Welcome to the

Summer 2023 3MT® Finals Competition

UNIVERSITY OF NOTRE DAME | THE GRADUATE SCHOOL

Your Research Matters - *Share It!*

Competition Overview

- The Three Minute Thesis (3MT®) competition celebrates the exciting research being conducted by graduate students.
- Developed by The University of Queensland (UQ) in 2008, the exercise cultivates students' academic, presentation, and research communication skills.
- This competition supports a student's capacity to effectively explain his or her research in three minutes, in a language appropriate to a non-specialist audience.
- This is Notre Dame's sixth year conducting the 3MT® event and the second year in which all graduate students are encouraged to participate.

Competition Guidelines

- Work presented must have been conducted at the University of Notre Dame.
- Students will be able to see a two-way clock that displays a countdown for three minutes, and the timer will buzz at the end of three minutes.
- Going over the allotted three minutes results in automatic disqualification from the competition.

Competition Rules

- A single static PowerPoint slide is permitted. No slide transitions, animations or ‘movement’ of any description are allowed. The slide is to be presented from the beginning of the oration.
- No additional electronic media (e.g. sound and video files) are permitted.
- No additional props (e.g. costumes, musical instruments, laboratory equipment) are permitted.
- Presentations are to be spoken word (e.g. no poems, raps or songs) and in random order.

Judging Criteria: *Comprehension & Content*

- Did the presentation provide an understanding of the background and significance to the research question while explaining terminology and avoiding jargon?
- Did the presentation clearly describe the impact and/or results of the research, including conclusions and outcomes?
- Did the presentation follow a clear and logical sequence?
- Were the thesis topic, research significance, results/impact, and outcomes communicated in language appropriate to a non-specialist audience?
- Did the presenter spend adequate time on each element of his or her presentation, elaborate for too long on one aspect, or rush the presentation?

Judging Criteria: *Engagement & Communication*

- Did the oration make the audience want to know more?
- Was the presenter careful not to trivialise or generalize his or her research?
- Did the presenter convey enthusiasm for the research?
- Did the presenter capture and maintain the audience's attention?
- Did the speaker have sufficient stage presence, eye contact and vocal range, maintain a steady pace, and have a confident stance?
- Did the PowerPoint slide enhance the presentation - was it clear, legible, and concise?

Judges

Alex Boomgarden
Fifth-year Ph.D. candidate from the Department of Biological Sciences, who won the University of Notre Dame's 2023 3MT Competition

Nate Krakowski
IT Solutions Consultant in the College of Arts & Letters representing the Notre Dame Toastmasters

Amanda G. McKendree, Ph.D.
Teaching Professor of Management & Organization, Academic Director for Undergraduate Studies, and Arthur F. and Mary J. O'Neil Director of the Fanning Center for Business Communication in the Mendoza College of Business.

Christian A. Lehman
Doctoral candidate at the University of Missouri in the Department of Educational Leadership & Policy Analysis and Graduate Career Consultant for the College of Engineering. He is a legend

Patrick Gibbons
Adjunct Professor, who teaches undergraduate and graduate courses in business writing and presentation skills at the Mendoza College of Business

Let the competition begin...

A Potential Diagnostic Approach for Tuberculosis

Alexandria Williams, Biology NSF REU

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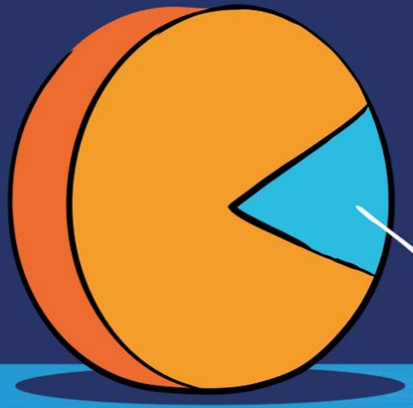
Tuberculosis is one of the top infectious killers in the world

In 2020, an estimated

1.5 MILLION* PEOPLE DIED FROM TB



Including **214,000 PEOPLE WITH HIV**

TB is the leading killer of people with HIV and a major cause of deaths related to antimicrobial resistance

Range: 1.4 - 1.6 million for TB deaths and 187,000 - 242,000 for TB/HIV deaths.

