

Mastering the Chaos: Organize your Research like a Pro



Scan to log attendance

Featuring:



Mehdia N. Rajab Ali



Anthony Compton

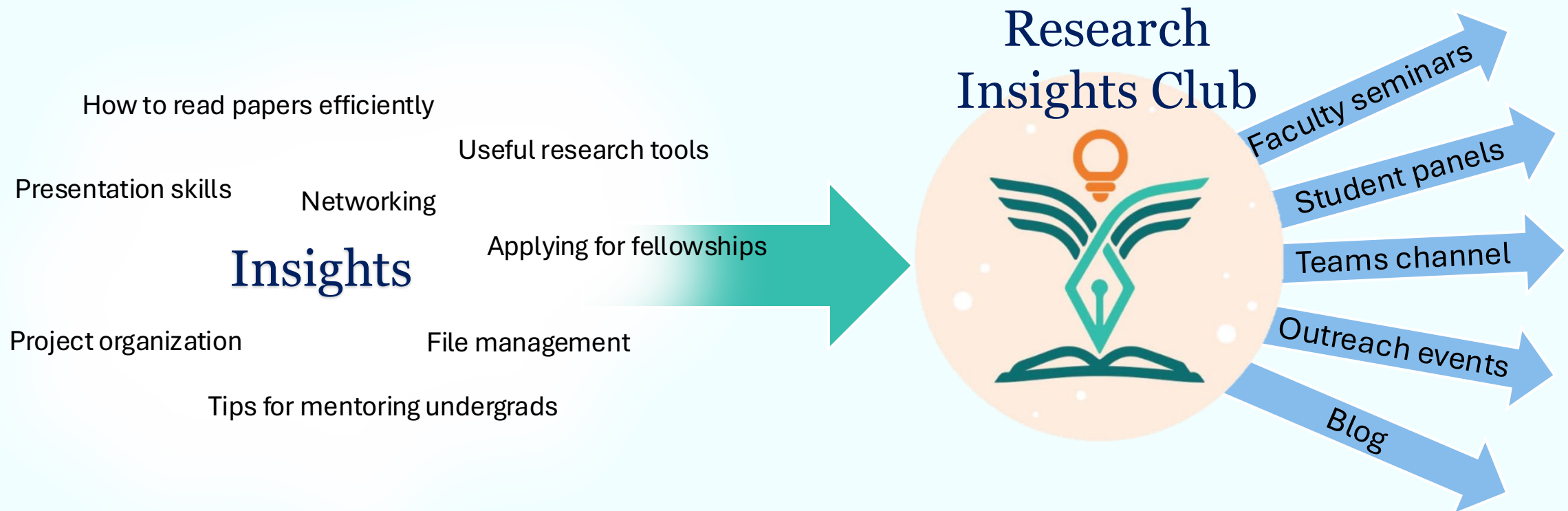


Research Insights Club

Our Purpose

- (1) To disseminate detailed and hard-to-obtain knowledge to Georgia Tech students to help them navigate and thrive in the complex field of academic research.*
- (2) To facilitate knowledge transfer and networking between student researchers outside their usual fields.*

Implementation Strategy



Join us!

**Students &
researchers at all
levels welcome**



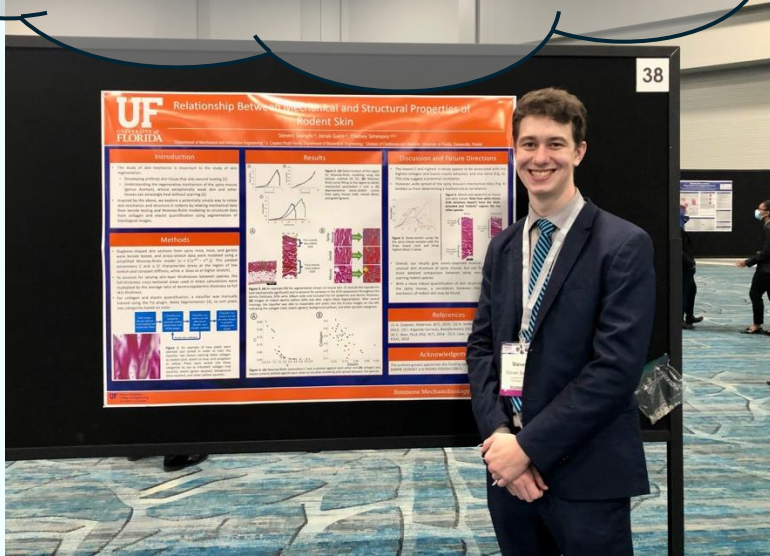
web-design event-planning
presentations merch
friendship teamwork
outreach leadership
networking

- If interested, reach out to Steven Swingle → steven.swingle@gatech.edu
- Find us on Engage <https://gatech.campuslabs.com/engage/>
- Follow us on instagram [@gatech.ric](https://www.instagram.com/gatech.ric)

Mastering the Chaos:
Organize your
Research like a Pro

Why is organizing your research important?

