Honors College Undergraduate Research Showcase

February 25, 2026

Oregon State University

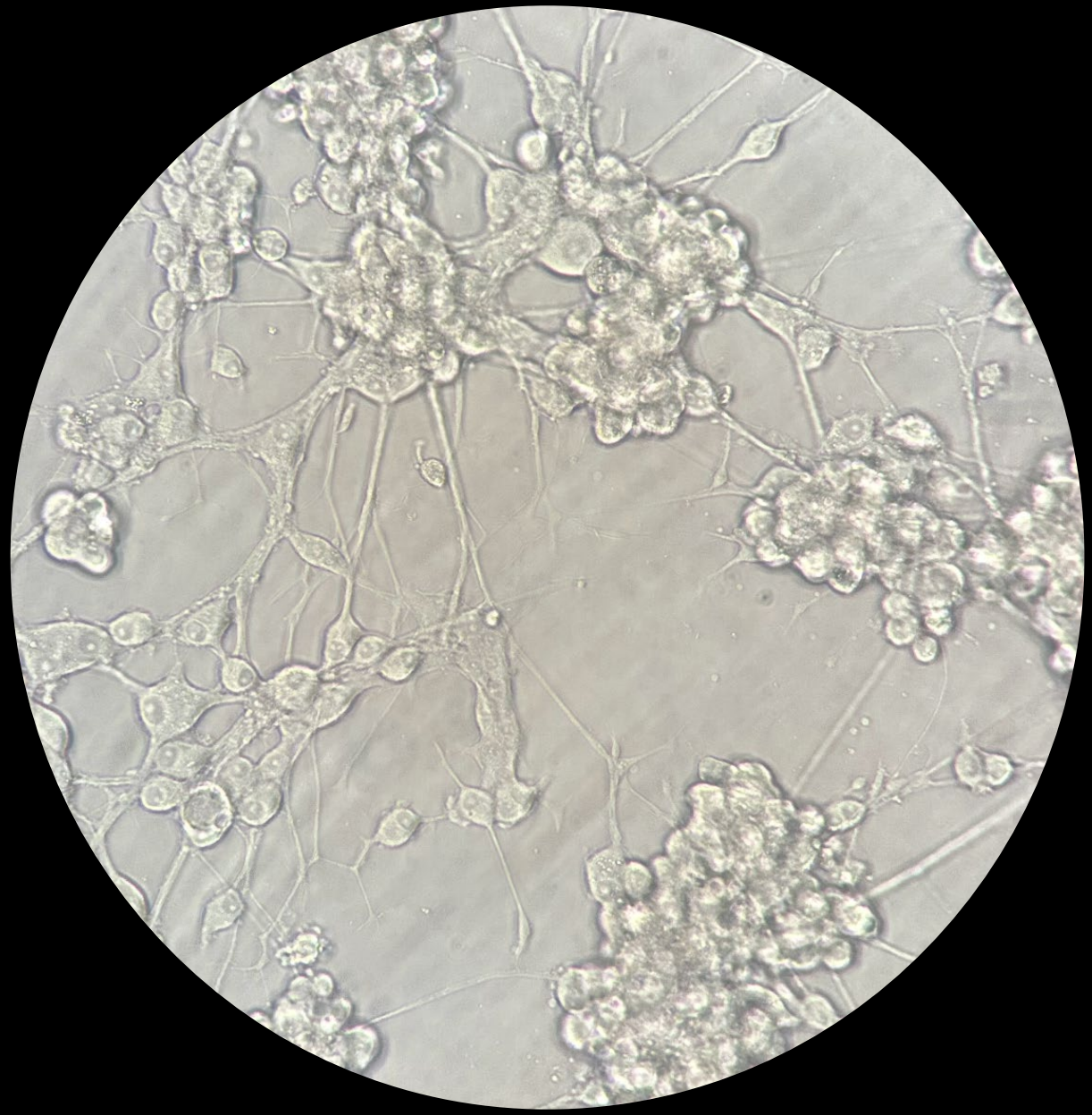
To Float or Not to Float: Proteomic Insights into Attachment Phenotypes of the PC12 Cell Line

Prong Colling

Biochemistry and Molecular Biology

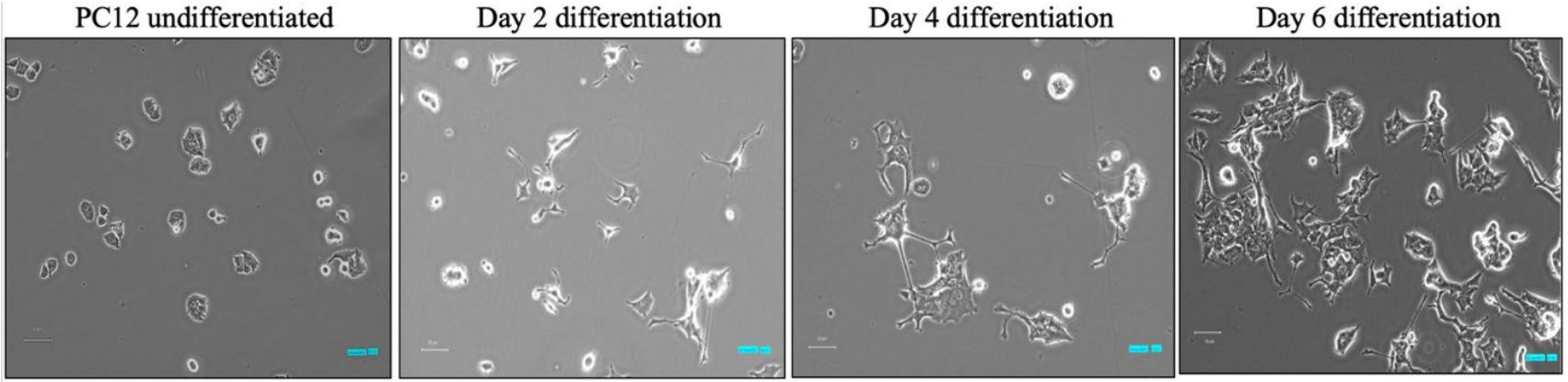
Mentor: Dr. Claudia Maier

2/25/2026



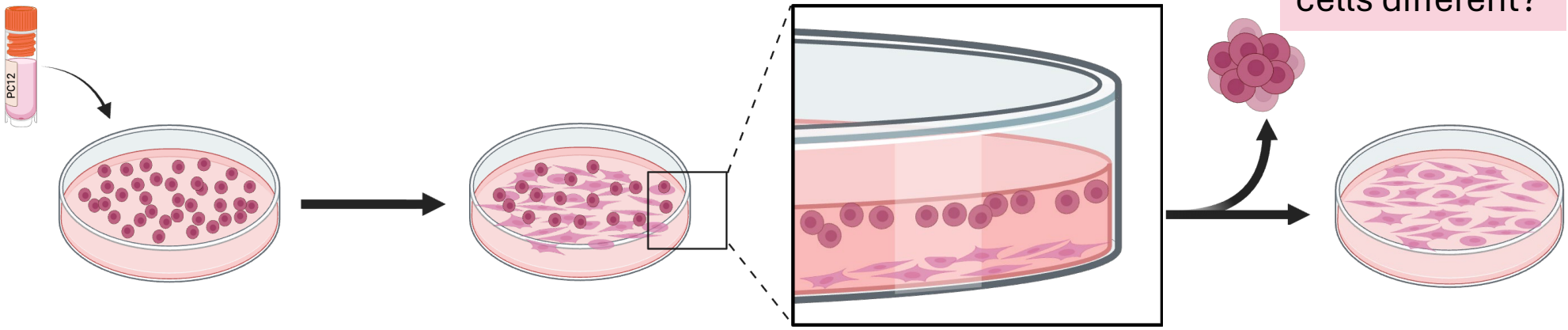
Oregon State University

Background: What are PC12 cells?



- Can develop similar characteristics to neurons
- Often used for *in vitro* neuroscience research as neuronal models

How are these cells different?



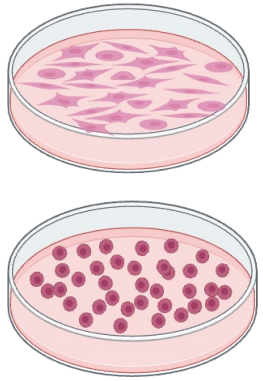
Seeding PC12 cells

Suspension and adherent populations present

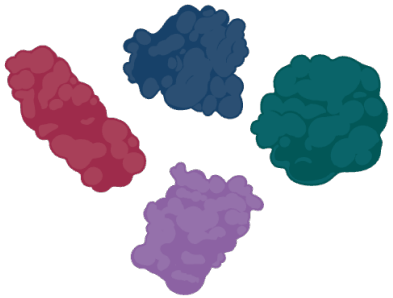
Routine subculturing discards cells in suspension

Proteomics uncovers differences between genetically identical cell populations

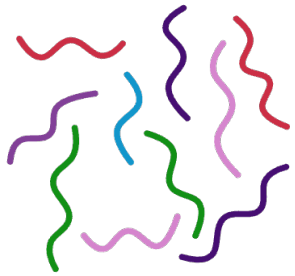
Proteomics: The study of all proteins expressed in a biological system (cells, tissues, or organism)