INVEST TO END TB SAVE LIVES

END TB

World Health Organization

Extracellular Vesicles under a microscope

Released from most cell types and crucial for intracellular communication

Understanding the Epigenetics of Synapse Formation in Kabuki Syndrome Type 2

Bella Wiebelt-Smith, Biology REU

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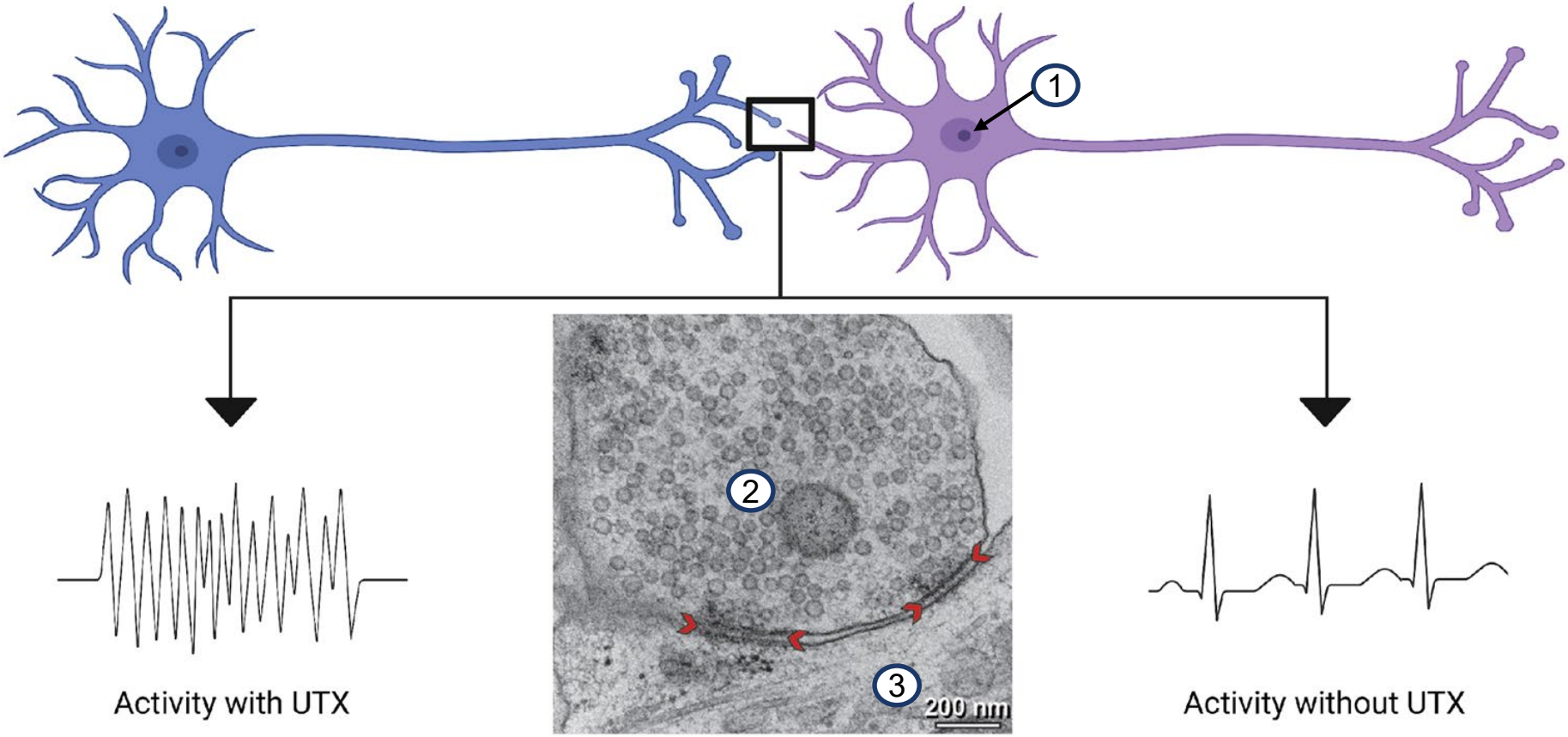
Kabuki Syndrome Type 2 Neurons