Stressed
Sporadic
Unfocused



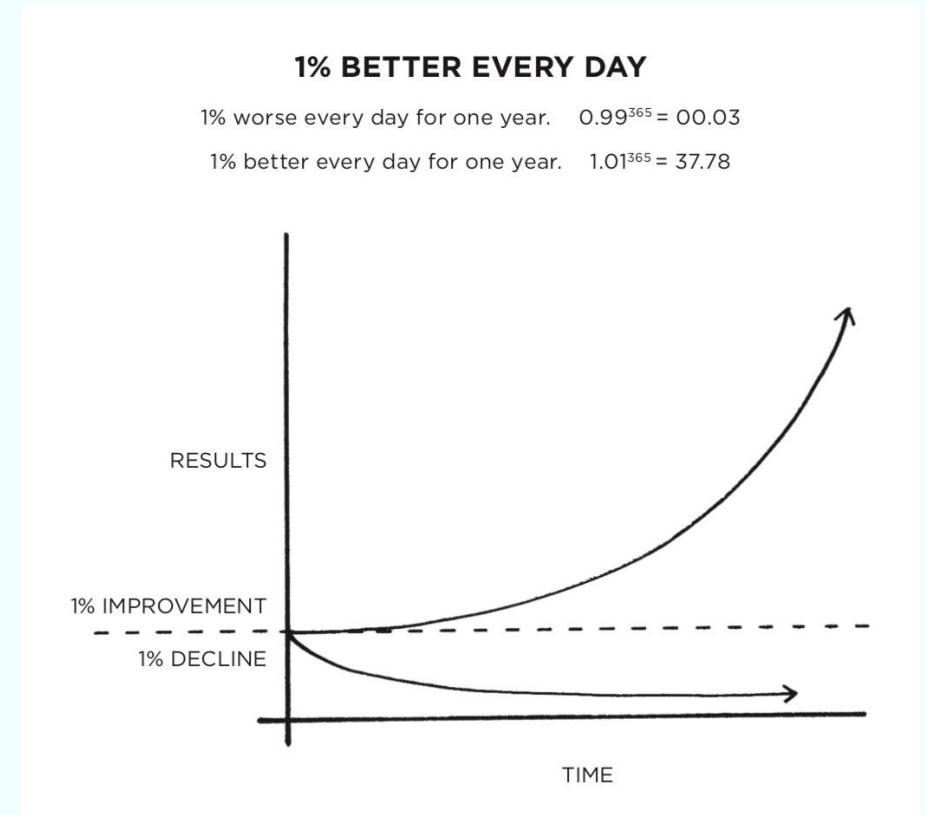
Steven, circa 2021

- Not organizing what I was doing
 - Research protocols
 - Goals
 - Papers
 - Network

Mastering the chaos – lessons learned

- Document everything
 - Protocols
 - Goals
 - Papers
 - Network
 - Meetings
- Have a system, any system
 - **Today's goal: suggestions for systems**
 - 1st half - Personal (Mehdia)
 - 2nd half - Research (Anthony)

Little improvements are ok



Personal Organization

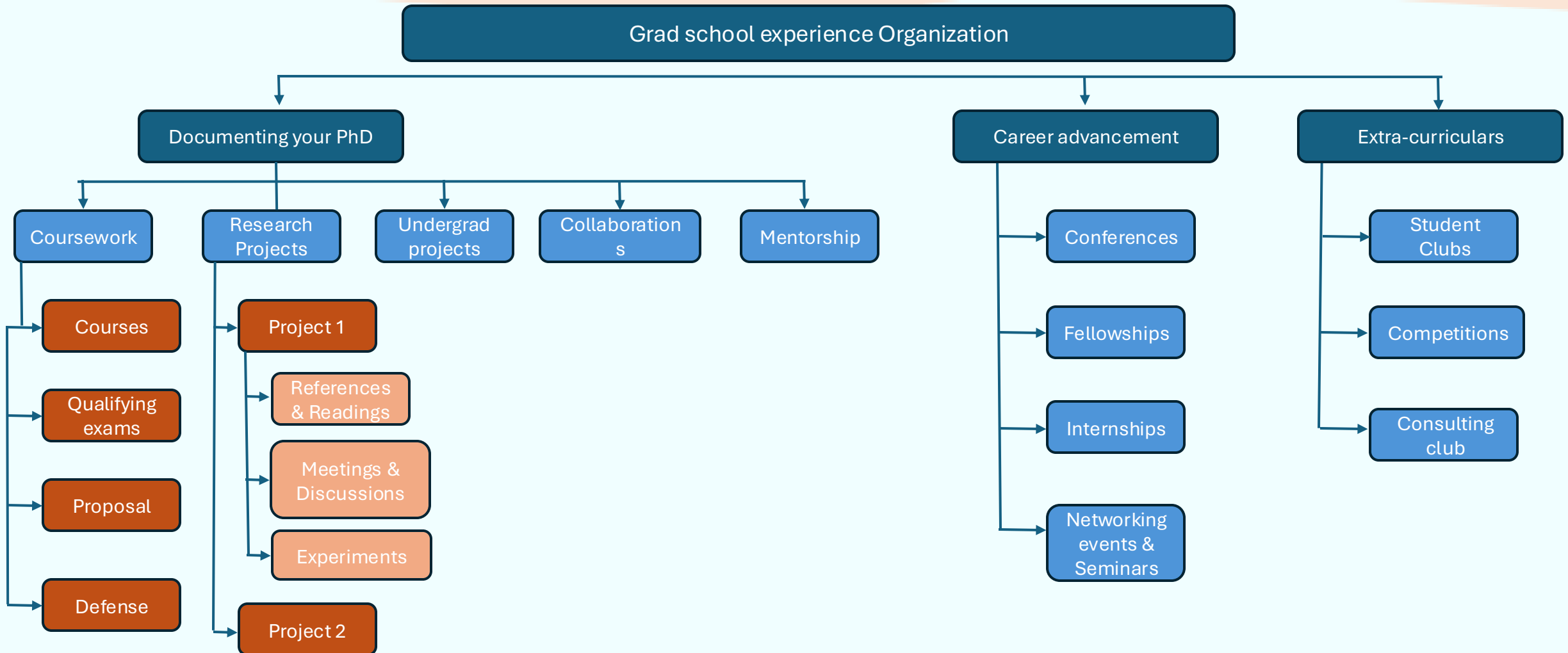


Mehdiya N. Rajab Ali

Personal Organization



How to organize your grad school experience?