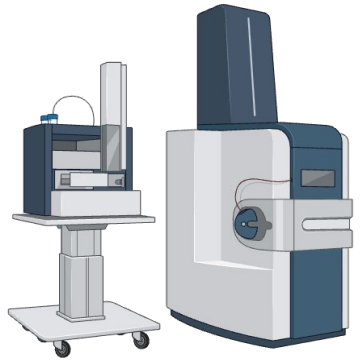
Cells



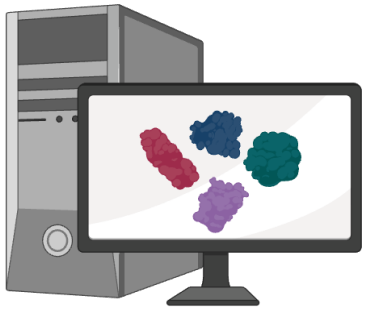
Proteins



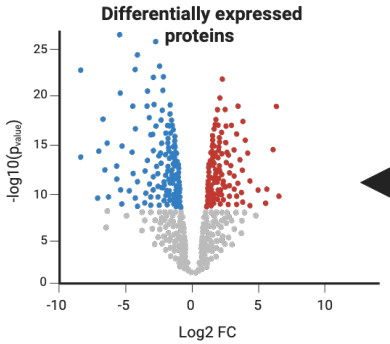
Peptides



Data acquisition via mass spectrometer

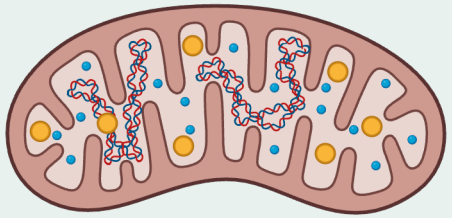


Identification and quantification



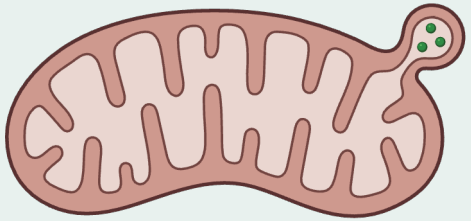
Biological interpretation

Differences seen in floating cells, compared to adherent

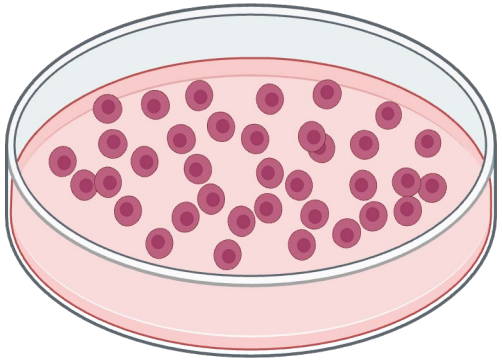


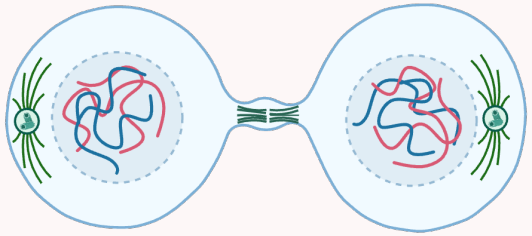
Mitochondrial organization

Response to oxidative stress

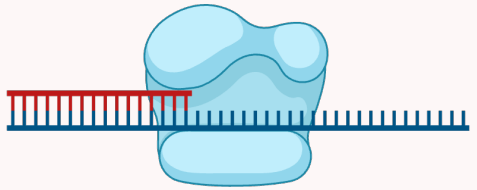


Mitochondrial import of biomolecules

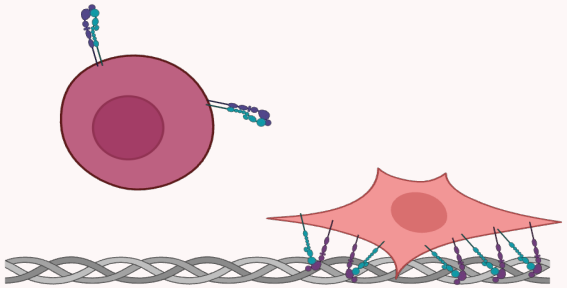




Mitotic cell cycle

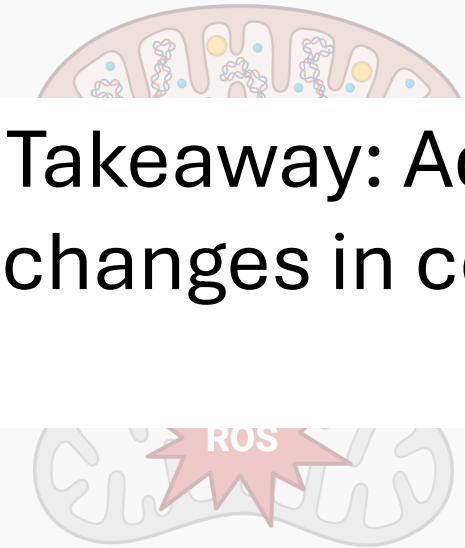


DNA replication

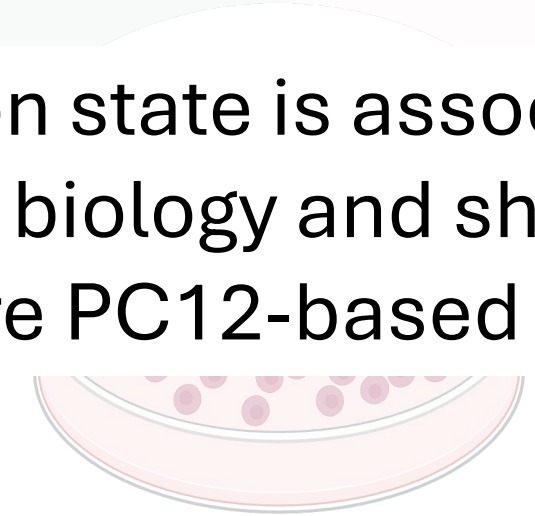


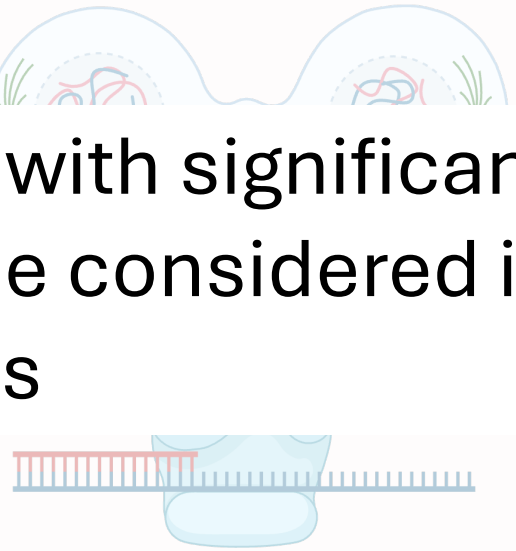
Integrin-mediated attachment

Differences seen in floating cells, compared to adherent

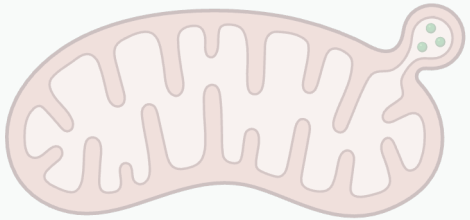


Response to oxidative stress

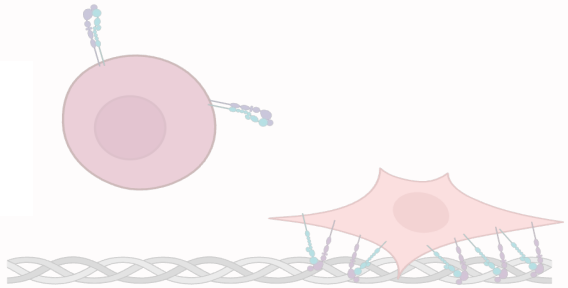




DNA replication



Mitochondrial import of biomolecules



Integrin-mediated attachment

Takeaway: Adhesion state is associated with significant changes in cellular biology and should be considered in future PC12-based studies

Thank you!

On Museums & Mites—An Examination of the Current State of Acarology Collections in the United States

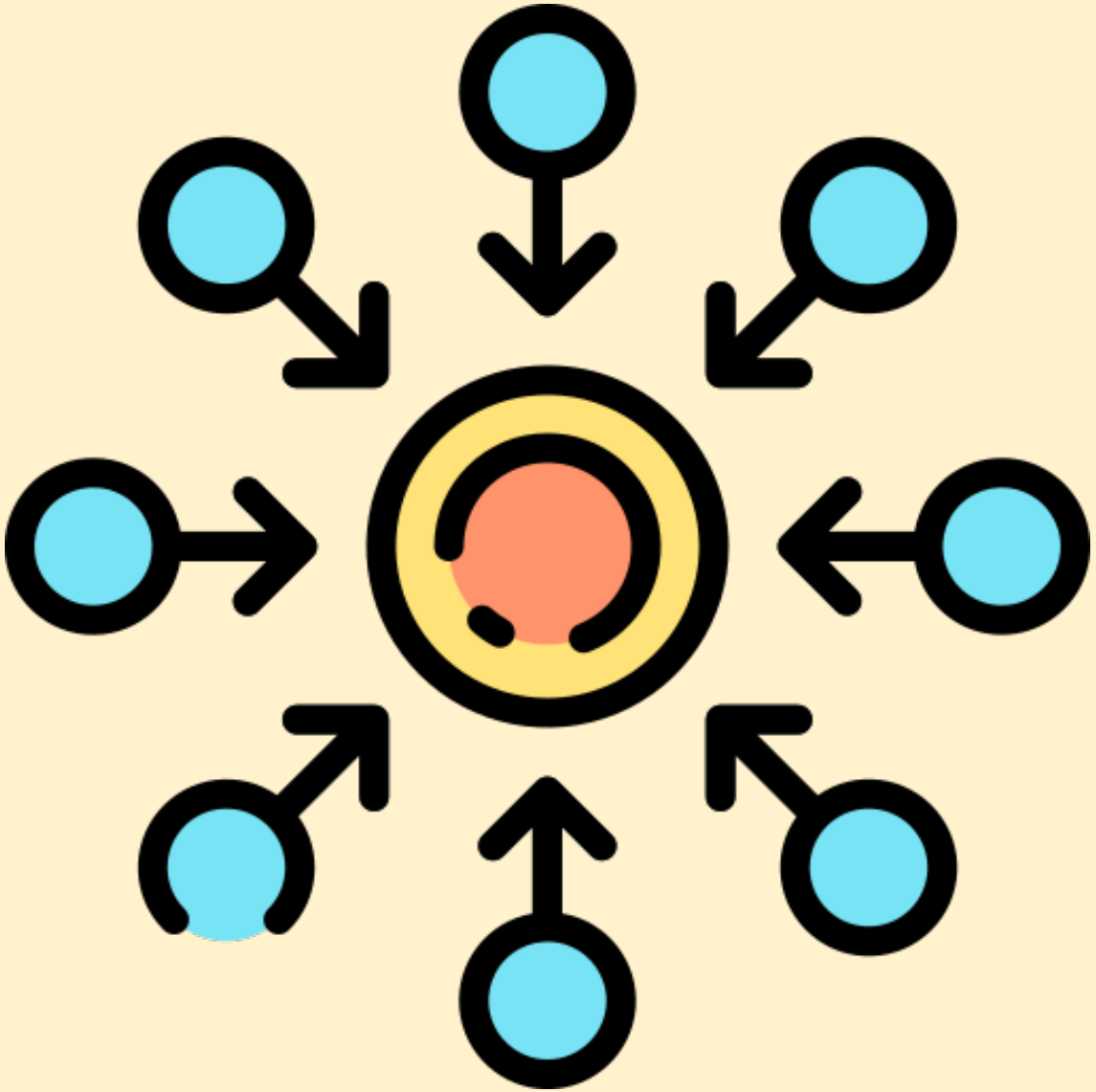
A Zoology Thesis by William Sohn Rehor,
Under Dr. Gerald W. Krantz

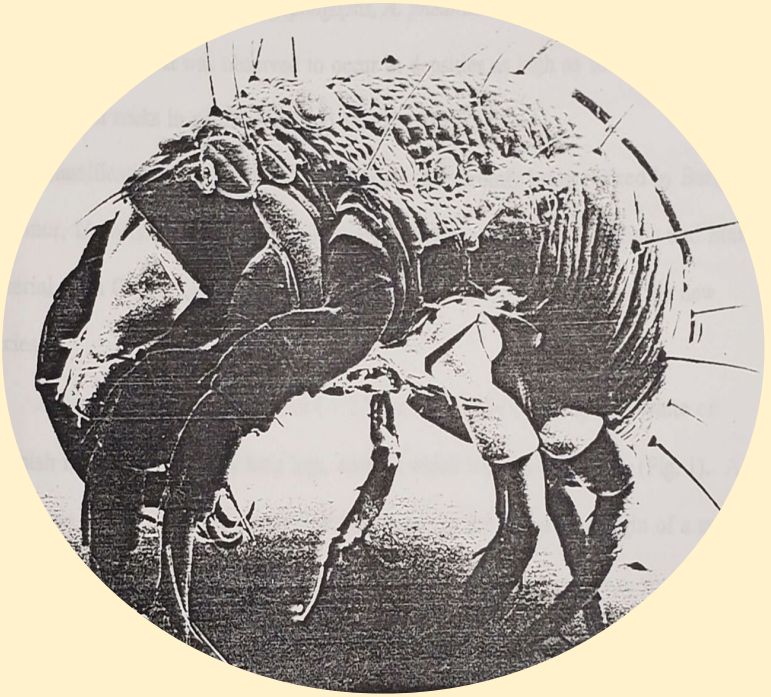
Crater Lake and *Algophagopsis sp.*

Problems in Acarology

- Slides Require Glue (Red Rings)
- Glue Degrades and Must be Remounted
- Remounting Requires Expertise
- Most Institutions Don’t Bother

Centralization





Assessing Bumble Bee (*Bombus*) Diversity Across Habitat Types in Kansas City, MO