1 Nuclear UTX 2 Presynaptic UTX 3 Postsynaptic UTX

Tang et al., 2017, *Front Mol Neurosci*
Südhof, 2021, *J Cell Biol*

Generating Genomic Contigs in Python

Lydia Csaszar, E-SURE

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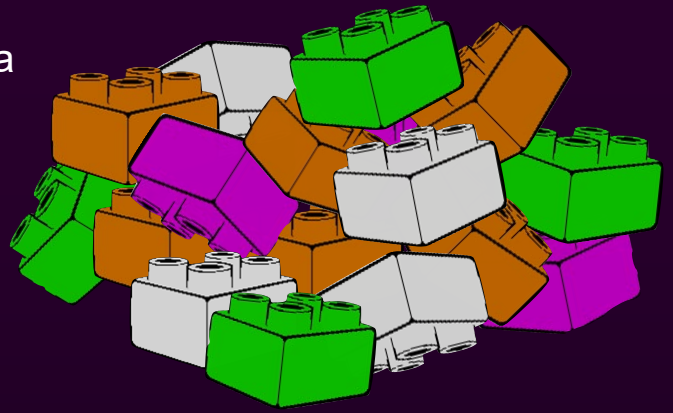
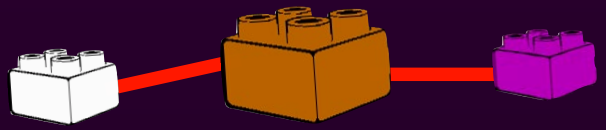
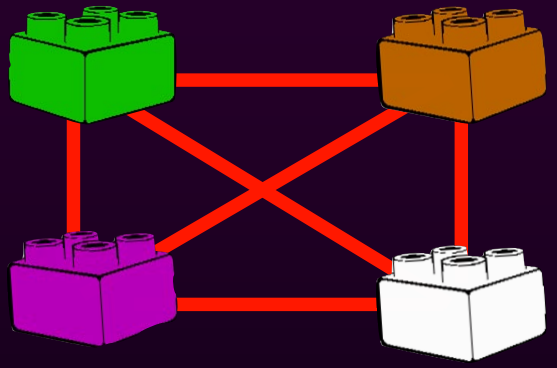
Data



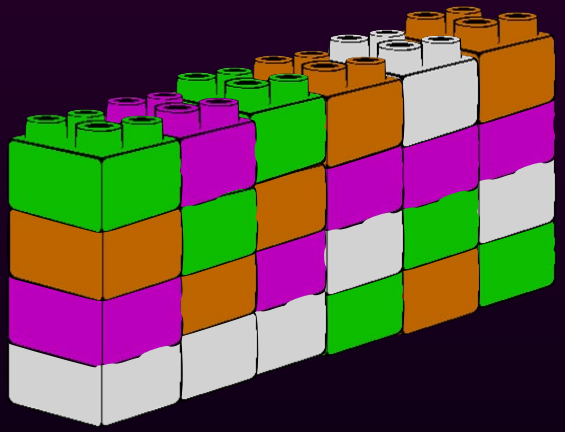
Cluster



Graphed

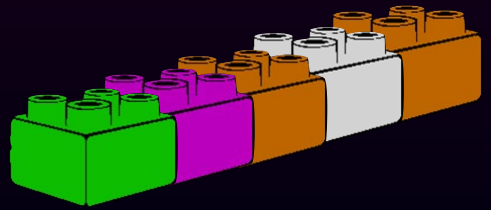


Sorted



Predicted Visualization

Line



Increasing Safety in Lithium-Ion Batteries with Gel Polymer Electrolytes by Modeling Thermal Runaway

Peter Schimpf, NURF

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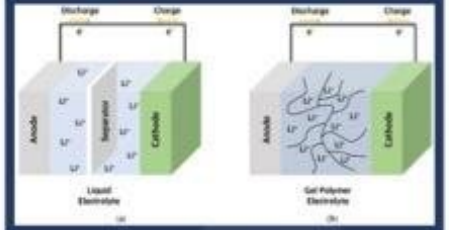
Lithium-ion Batteries

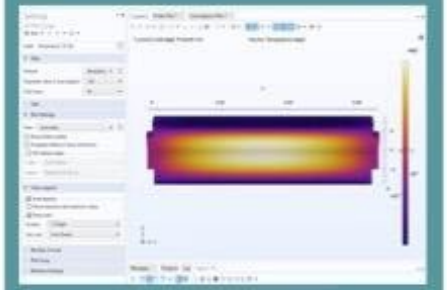
- ✖ Rising global temperatures
- ✖ Extreme weather

- ✓ Decreased emissions
- ✖ Risk of thermal runaway

Modeling Thermal Runaway



- ✓ Lower risk of thermal runaway
- ✖ Needs more research



- ✓ Safe
- ✓ Sustainable
- ✓ Quick

Gel Polymer Electrolytes (GPEs)

