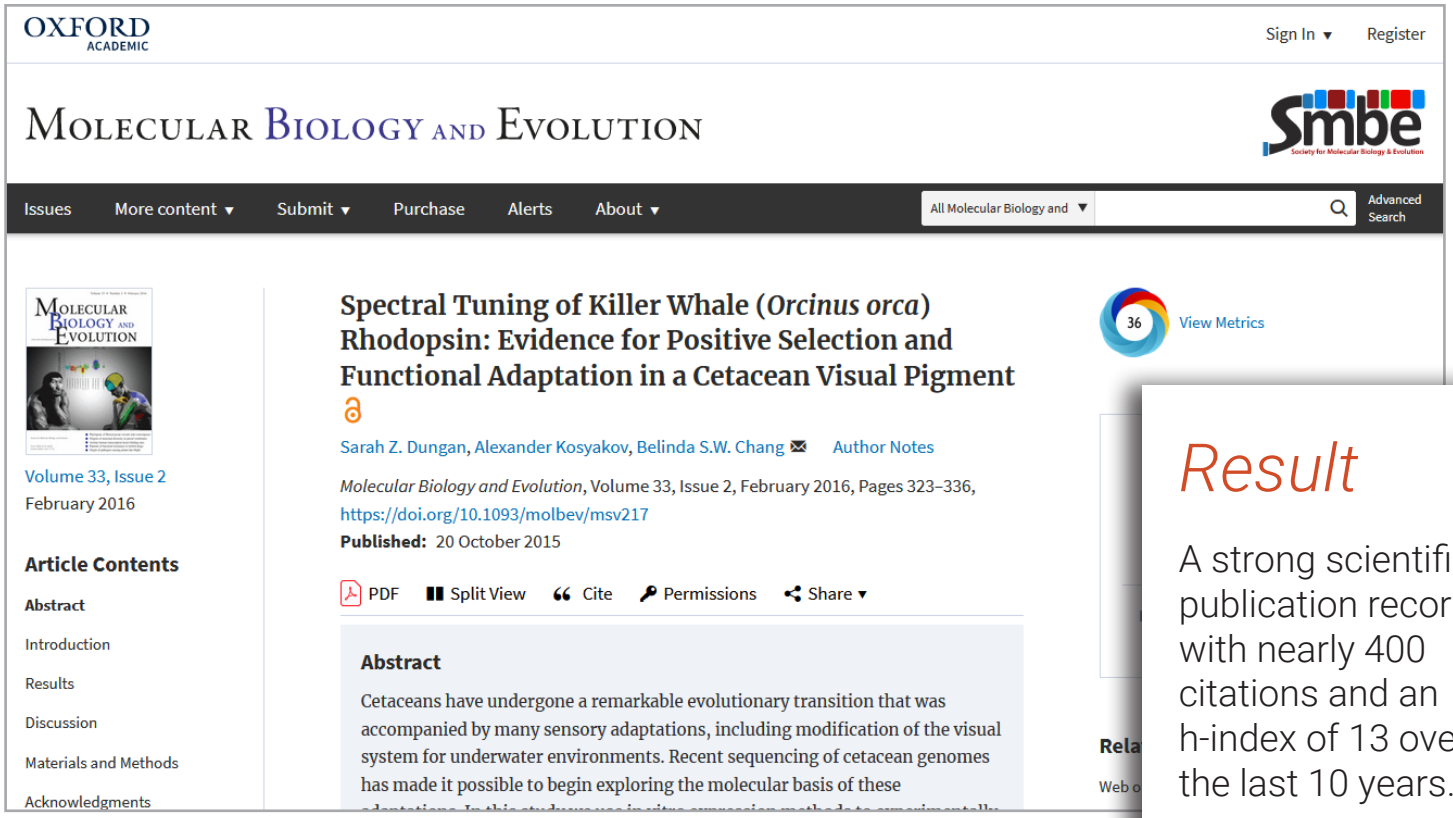
Peer-Reviewed Paper

Adaptations in whale genes

Yes, whale genes were once my area of expertise. This was one of the first papers I wrote as a PhD student and it captures what I personally love about research: interdisciplinary approaches that combine concepts and techniques from different fields (bioinformatics and protein biochemistry in this case). I'll take the time to learn anything, no matter how complicated, to answer a question I'm interested in. For example, I started my PhD with zero wet lab experience, but was conducting tissue culture and protein expression experiments within 6 months.