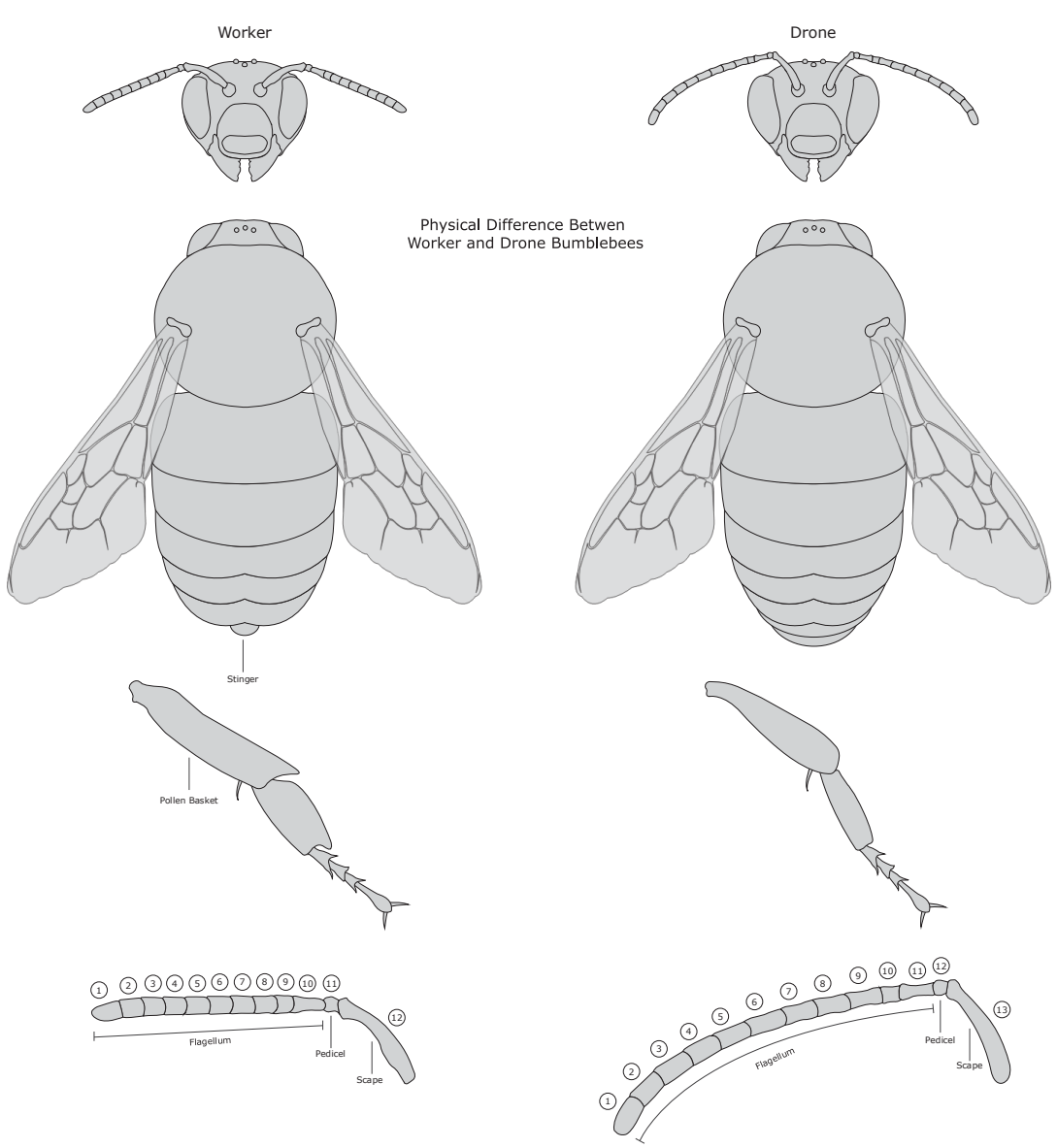
Presented By
Taylor Bolls

Honors Bachelor of Science
Horticulture

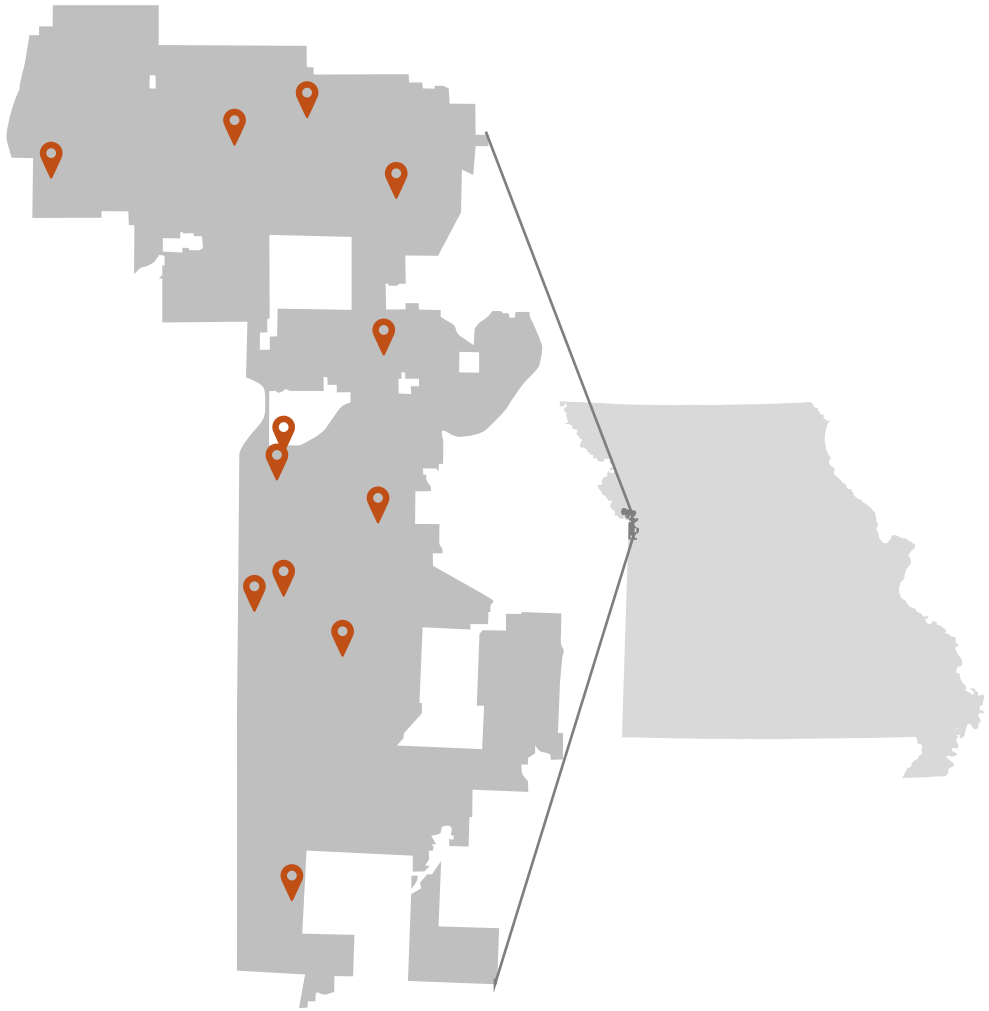
Mentor Dr. Louisa Hooven

Winter Undergraduate
Research Showcase
February 25, 2026

Overview



Survey Process

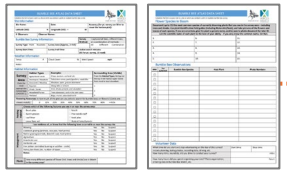


1 **Search** 1 hectare site for 45 min.

2 **Capture** all Bumble Bees Present

3 **Chill** Bumble Bees on Ice

4 **Identify** and Photograph



5 **Report** Data

Survey Results

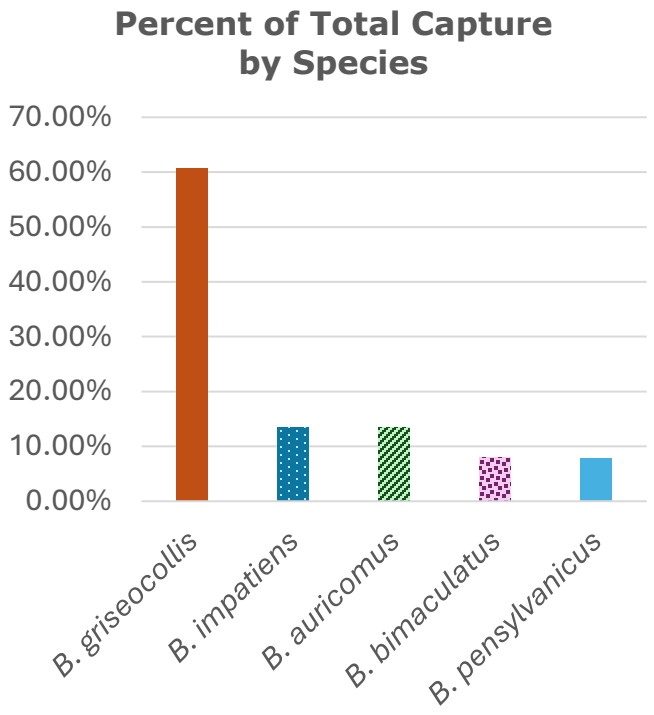
Brown-belted Bumble Bee
(*Bombus griseocollis*)

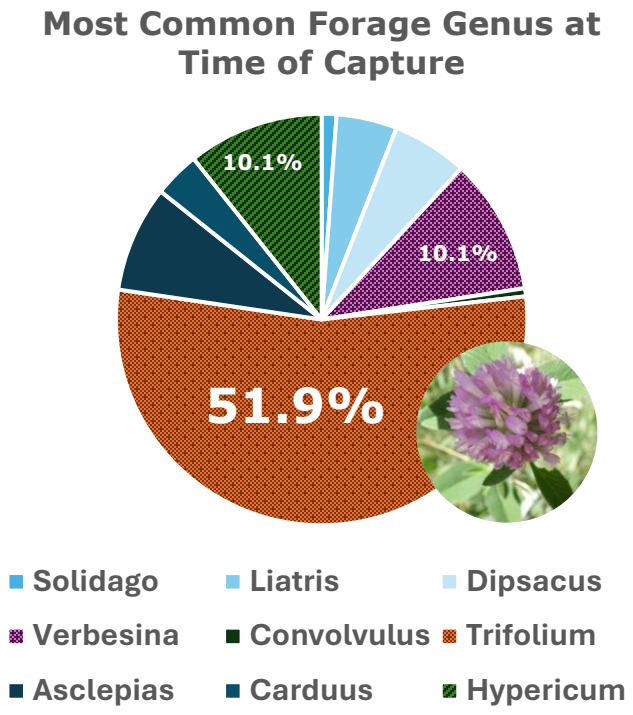
Common Eastern Bumble Bee
(*Bombus impatiens*)

Black and Gold Bumble Bee
(*Bombus auricomus*)

Two-spotted Bumble Bee
(*Bombus bimaculatus*)

American Bumble Bee
(*Bombus pensylvanicus*)





Average number of bees caught per survey

Fewest number of bees caught in single survey

Special thanks to

My mentor Dr. Lousia Hooven, my thesis committee Gail Langellotto and Genevieve Pugesek, The Missouri Bumble Bee Atlas Project, and the Missouri Conservation Department

References

Missouri Department of Conservation. (n.d.). Apid bees. Retrieved February 24, 2026, from https://mdc.mo.gov/discover-nature/field-guide/apid-bees

Missouri Department of Conservation. (n.d.). Bumblebees. Retrieved February 24, 2026, from https://mdc.mo.gov/discover-nature/field-guide/bumblebees

The Xerces Society. (n.d.). Bumble bee conservation efforts. Retrieved February 24, 2026, from https://xerces.org/bumble-bees/conservation-efforts