Extreme Temperatures Reduce Feeding Success in Smallmouth Bass

Grace Johnston, Saint Mary's Neuhoff in Whitlow Lab

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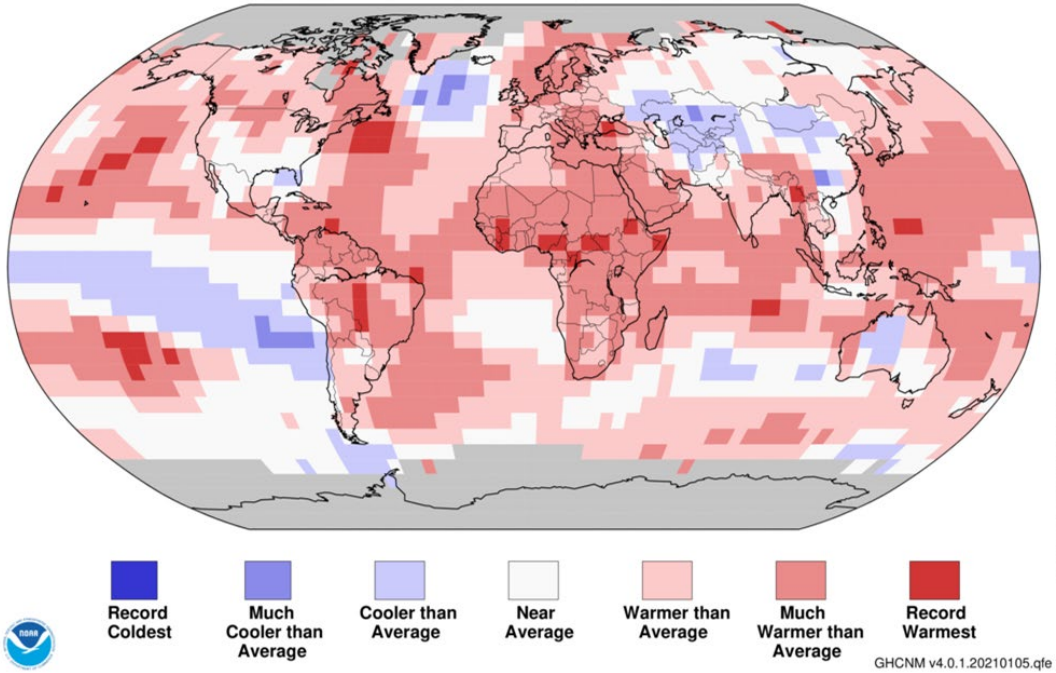
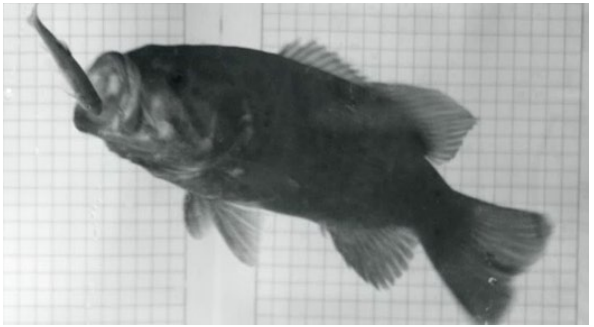
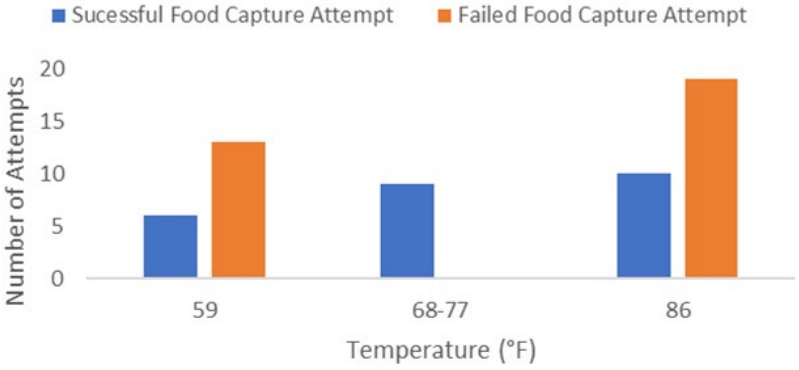
Extreme Temperatures Reduce Feeding Success in Smallmouth Bass







Gel Polymer Electrolyte in Lithium-ion Battery: Safety and Performance

Sam Chen, Slatt Fellowship

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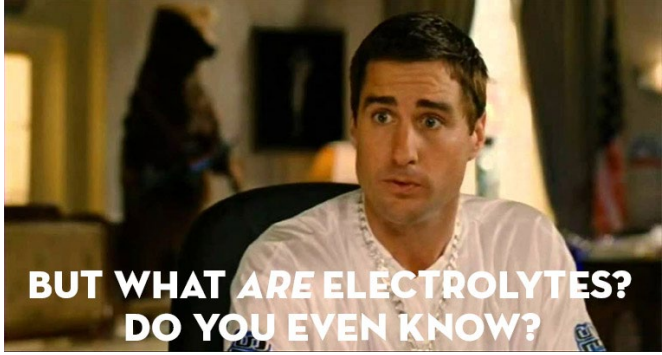
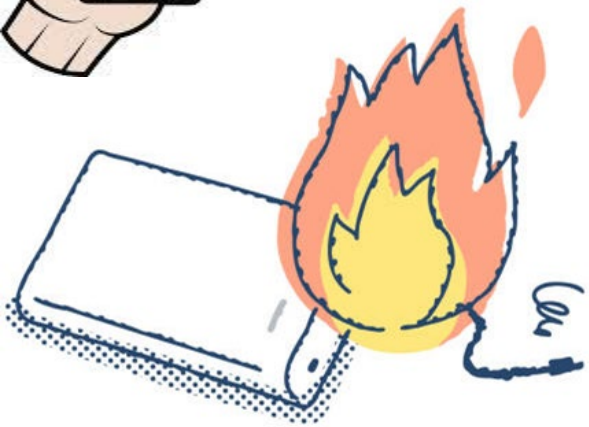
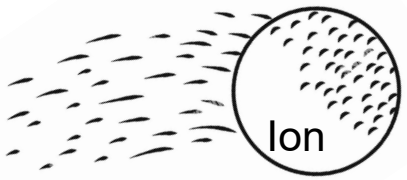
Gel Polymer Electrolyte in Lithium-ion Batteries: Safety and Performance