Documenting your PhD – keeping track of milestones, meetings, experiments, decisions



1. There is no best way to document, the how is less important
2. You can structure 5-6 years of your PhD by either:
 - Academic years
 - Specific years



Categories within a year/semester



1. Coursework

- Dedicated folders for each course
- Program of study form
- RCR
- Student Advisor Matching form
- Qualifying exams
- Proposal
- Defense

Categories within a year/semester cont.



2. Research Projects

- **Project 1: 2020-2025_Grant #_Chemotherapy based cell Sorting**
 - References & Readings
 - Meetings & Decisions
 - Experiments (organize by theme or instrument used)
 - 09.23-03.24_Drug induced biomechanics
 - 02-34-ongoing_microfluidic sorting
- **Project 2: 2024-2025 Grant # Natural Killer cell grant**
 - Proposal draft
 - Illustrations

Categories within a year/semester cont.



3. Undergraduate projects

- Create dedicated folders for each undergrad
 - Learning goals
 - Research timelines
 - Weekly updates
 - Resources

4. Collaborations

- Create dedicated folders for each intra-lab or inter-lab collaboration
 - Parent objectives
 - Timelines
 - Task assignments
 - Communication records

Categories within a year/semester cont.



5. Mentorships

- Learning Goals
 - Initial assessments
 - Skill-building
 - Target competencies
- Development Plans
 - Milestones & timelines
- Meeting Notes
- Progress Updates
- Feedback & Reflections

Categories unspecific to semesters



1. Career Advancement

- CVs
- Conferences
 - Abstracts
 - Agendas
 - Presentations/Posters
- Fellowships
 - Application
 - Recommendation letters
 - Project proposals
 - Important deadlines
- Internships
 - Interview notes
 - Offer letters
- Networking events & Seminars
 - Event schedules, speaker information, resources, follow-up emails etc.

Categories unspecific to semesters



2. Extra-curriculars

- Student Clubs
 - RIC
 - 1. Academic resource committee
 - 2. Finance
 - 3. Marketing
- Mentorship Programs
- Competitions

3. Health & Wellness

- Meal prep/recipes
- Work out plan
- Health Insurance

4. Finances

- Budgeting
- Bills & Payments
- Savings & Investments
- Taxes

Software/Tools to organize



1. OneNote: use the notebook and section layouts to categorize projects, notes, and data.

OneNote

Home Insert Draw View Tell me

Calibri 11

Heading 1
Heading 2

To Do
Important

Share

Graduate School

Other

Fall 2021

Spring 2022

Summer 2022

Fall 2022

Spring 2023

Fall 2023

Spring 2024

Summer 2024

Fall 2024

Week of 09/03/...

Week of 9/11/2...

Week of 9/18/2...

Week of 09/25/...

Week of 10/02/...

Week of 10/09/...

Week of 10/16/...

Week of 10/23/...

Week of 10/30/...

Week of 11/6/2...

Week of 11/13/2...

Week of 11/20/...

Week of 11/27/2...

Week of 12/4/2...

Week of 12/11/2...

Week plan tem...

Week plan tem...

Add section

Add page

Wednesday	To Do	Accomplished	Meetings	Notes
	<ul style="list-style-type: none"><input type="checkbox"/> Finalize design for Dean force device<input type="checkbox"/> Request sums trainings<ul style="list-style-type: none"><input type="checkbox"/> Metal Deposition<input type="checkbox"/> RIE<input checked="" type="checkbox"/> Lab coat washing training<input type="checkbox"/> Email Jacob Bryson about 3rd floor access and removing/replacing the BSC<input type="checkbox"/> Email Michelle for getting floors cleaned<input checked="" type="checkbox"/> Research update for Todd and MF meeting<input checked="" type="checkbox"/> Request quote for cryo-media			<p>Things to bring up for Todd meeting and MF meeting</p> <ul style="list-style-type: none">Bubble cleaning methodBimodal size distributionControl system not workingBSC updates<ul style="list-style-type: none">Small one is discontinued. We need a new onePutting a microscope in the large BSC<ul style="list-style-type: none">No UV in the large BSC

Thursday	To Do	Accomplished	Meetings	Notes
	<ul style="list-style-type: none"><input type="checkbox"/>		<p>Evo microscope for cell culture hood</p> <ul style="list-style-type: none">15,000-30,000 <p>Amoscope might be able to go in the hood as well</p> <p>Would this one be a bad idea? It's very cheap</p> <p>https://www.amazon.com/Opsopz-Digital-Microscope-50-2000X-Observing/dp/B08A655K1C?source=ps-sl-shoppingads-lpcontext&ref_=ps-sl&mid=A21ZEEPSKUZRP&th=1</p>	<p>Mech Project deliverables</p> <ul style="list-style-type: none">Maintain constant strain<ul style="list-style-type: none">DC motor w lead screw (ACME)SOP/SI (make miniature lead screws)Machine vision<ul style="list-style-type: none">measure ridge angleAdd dots to get strainLoad cell<ul style="list-style-type: none">EutekObtain a strain vs angle curve <p>Validate whether material can flow through the device</p>