Oregon State University

CHEMICAL ANALYSIS OF PYROLYSIS OIL PRODUCTS

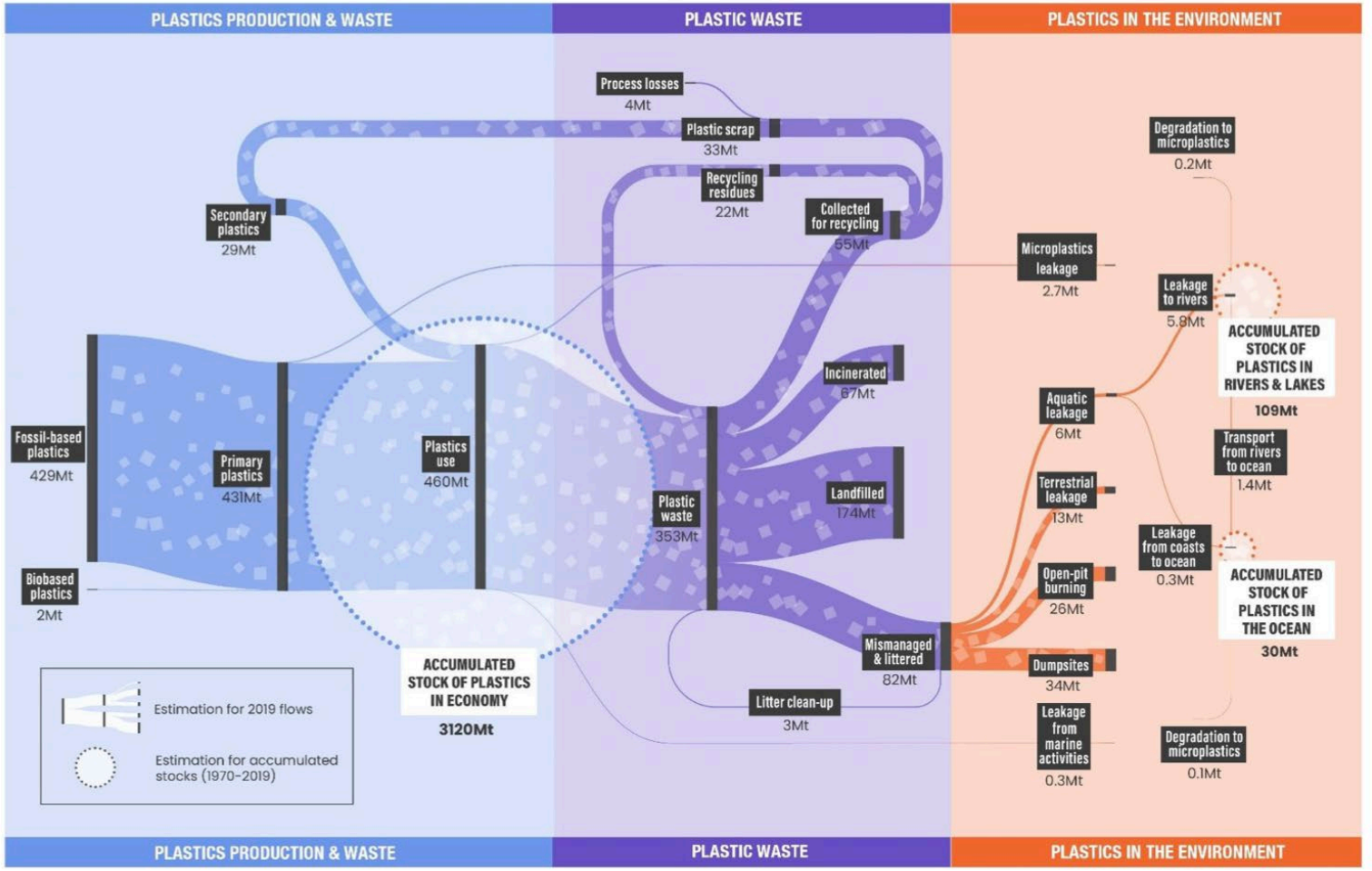
By Henry Seely

Oregon State University
College of Engineering

Recycling Crisis

- ~9% of plastic is recycled
- Modern recycling infrastructure is inadequate
- Chemical recycling could help

Figure 1.1. Only 33 million tonnes (Mt), or 9% of the 353 Mt of plastic waste, was recycled in 2019

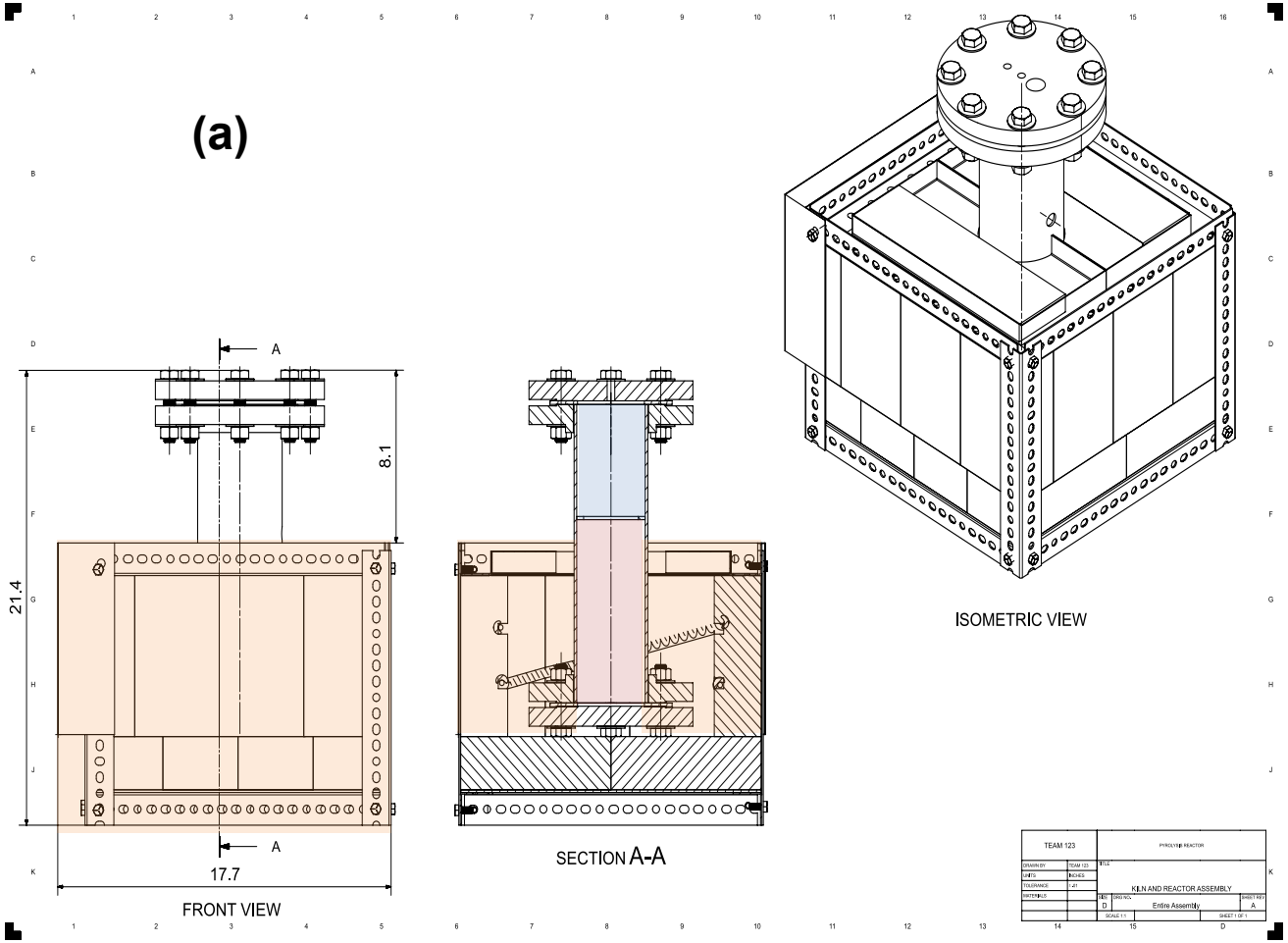


https://www.oecd.org/en/publications/global-plastics-outlook_de747aef-en.html

Pyrolysis Reactor – "The Helenator"

Oregon State University
College of Engineering

(a)



(b)

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Process and Analysis

- Process:
  - Plastic feedstock reacts in reactor
  - Diesel product produced
- Analysis:
  - Variation in chain length (GC-FID)
    - Confirm diesel-like distribution
  - Distribution of structures (NMR)
    - Confirm diesel-like distribution

GC-FID Result

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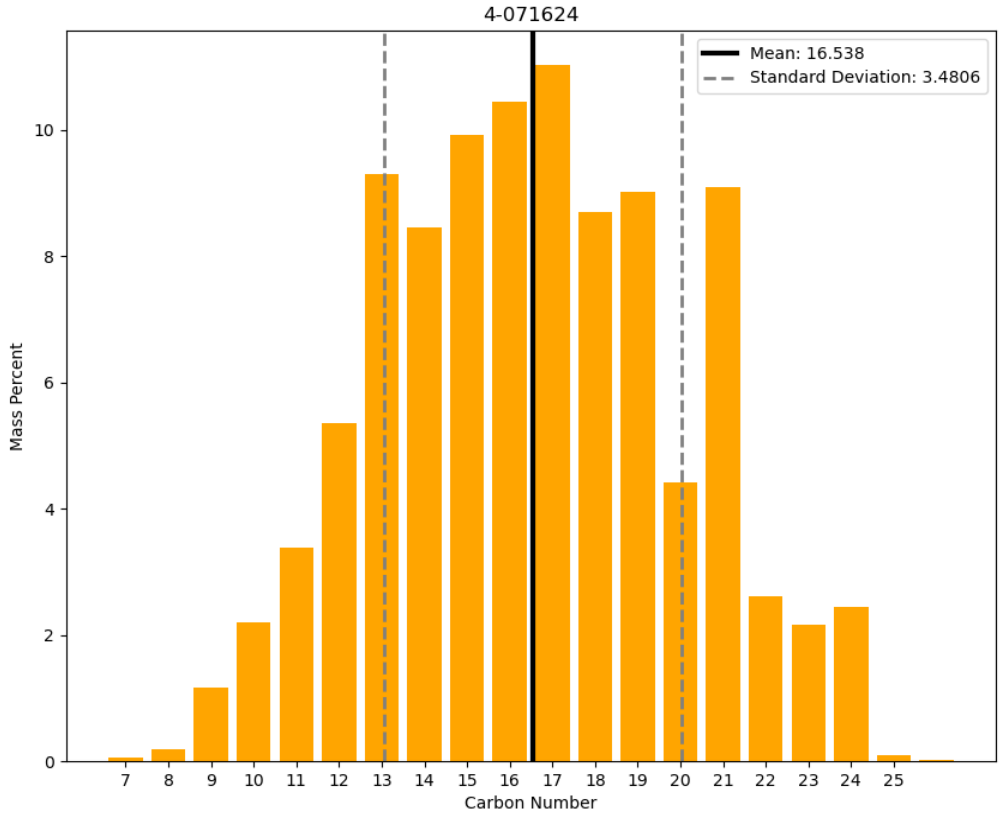
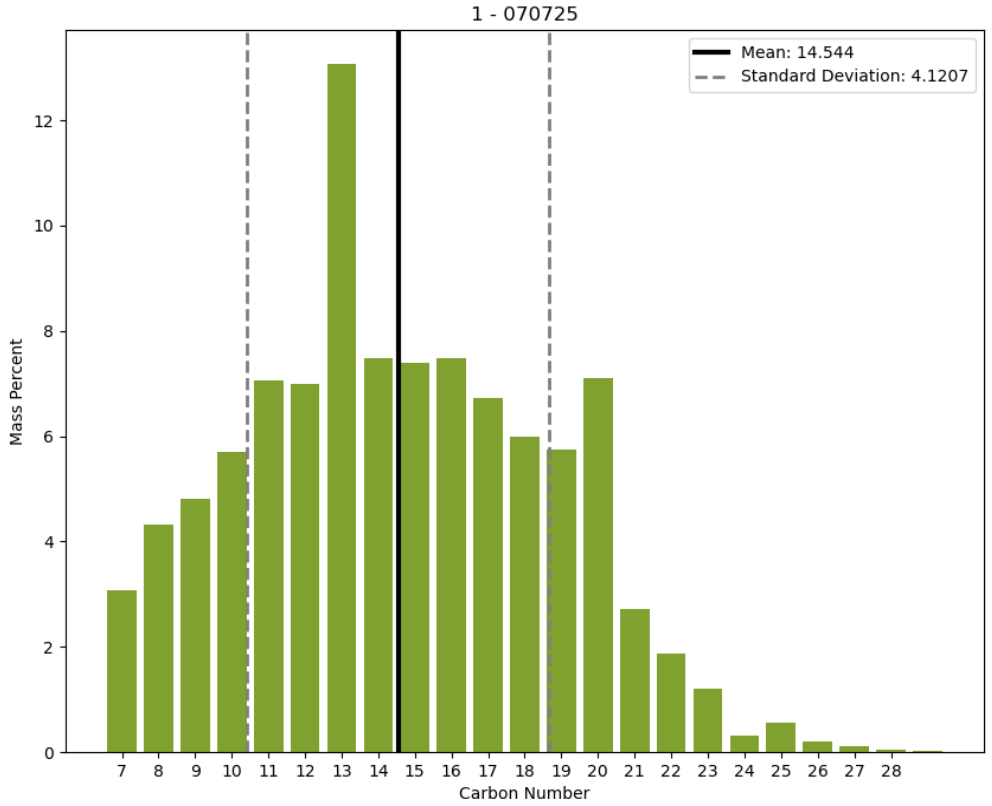
College of Engineering