Better Recycling for Lithium-Ion Batteries

Evan Wood, Slatt Fellowship

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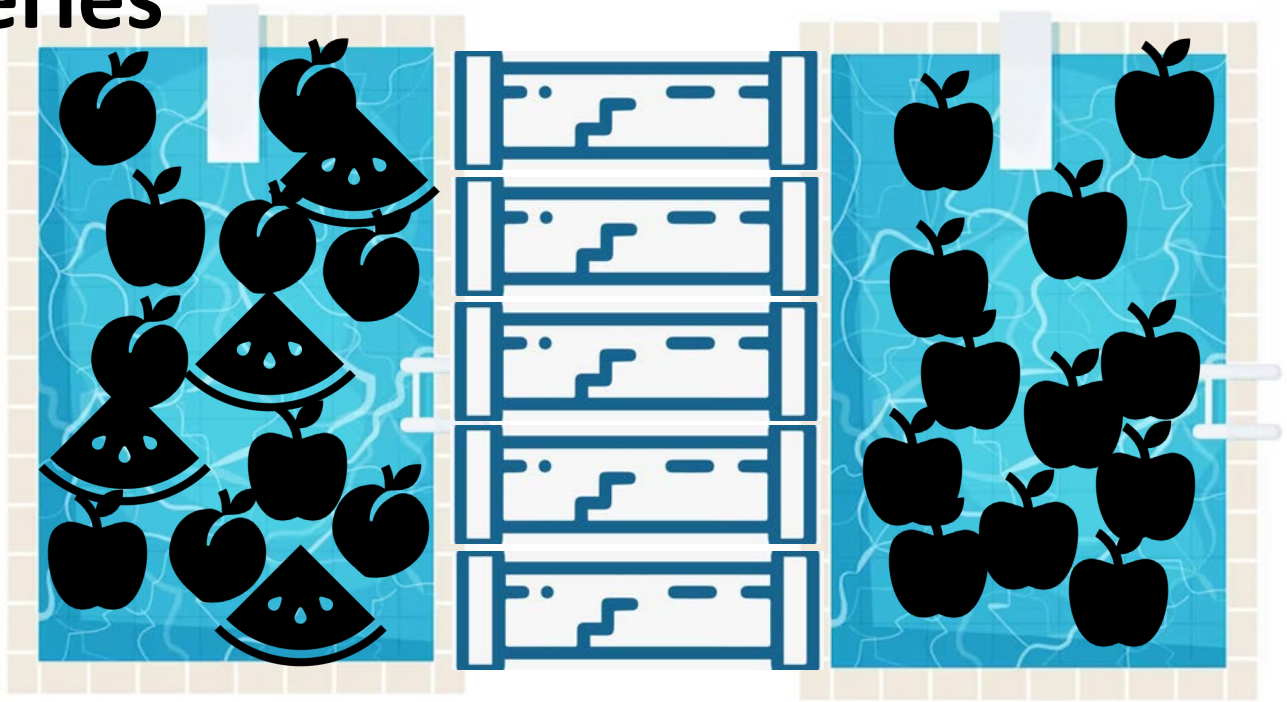
Better Recycling for Lithium-Ion Batteries



Cell-to-Cell Communication

Kailee Mendiola, SMASH

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Cell - to - Cell Communication