Software/Tools to organize



1. OneNote: can create pages within sections of a notebook

The screenshot displays the Microsoft OneNote application interface. On the left, a sidebar shows a list of sections under the notebook 'Graduate School'. The sections include 'Other', 'Fall 2021', 'Spring 2022', 'Summer 2022', 'Fall 2022', 'Spring 2023', 'Fall 2023', 'Spring 2024', 'Summer 2024', and 'Fall 2024'. The 'Fall 2024' section is currently selected. The main area shows a page titled 'Week of 10/13/2024' for Tuesday, October 15, 2024, at 2:17 PM. The page content is organized into two columns. The left column contains a 'Goals:' section with a bulleted list of tasks, including 'Dixon Buffer Exchange' and 'Buffer Exchange (BMES poster)'. The right column contains a 'Things to do:' section with a bulleted list of tasks, including 'IP for 2 phase cleaning' and 'Proposal'. Below these sections, there is a date entry '10/17:' followed by a bulleted list of tasks, including 'Analyze data from yesterday' and 'Practice UV spec on little cuvettes'. At the bottom of the page, there is a section titled 'Thoughts on buffer exchange next steps:' followed by a bulleted list of tasks, including 'Try thinner channel' and 'Try lower ridge angle 0.5 deg, 0.25 deg.'.

Graduate School

Week of 10/13/2024
Tuesday, October 15, 2024 2:17 PM

Goals:

- Dixon Buffer Exchange
 - o Make and test the thing
- Buffer Exchange (BMES poster)
 - o Figures (need triplicates) (6 experiments)
 - 2 experiments per day plus one extra day = 4 days in the lab
 - o Mixing data
 - 1 day in lab

Things to do:

- IP for 2 phase cleaning
- Proposal
- Spiny project
- Iowa Project
- Dixon lab project
- RIC
- Nucleate for buffer exchange/2 phase cleaning

10/17:

- Analyze data from yesterday
 - o Get concentrations
 - Obtain sample volumes and input into Excel
 - o Encircle clogs
 - o Make graphs
- Practice UV spec on little cuvettes
- Prep for experiments tomorrow
 - o Make and passivate device
 - 1 degree
 - o Make experiment kits
- Make organ dissociator?
 - o Literature search
 - Vortex generation
 - Large vs small particles in vortices
 - o Lookup dimensions of tissue
 - Retinal organoids
 - Lymph nodes

Small, important tasks

Thoughts on buffer exchange next steps:

- Try thinner channel
 - o Reduce chance of clogging along the ridge because of a shorter ridge
- Try lower ridge angle 0.5 deg, 0.25 deg.
 - o Can decrease the perpendicular force further
- Try higher flowrate.
 - o May make clog unstable

Software/Tools to organize



2. Notability: can create folders, annotate PDFs, audio recording, calendar and in-built templates

The screenshot displays the Notability app interface. On the left is a sidebar with a search bar and a list of folders under 'Literature' and 'Reviewed Papers'. The main area is divided into sections: 'Gallery' with 'Discover', 'Popular', and 'Following' tabs; 'Back-to-School Essentials' featuring templates like 'Assignment Planner', 'Semester Overview', 'Weekly Planner', and 'Mind Map'; 'Academic Planning' with '2024-2025 Academic' planners; 'Templates' including a calendar, spiral notebook, and to-do list; and a '#planner' section. On the right, an article preview for 'DRUG-seq for miniaturized high-throughput transcriptome profiling in drug discovery' is shown, including the title, authors, and a brief description.

Software/Tools to organize



3. Notion: flexible database structure, manage notes, tasks, and project timelines

The screenshot displays the Notion workspace for a user named Mehdia. The interface is divided into a left sidebar and a main content area.

Left Sidebar:

- M Mehdia's Notion
- Search
- Notion AI
- Home
- Inbox
- Getting Started
- Projects
 - Active
 - Timeline
 - Board
 - All
- Personal Home
 - Movie List
 - Recipes
 - Yearly Goals
 - Travel Plans
- Task List
 - Board View
- Lab Meetings
 - All entries
- Invite members

Main Content Area:

Good afternoon, Mehdia

Recently visited

- Projects (M Feb 6)
- Personal Home (M Jun 12, 2023)
- Cytoflex (M Jun 21)
- Flow Cytometry questions (M Jan 14)
- Chemo drug sort (M Jan 29)
- Lab M (M Jan 29)

Upcoming events

Today October 30

- RIC Meeting (5 – 6 PM)
- Pizza social (6 – 8 PM)
- EBCC email (9 – 10 PM)

Home views

Activity	Status
Wake up and freshen up	Done

Software/Tools to organize



Projects

★ Active Timeline 2 more...