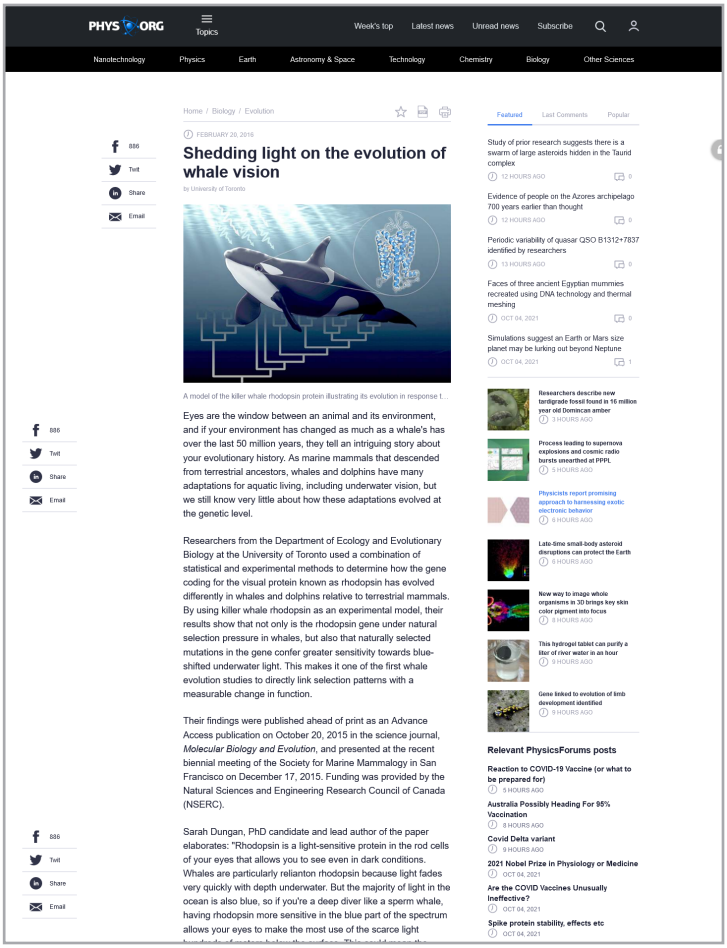
Even so, my favourite part of science is taking the whole process, all the data and statistics, and writing it up into a cohesive story that advances knowledge in my field.





Result

A strong scientific publication record with nearly 400 citations and an h-index of 13 over the last 10 years.



Writing the same information for a different audience

Peer-reviewed papers target other experts in the field, but I wanted some experience writing for other kinds of audiences too. As such, I took the initiative to also write press releases for my published papers.

Scientific press releases get read by both other scientists and non-experts so they need to **balance interest from both audiences**. I successfully pitched the press release for this particular paper to Phys.org.

(I also digitally painted the illustration!)

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Contact & Parting Thoughts

For me, the biggest and most rewarding challenge of technical writing is in balancing the needs of target audiences with differing levels of expertise, often within the same content.

I believe that my writing skills combined with my background as a scientist put me in a unique position to navigate this balance. For most of the content I create, I occupy an empathy space in between the specialized expert and the fully naive user. As a result, it's a little easier for me to pivot between the two.

Have you ever written (or read!) content that had to appeal to more than one target audience with differing levels of expertise?

What do you think allows a writer to successfully meet this challenge?