Kailee Mendiola

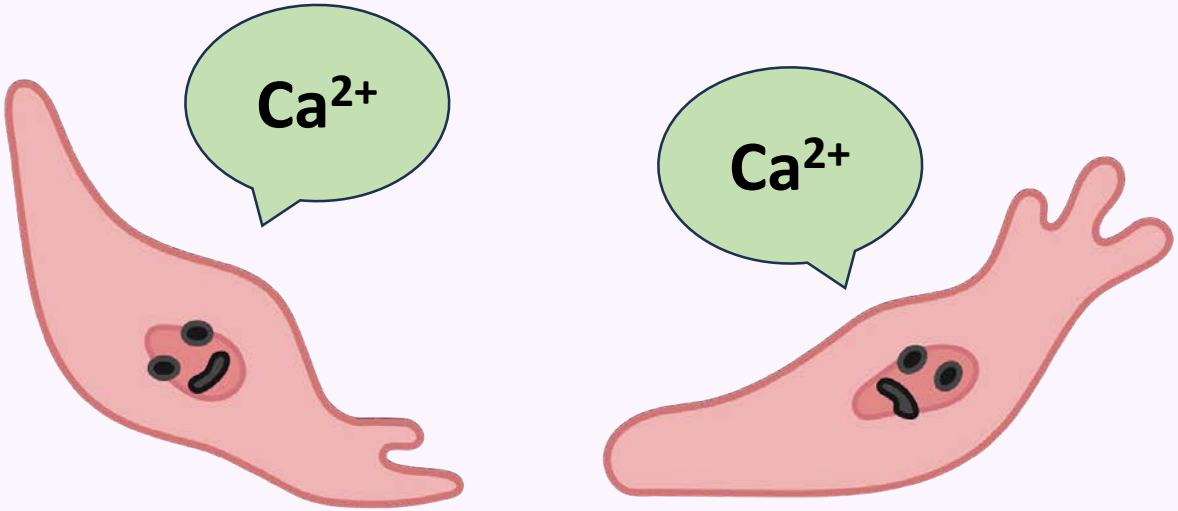

Figure made using BioRender.com

Fighting Diabetes through Pneumatic Sleeves and Exosuits

Ultan Fallon, Naughton Program

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“Will this disease define my life as I get older?”

Winning the Microbial War: Combating Evolving Fungal Infections with Novel Antimicrobials

Dorrian Cohen, College of Science Summer Undergraduate Research Fellowship (COS-SURF)

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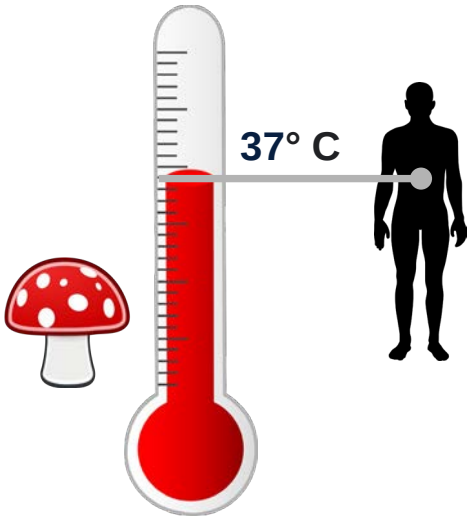
Winning the Microbial War

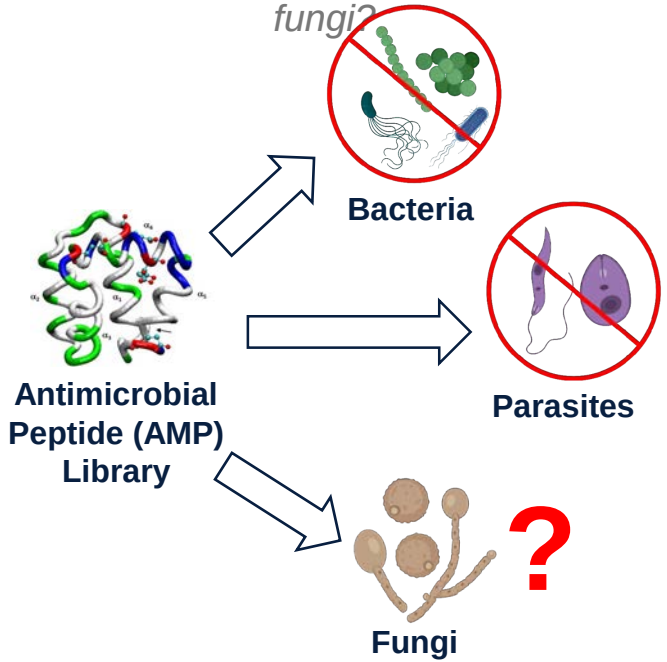
Combating Evolving Fungal Infections with Novel Antimicrobials

Background



Essential Question

Does the antimicrobial efficacy of the peptide library extend to fungi?