≡ ↑↓ ⚡ 🔍 ... New ▾

▼ Planning 3

Aa Project name	⚙ Status	👤 Owner
🧬 Apoptosis/necrosis endpoints	● Planning	M Mehdia
🎓 Master's thesis and PhD application	● Planning	M Mehdia
🌱 Cell Health Review paper	● Planning	

+ New project

▼ In Progress 4

Aa Project name	⚙ Status	👤 Owner
🎯 Chemo drug sort	● In Progress	
🎯 Treasury RIC	● In Progress	
📖 Yeast prion stiffness measurements	● In Progress	M Mehdia
🎯 Freeze/Thaw in NK & T-Cell Therapies	● In Progress	

+ New project



Apoptosis/necrosis endpoints

⚙ Status ● Planning

👤 Owner M Mehdia

📅 Dates September 1, 2023 → September 14, 2023

📌 Priority High

≡ Summary AI To find the minimum drug dose required to kill cells at the earliest detectable time point

+ Add a property

✓ Tasks

- 📖 Understanding types of Leuke... ● Not Start... August 30, 2023 Hi...
- 📖 Developing drug dose res... ● Not S... M Mehdi June 30, 202 Me...
- 📖 Biomechanical properties of drug ... ● No... M Meh June 19, 2 M...
- 📖 Hill Equation ● Not Started September 12, 2023 High
- 📖 Biomarkers for cell death ● Not Started
- 📖 Nucleocounter Chemometec ● In Progress March 24, 2024 High

+ New

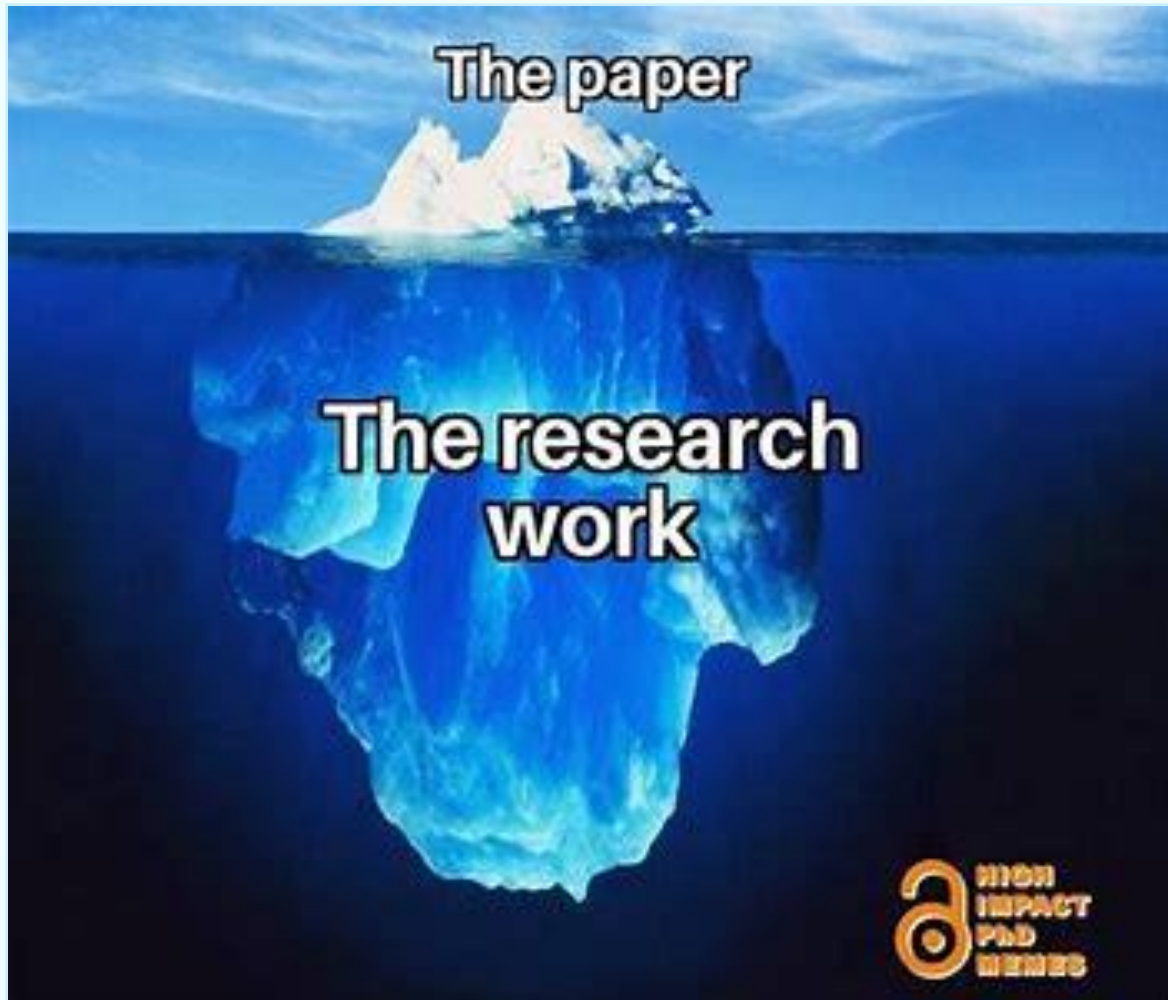


Research Organization



Anthony Compton

Research Organization



Core Tenets of Research Organization



- Recording as much as you can
- Information storage and upkeep
- Working with others on the project
 - Coordination/Communication
 - Conveying information