Red Diesel Carbon Distribution



Red Diesel
Range 8-25 Carbons
Mean 16.5 Carbons

Drip Tape Diesel Carbon Distribution



OSU Drip Tape
Diesel Range 7-28 Carbons
Mean 14.5 Carbons

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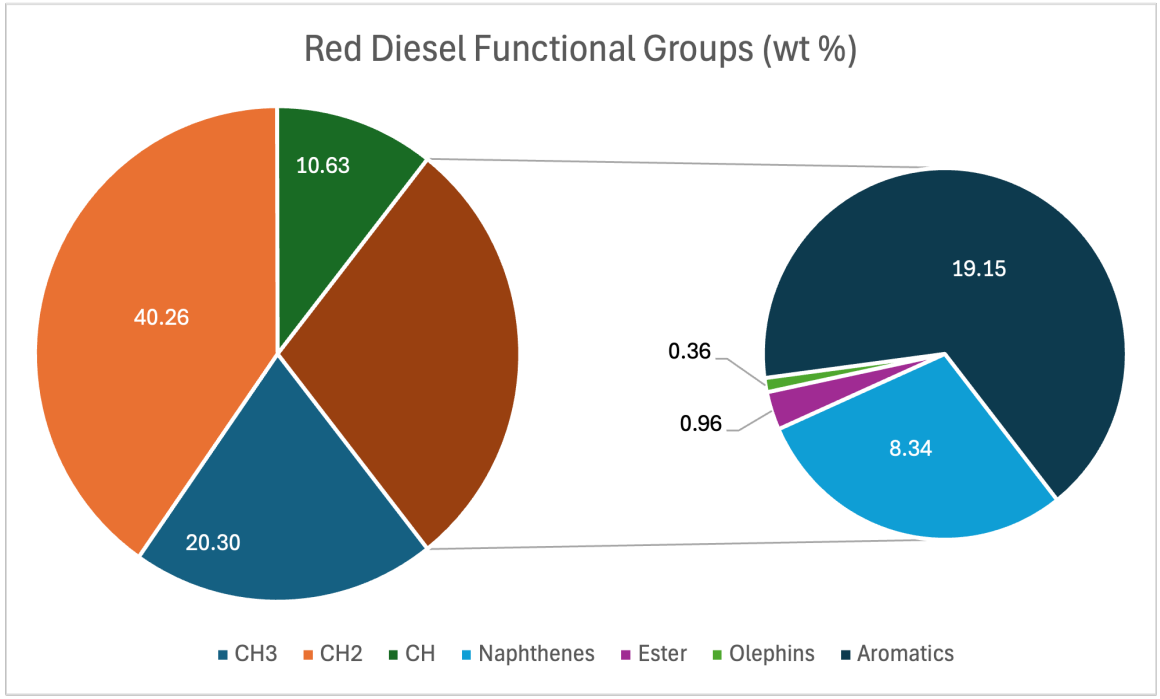
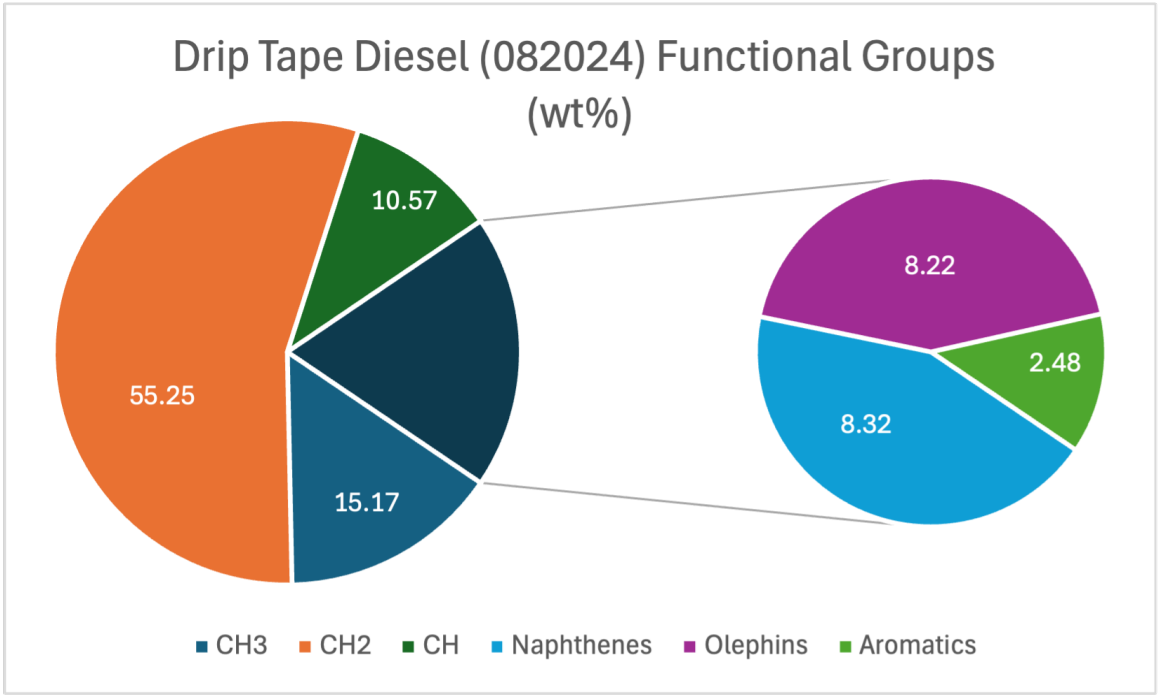
NMR Result





Red Diesel
Typical content for commercial diesel
Ester likely from biodiesel additive

OSU Drip Tape
Similar paraffin content
Higher olefin and lower aromatic

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College of Engineering

Conclusions and Future Works

- Similar distribution of carbon chains
  - Falls in “diesel range”
- Same chemical structures
  - Different percentages
- Future analysis methods
  - Cetane test and fingerprinting

Thank you for your time

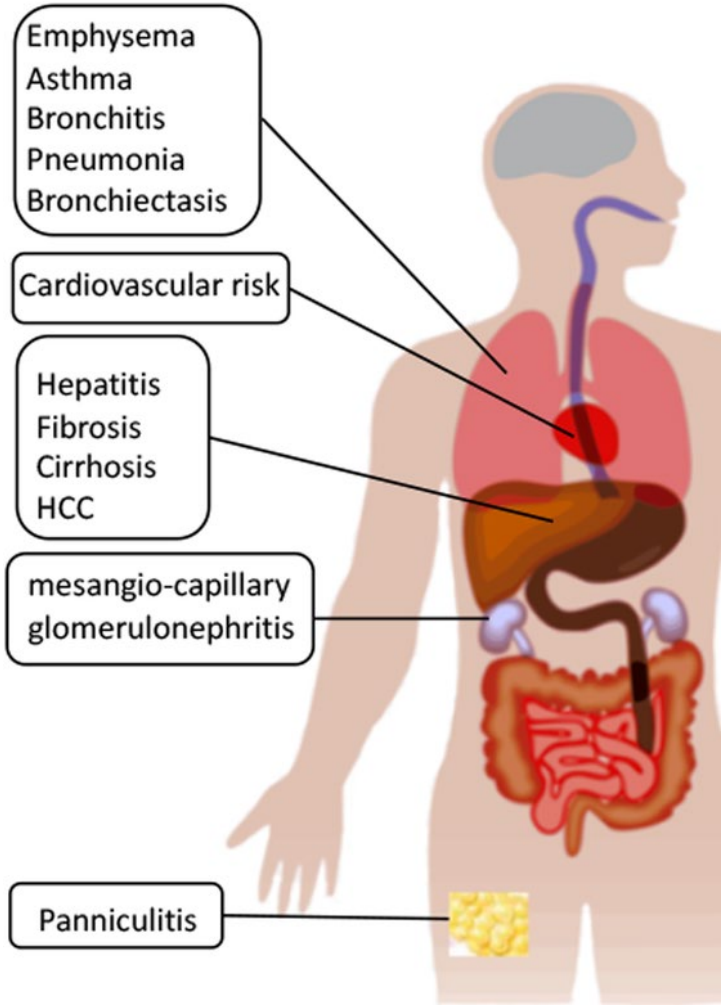
High-Throughput Screening of Lipid Nanoparticles for Alpha-1 Antitrypsin mRNA Therapy

Gavin Dotson
9/5/2025
Fourth-Year
Bioengineer

Oregon State University

Background

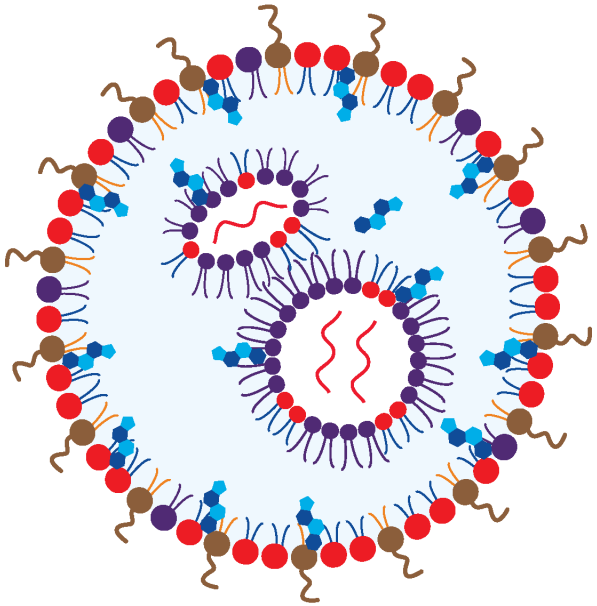
- **Prevalence:** Alpha-1 Antitrypsin Deficiency is a disorder that affects 1 in 2500 people worldwide.
- **Effect:** This disorder impairs the production of Alpha-1 antitrypsin (AAT), a protein that protects the lungs and liver from harmful proteases.
- **Implications:** Without enough AAT, proteases damage the alveoli, leading to emphysema.
- **Treatment Options:** Weekly blood infusions, lung and liver transplants, inhalers, lifestyle changes.