Results

Screening

Minimal Inhibitory Concentration

Fungicidal/ Fungistatic Test

Cell Count Growth Curve

Peptide 32

Machine Learning for Predicting Signal Coverage

Allen Jeremy Uy, *AWaRE REU*

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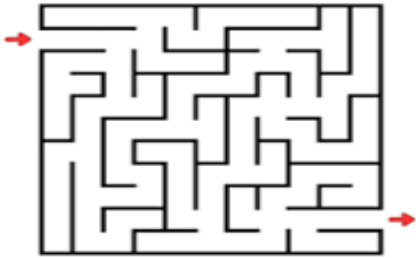
Machine Learning for Predicting Signal Coverage

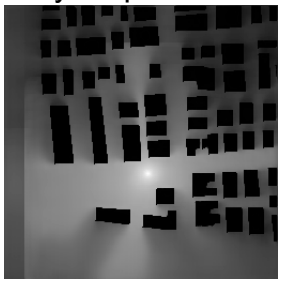
Ray casting

Machine Learning (trained on many cities)

Machine Learning (Train on a single city)



City map w/ Transmitter



Signal in the city

Signal coverage (usable signal area)

Smart Substitutions: Bettering Health through Technology

Reid Metoyer, *Summer Research Opportunities Program*

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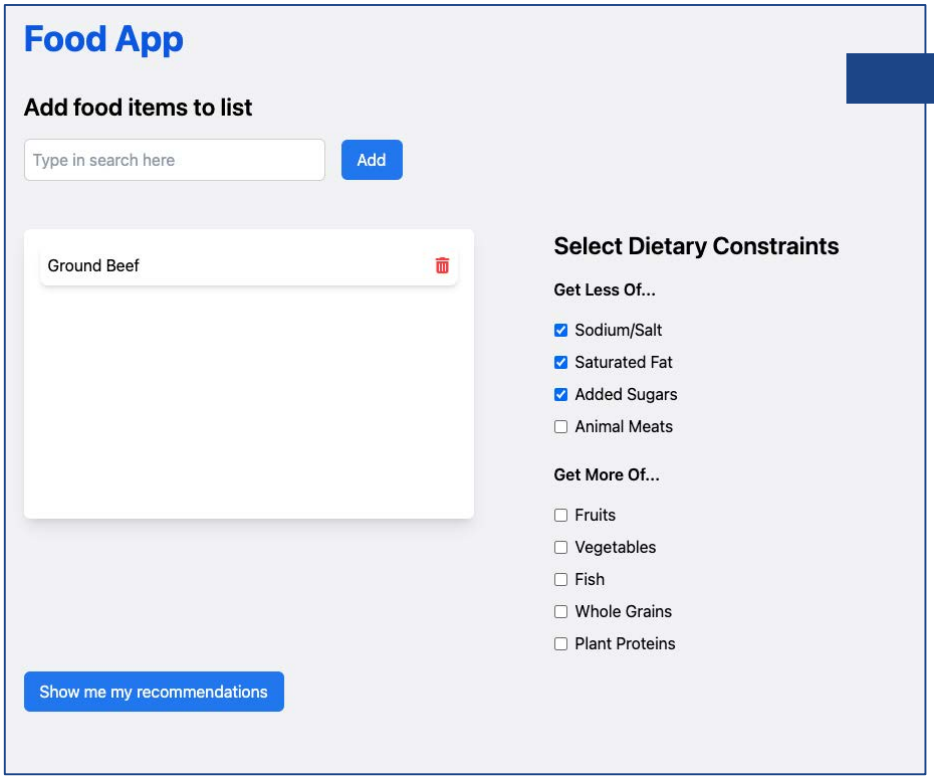
Smart Substitutions: Bettering Health through Technology



A healthy, affordable **ground beef** option...

+ Add

$6.87 $6.87/lb
All Natural* 93% Lean/7% Fat Lean Ground Beef, 1 lb Roll

A healthy, affordable **meat** option...

+ Add

Sponsored
$9.37 $4.64/lb
Final cost by weight
Tyson All Natural Boneless Skinless Chicken Breasts, 1.75 - 3.0 lb Tray

A healthy, affordable **protein** option...