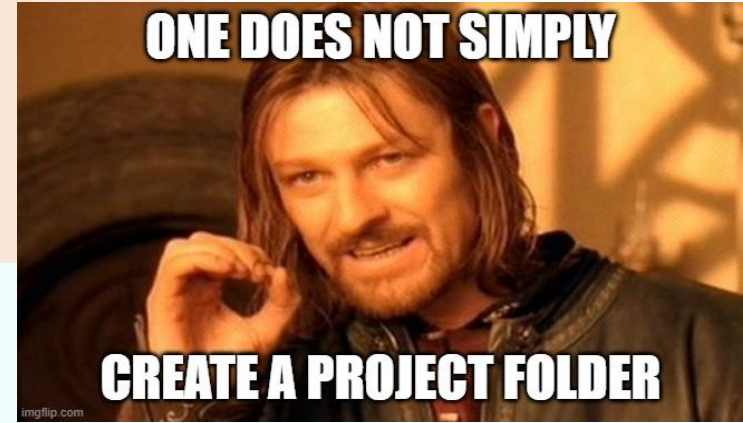
First Rule of Research Organization...



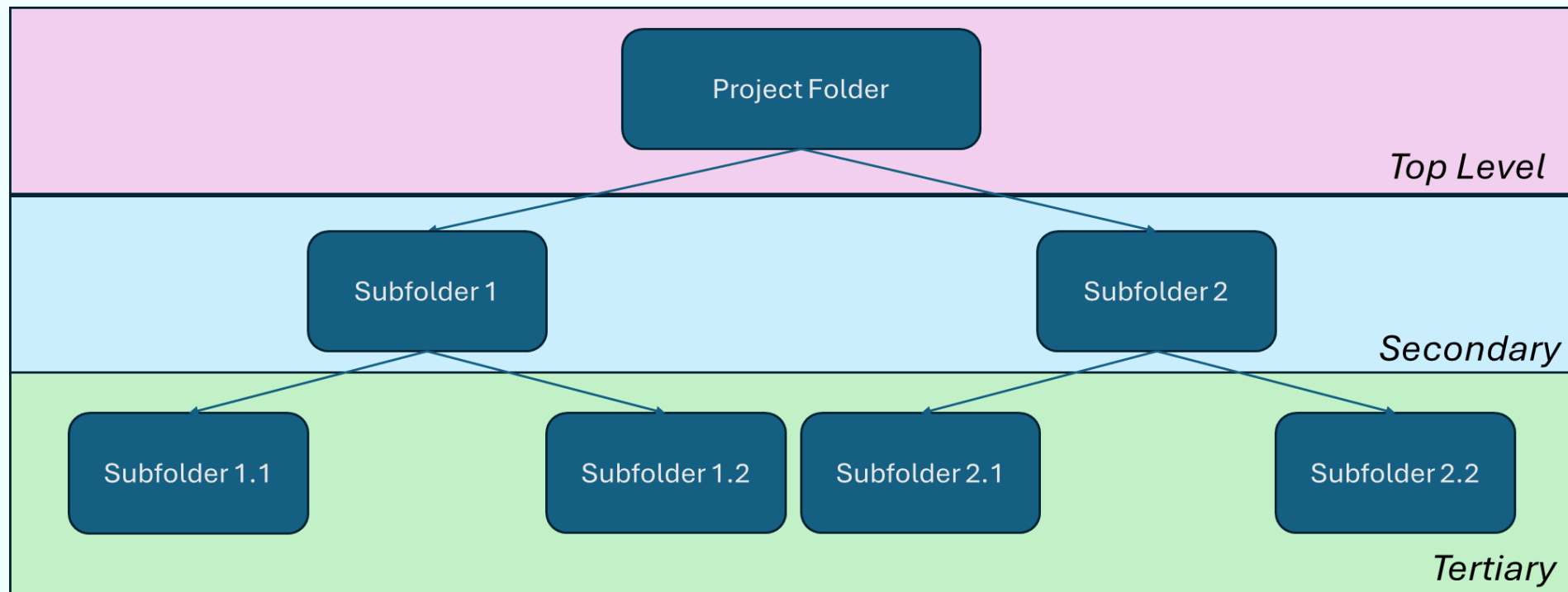
SET UP A SHARED FOLDER!!

- Project Folders are..
 - Online and backed up
 - Dropbox, OneDrive, Benchling
 - Shared with anyone working on the project
 - Contains related information
 - Organized into subfolders with specified information

How does one set up a project folder??



- File Hierarchy
 - Order of subfolders within the primary folder
 - Any file/folder within a folder should be related to the bigger folder