Khodayari, N., Oshins, R., Holliday, L.S. *et al.* Alpha-1 antitrypsin deficient individuals have circulating extracellular vesicles with profibrogenic cargo. *Cell Commun Signal* **18**, 140 (2020). https://doi.org/10.1186/s12964-020-00648-0

Background

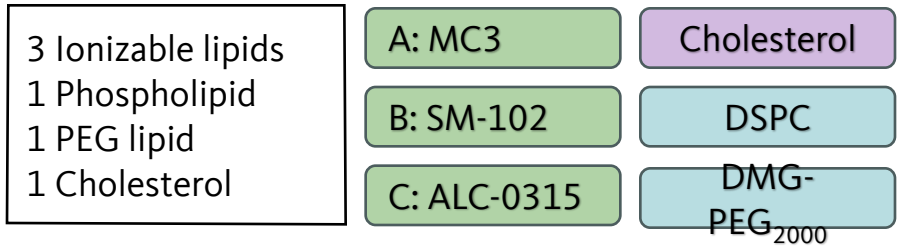
- **Lipid Nanoparticles (LNPs)**: LNPs are non-viral delivery systems used to deliver nucleic acids (e.g., mRNA) into cells.
- **Role in COVID-19 Vaccines**: LNPs played a crucial role in the success of mRNA COVID-19 vaccines.
- **Composition of LNPs**: LNPs are typically composed of four main components: ionizable lipids, phospholipids, cholesterol, and polyethylene glycol (PEG) lipids.



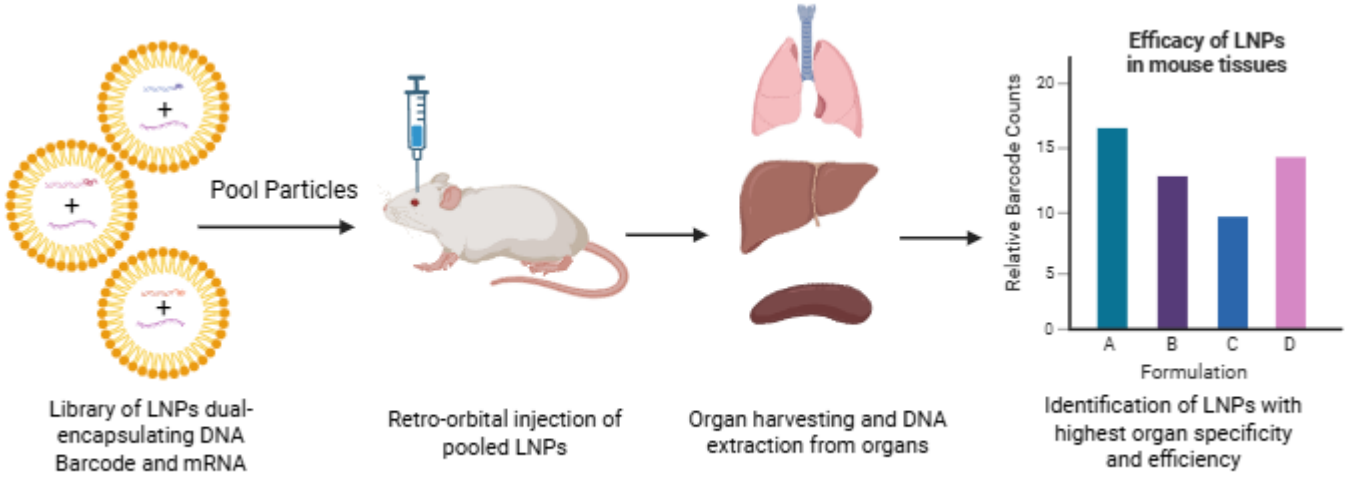
Lipid Nanoparticles (no date) *Tocris Bioscience*. Available at: https://www.tocris.com/product-type/lipid-nanoparticles#background (Accessed: 30 August 2024).

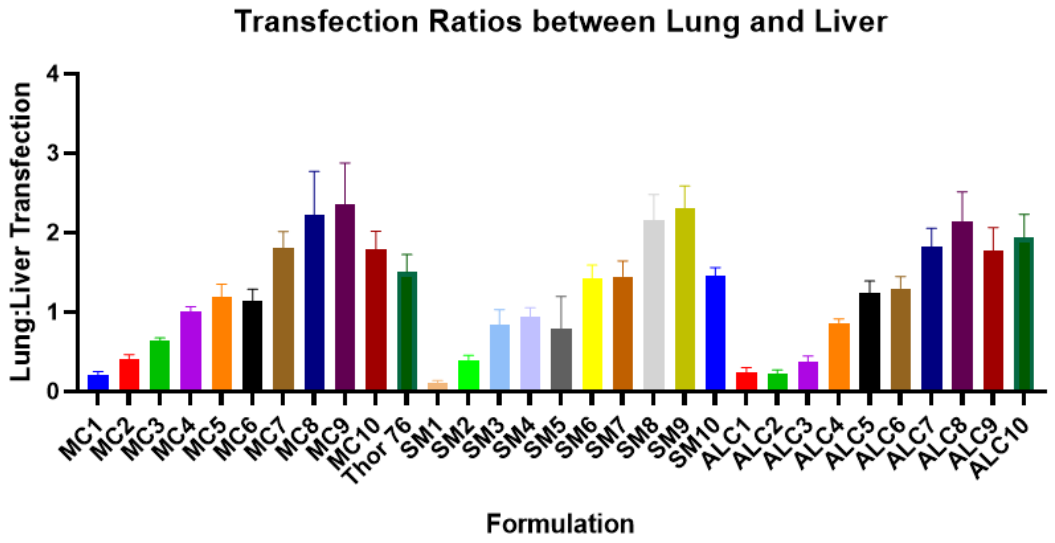
Delivering AAT mRNA

- **Research Question:** Can LNPs be used to deliver AAT mRNA to the lungs to facilitate AAT protein production?
- **Stage 1:** High-throughput barcode screening of a lipid library
- **Stage 2:** Test the best formulations in vitro and in AAT-deficient mice to measure protein expression.



Methods: Characterization and Screening





Liu, D., Wang, X., Xu, L., Al-Delfi, Z. N., Mekonnen, Z. A., Gao, S., Grubor-Bauk, B., & Zhao, C.-X. (2025). Screening lipid nanoparticles using DNA barcoding and qPCR. *Colloids and Surfaces B: Biointerfaces*, *251*, 114598. https://doi.org/10.1016/j.colsurfb.2025.114598

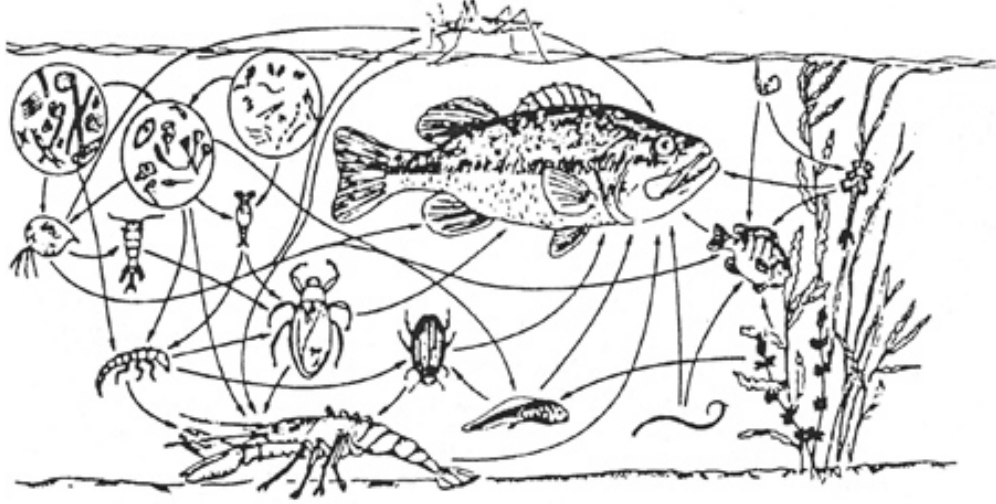
Testing an AI-Assisted Approach to Freshwater Macroinvertebrate Biomass Estimation

Ezekiel Peterson | Fisheries and Wildlife Conservation Sciences

Advised by Dr. Tiffany Garcia

Pond Ecosystems, Invertebrates, and Biomass

- Wetlands are essential ecosystems that provide services such as water filtration, carbon sequestration, and animal habitat
- Invertebrates play foundational role in aquatic ecosystems
- Measuring invertebrate biomass is a key metric for understanding how to best manage these systems for ecological health



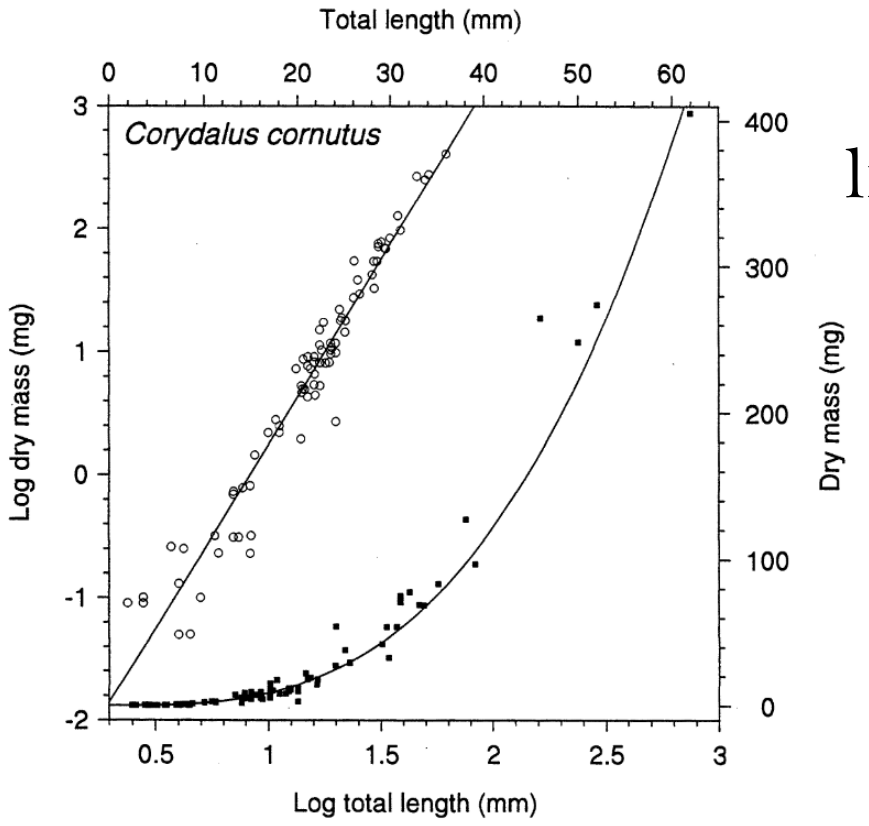
Freshwater Invertebrate Length–Mass Regressions