+ Add

$1.34 8.4 ¢/oz
Great Value Lentils, 1 lb

Identifying Bacteria in Medical Devices

Gabriela B. Meléndez Martínez, *Summer Research Opportunities Program*

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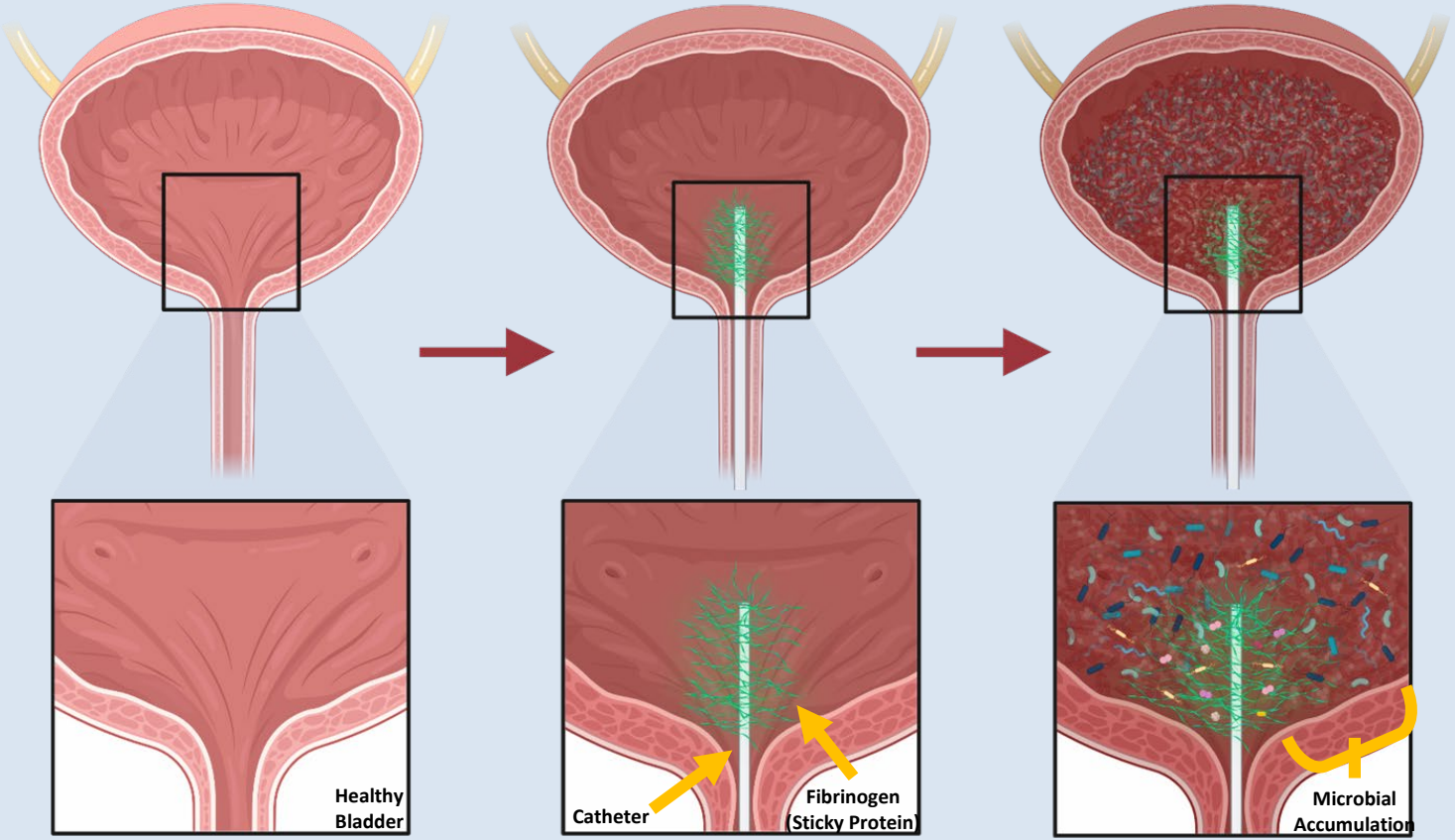
Identifying Bacteria in Medical Devices



Judges Intermission

People's Choice Award

People's Choice Award: *Judging Criteria*

Comprehension & Content:

- Did the presentation provide an understanding of the background and significance to the research question being addressed, while explaining terminology and avoiding jargon?
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Engagement & Communication:

- Did the oration make the audience want to know more?
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People's Choice Award

- Please use the QR code to cast your vote for People's Choice Award!

Please note:

- A student may not win more than one award
- The People's Choice Award will go the individual with the most votes after the selection of first and second place winners

People's Choice Award

Finalists in no particular order:

1. Alex Williams, A Potential Diagnostic Approach for Tuberculosis
2. Bella Wiebelt-Smith, Understanding the Epigenetics of Synapse Formation in Kabuki Syndrome Type 2
3. Lydia Csaszar, Generating Genomic Contigs in Python
4. Peter Schimpf, Increasing Safety in Lithium-Ion Batteries with Gel Polymer Electrolytes by Modeling Thermal Runaway
5. Grace Johnston, Extreme Temperatures Reduce Feeding Success in Smallmouth Bass
6. Sam Chen, Gel Polymer Electrolyte in Lithium-ion Battery: Safety and Performance
7. Evan Wood, Better Recycling for Lithium-Ion Batteries
8. Kailee Mendiola, Cell-to-Cell Communication
9. Ultan Fallon, Fighting Diabetes through Pneumatic Sleeves and Exosuits
10. Dorrian Cohen,Winning the Microbial War: Combating Evolving Fungal Infections with Novel Antimicrobials
11. Allen Uy, Machine Learning for Predicting Signal Coverage
12. Reid Metoyer, Smart Substitutions: Bettering Health through Technology
13. Gabriela Melendez Martinez, Identifying Bacteria in Medical Devices

Judges Intermission

Your 2023 Summer 3MT® Winners are...

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Thank You for Coming!

2023 Summer 3MT®
Final Competition

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