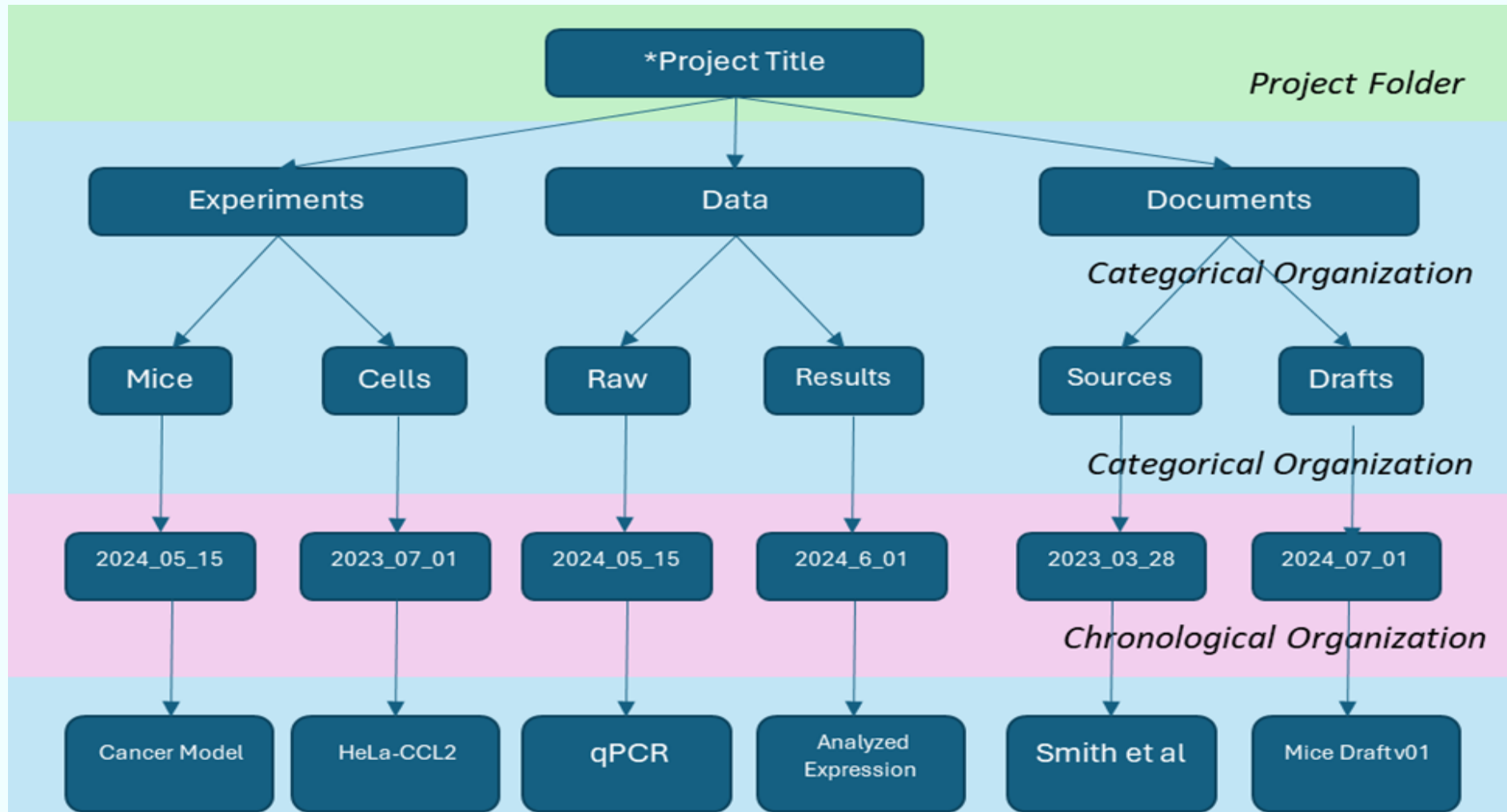
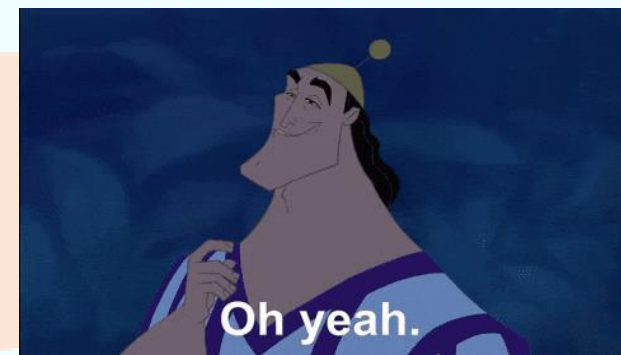




Different Types of Levels

- Categorical
 - Folders are named using words
 - Qualitatively describes the information stored within
- Chronological
 - Folders are named using dates
 - All of the information stored within are related to that date

Putting it all together...





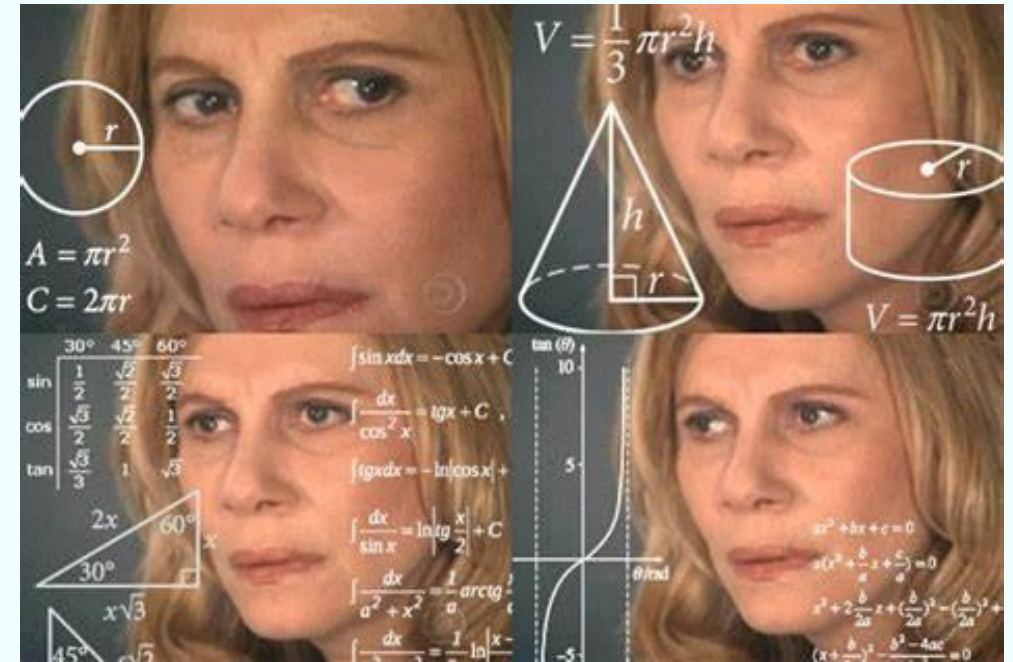
Organize to your taste!