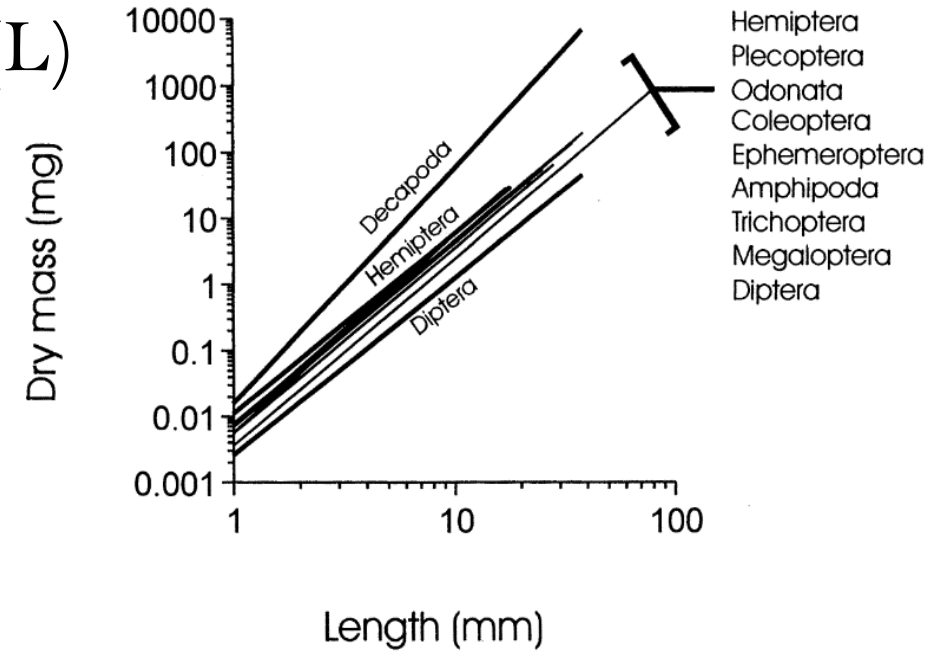
Power Function – Exponential relationship between length and mass, variable by taxonomic group

$$M = a\,L^{b}$$

or

$$\ln(M) = \ln(a) + b\,\ln(L)$$





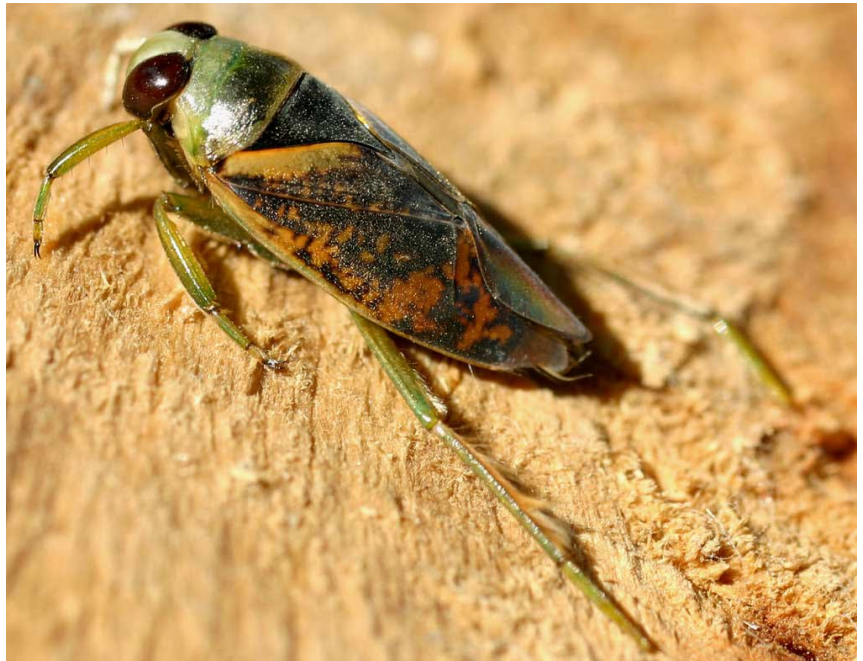
Benke et al., 1999

Methods

- Selected macroinvertebrate families to focus study on
- Sampled individuals from ponds across the Willamette Valley

Physidae

Notonectidae



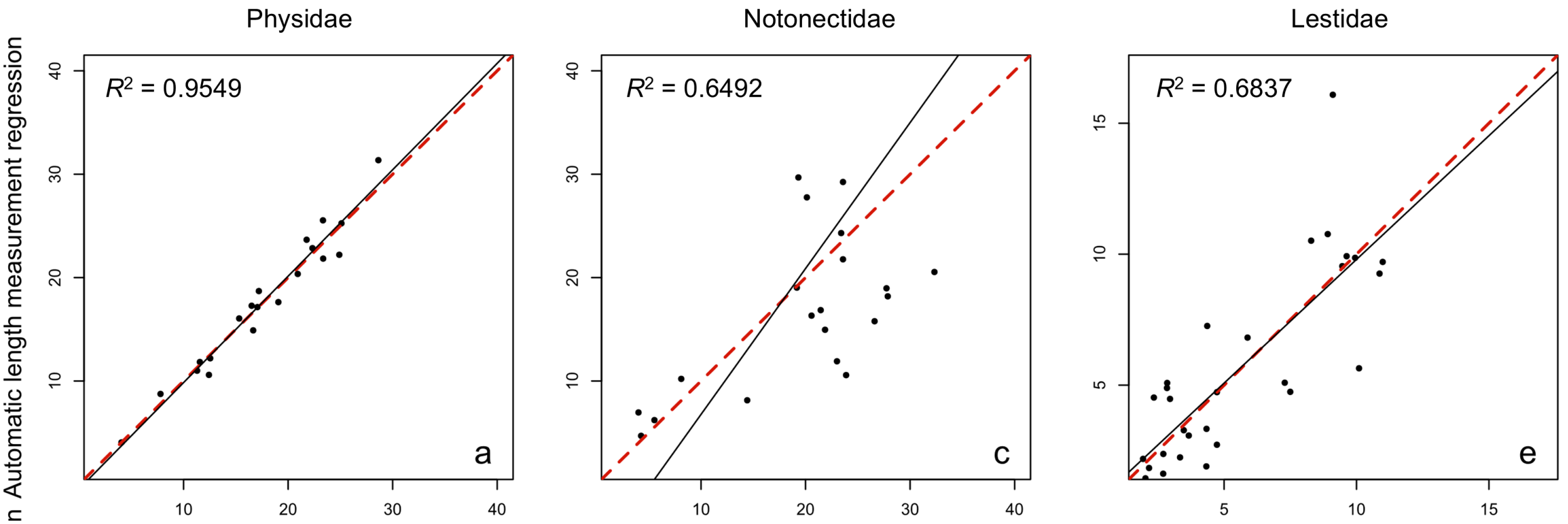
Lestidae

Methods

- Used ZooScan to automatically measure lengths of individuals
- Dried specimens at 60 degrees C for 24 hours and weighed
- Calculated regressions in R, compared across manual and automatic fitted values

Results

- ❖ Automatic regressions work okay
- ❖ Excellent for organisms with simple body plans, less accurate for complex body plans
- ❖ Plan to use other metrics such as body area to compensate in the future



Thanks!

Oregon State University
Honors College

Huge thanks to the Oregon State University Honors College, Dr. Garcia and the Garcia Lab, Courtney Hendrickson, Dr. Kim Bernard, Abby Tomita, and everyone else who made this project possible.



Floral Preferences of Pollinators in Remnant Oak Savanna

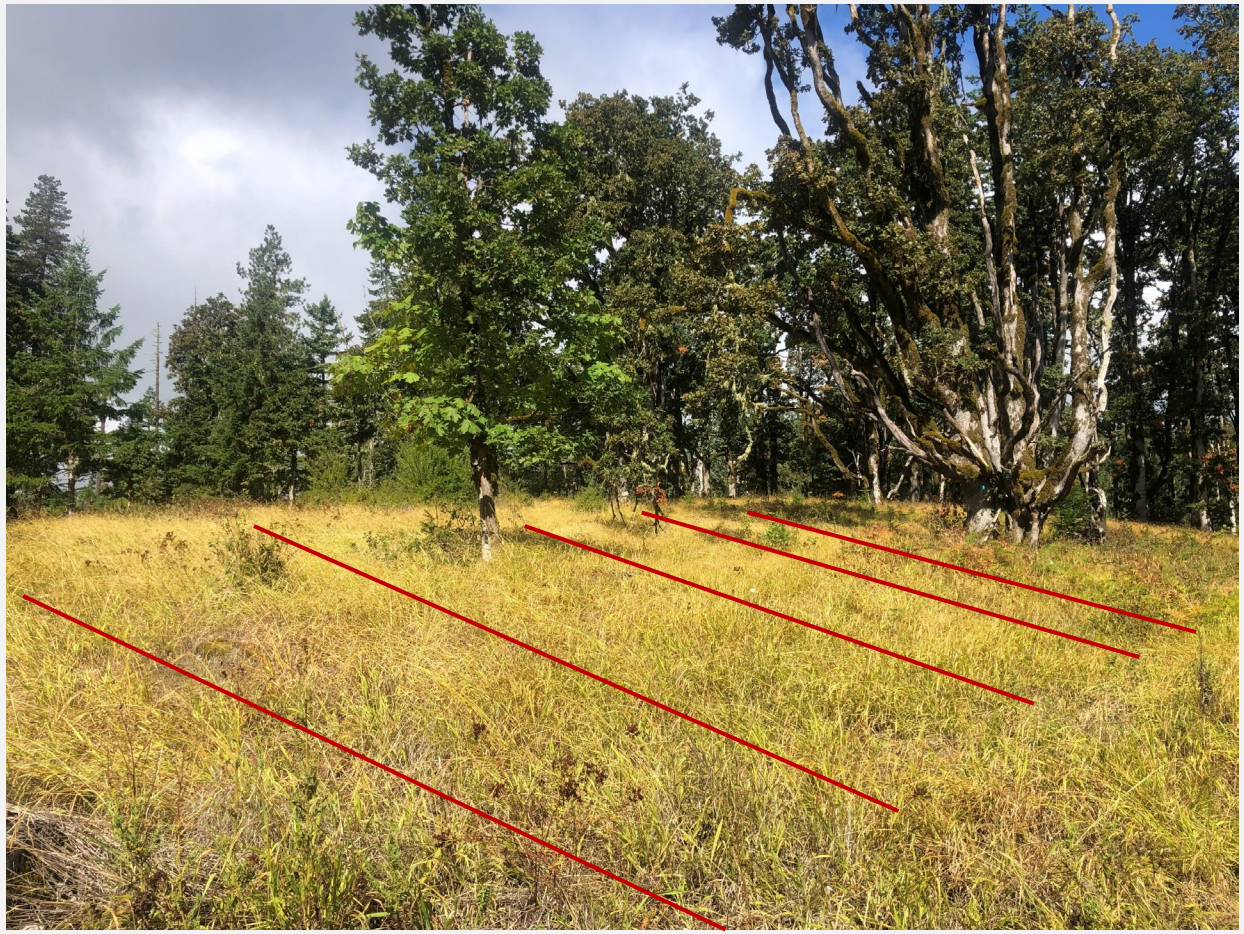
Florian L. Malnor [1], Sandra J. DeBano [2,3]

[1]Oregon State University Bioresource Research Program, [2]Hermiston Agricultural Research Extension Center, [3]Oregon State University Department of Fisheries, Wildlife, and Conservation Sciences