- Many different projects will consist of different levels of organization
- Not all subfolders have the same number of hierarchical levels
- Files tend to be at the bottom of the hierarchy
- Do what works for you
 - Be consistent
 - Be descriptive
 - Easy to follow



File Comprehension

- Tells everyone going through the project folder what in the world is going on
 - Includes yourself! You can't remember everything!
- Improve comprehension?
 - Descriptive Filenames
 - "ReadME" Files



Me looking at my old files








File Comprehension: Filenaming

- Start with the date of the file's creation
 - Convention: yyyy_mm__dd or yyymmdd
- Any specific descriptors
 - Information type, conditions, equipment used, etc.
- End with numbers when applicable:
 - Replicate numbers
 - Version numbers: v01
 - Use 0s to fill in the higher place numbers to maintain numerical order
 - "V02" would be ordered before "V10" unlike "V2"



File Comprehension: Filenaming

- Personal Example

<input type="checkbox"/> Name	Status	Date modified	Type	Size
 2024_07_24_ARPE_C11_10_7um_Outlet_01_sort_02	✓	8/1/2024 10:27 AM	Microsoft Edge PDF ...	196 KB
 2024_07_24_ARPE_C11_10_7um_Outlet_02_sort_02	✓	8/1/2024 10:28 AM	Microsoft Edge PDF ...	196 KB
 2024_07_24_ARPE_C11_10_7um_Outlet_03_sort_02	✓	8/1/2024 10:27 AM	Microsoft Edge PDF ...	195 KB
 2024_07_24_ARPE_C11_10_7um_Outlet_04_sort_02	✓	8/1/2024 10:28 AM	Microsoft Edge PDF ...	195 KB
 2024_07_24_ARPE_C11_10_7um_Outlet_05_sort_02	✓	8/1/2024 10:28 AM	Microsoft Edge PDF ...	195 KB



File Comprehension: "ReadMe" Files

- What are ReadMe files?
 - Text files that describe the files/folders that are organized at the same level of hierarchy
 - Observations, Comments, Procedures, Notes, Mishaps, etc
 - Filename acronyms
 - Facilitate you, your project team, and your readers' understanding of what went right and/or wrong
 - Info dump



File Comprehension: "ReadMe" Files

- Personal Example

Navigation path: Error > Lab stuff > RPE Project > qPCR > iPSC-RPE > Results > 2024_08_20

Tools: Copy, Paste, Text, Share, Delete, Sort, View, More

Files and Charts:

- 2024_08_20_Re adME (Icon: Document with blue tab)
- 2024_08_20_S subtype Heterogeneity in iPSC-deriv... (Icon: Excel spreadsheet)
- 2024_08_20_S subtype Heterogeneity in iPSC-deriv... (Icon: Excel spreadsheet)
- ELNUpdated (Icon: Bar chart titled "ELN Positive Expression")
- SLC4A5Updated (Icon: Bar chart titled "SLC4A5 Positive Expression")
- SULF1Updated (Icon: Bar chart titled "SULF1 Positive Expression")
- WFDC1Updated (Icon: Bar chart titled "WFDC1 Positive Expression")

Each file icon is preceded by a green checkmark.



File Comprehension: "ReadMe" Files

qPCR Notes and Protocol for 2024_08_20 Experiment

Using the iTag Universal One-Step Kit for Sybr Green qPCR (probing one genetic marker per well).

Used the Step One Plus qPCR machine to read the 96-well plate.

Aim:

Looking for macular and peripheral genetic markers among iPSC-RPE lines from 3 different donors.

Experimental Setup:

Each marker had 4 assay replicates. With 3 donor replicates, 72/96 of the wells were used.

Macular Markers: WFDC1 and SULF1

Peripheral Markers: ELN and SLC4A5

Normalization Markers: RPE65 and ACTB ---UPDATE 09/11/2024: USE B2M instead of RPE65 since it is a more stable marker for normalizing expression

Positive Control: ROX

Negative Control: Nuclease-free water

Observations:

Some wells had very little fluorescence readings. It could be that the RNA was not distributed equally.

Raw Data is available in the Excel sheets.

Analyzed data in Origin Pro 2022 using the ANOVA-Tukey Statistical Test

Questions?



Scan to log attendance

- If interested, reach out to Steven Swingle → steven.swingle@gatech.edu
- Find us on Engage <https://gatech.campuslabs.com/engage/>
- Follow us on instagram [@gatech.ric](https://www.instagram.com/gatech.ric)



Research Insights Club