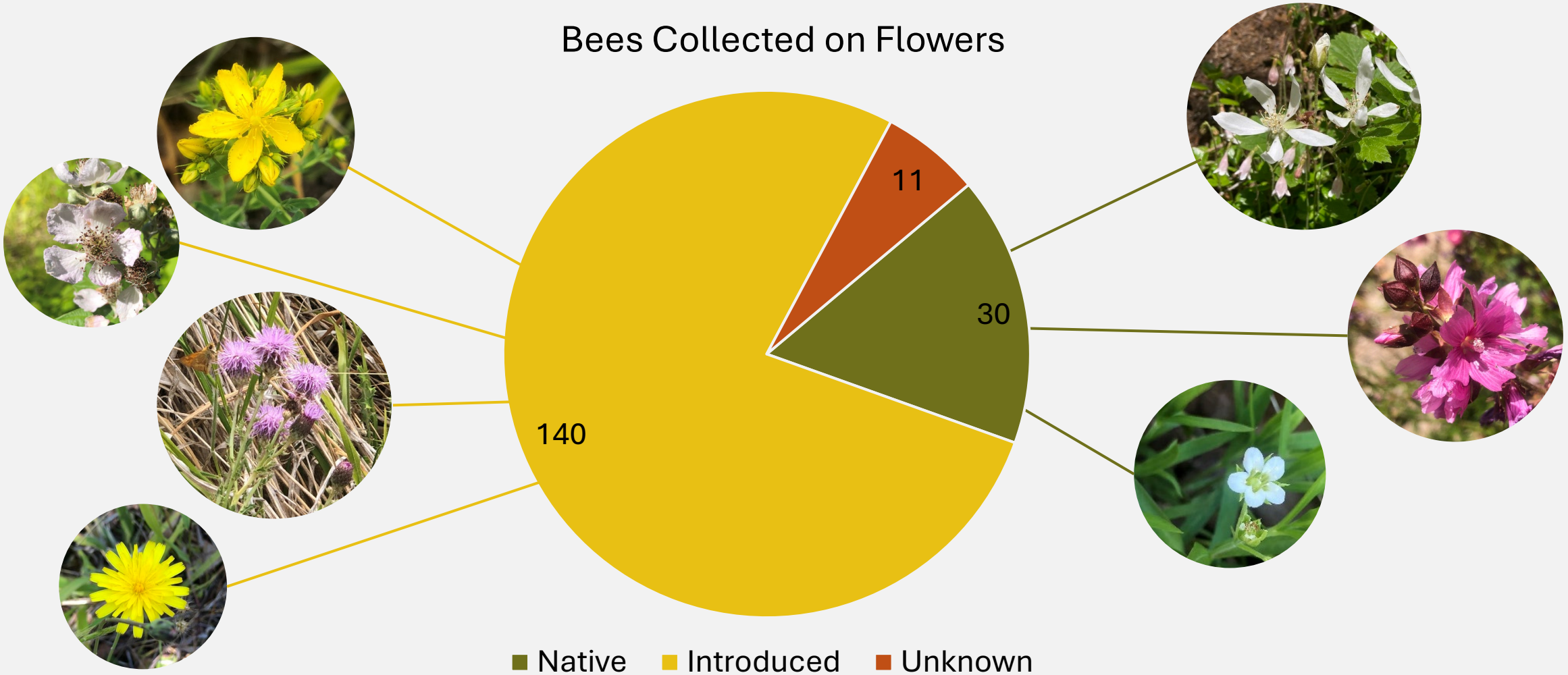
Acknowledgements

This project is supported by the OSU College of Agricultural Sciences Continuing Researcher Support Program. The remnant oak savanna sites in this study are located in OSU's McDonald-Dunn Research Forest, which is managed by the OSU College of Forestry. Identification of bee genera was done with support from August Jackson , Lincoln Best, and Andony Melathopoulos.

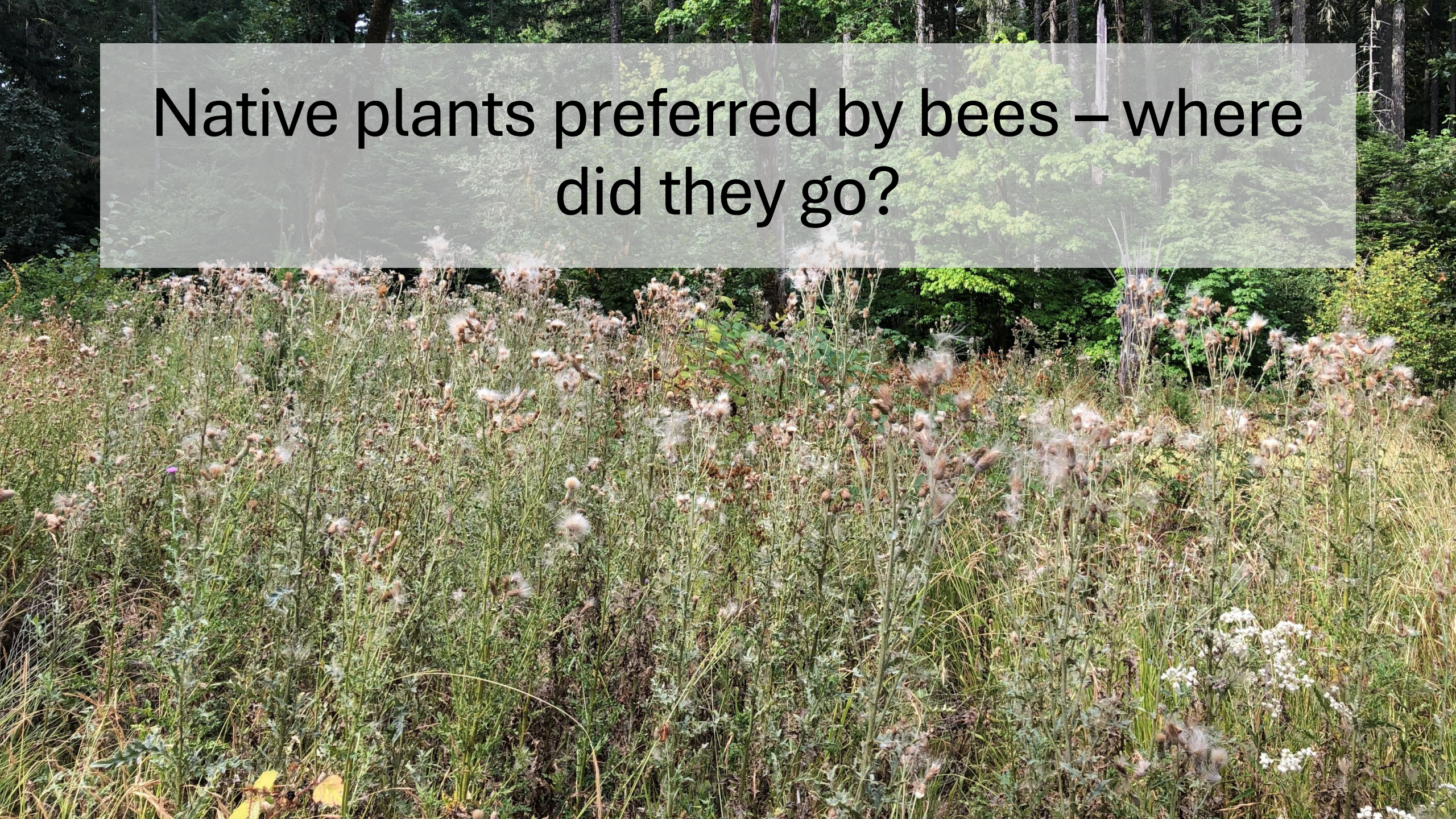
Methods



Bees visited introduced flowers more than native flowers.



Native plants preferred by bees – where did they go?



Native plants preferred by bees – where did they go?

Conclusions

- Bees visited more introduced flowers than native flowers
- Introduced plants likely outcompete native plants
- Future research: bee species diversity

Works Cited

Anderson, A. G., Costner, L., Best, L., & Langellotto, G. A. (2022). The bee fauna associated with Pacific Northwest (USA) native plants for gardens. Conservation Science and Practice, 4(10), e12801. https://doi.org/10.1111/csp2.12801

Grand, L. (2024, April 15). *Fire Adapted Oak Habitats in the South Willamette Valley* [Extension Catalog publication]. Extension Communications; Oregon State University Extension Service. https://extension.oregonstate.edu/catalog/em-9425-fire-adapted-oak-habitats-south-willamette-valley

Powers, Breanna. (2014). Butterfly and flower community composition among prairie-oak ecosystem habitats in the Willamette Valley, Oregon [Oregon State University]. https://ir.library.oregonstate.edu/concern/file_sets/8049g8841?locale=en

Gilia capitata photo credit: Peri Lee Pipkin, iNaturalist https://www.inaturalist.org/observations/117064104

Symphyotrichum subspicatum photo credit: Catherine Indrebo, iNaturalist https://www.inaturalist.org/observations/243712537

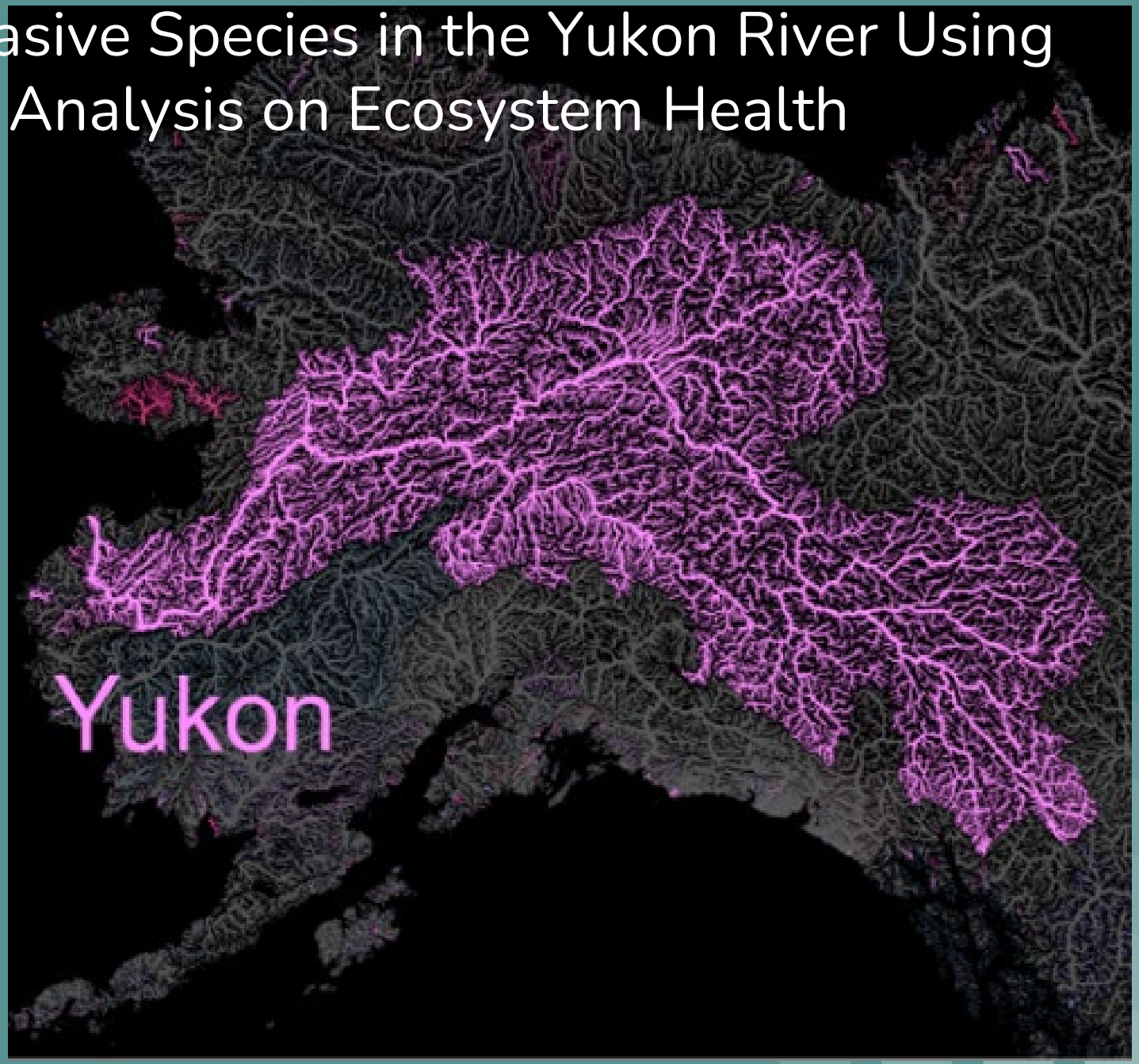
Madia elegans photo credit: Emily Scherer, iNaturalist https://www.inaturalist.org/observations/120616043

All other photos by Florian Malnor

Tracking Biodiversity and Invasive Species in the Yukon River Using eDNA: A 15- Year Study and Analysis on Ecosystem Health

By: Devri Ellett
Major - Biology

Mentor: Byron Crump



Background Information

- eDNA samples taken over a 15yr period from the Yukon River

(PCR)

- MiFish (primer)
- COI (primer)

*focusing on eukaryote diversity

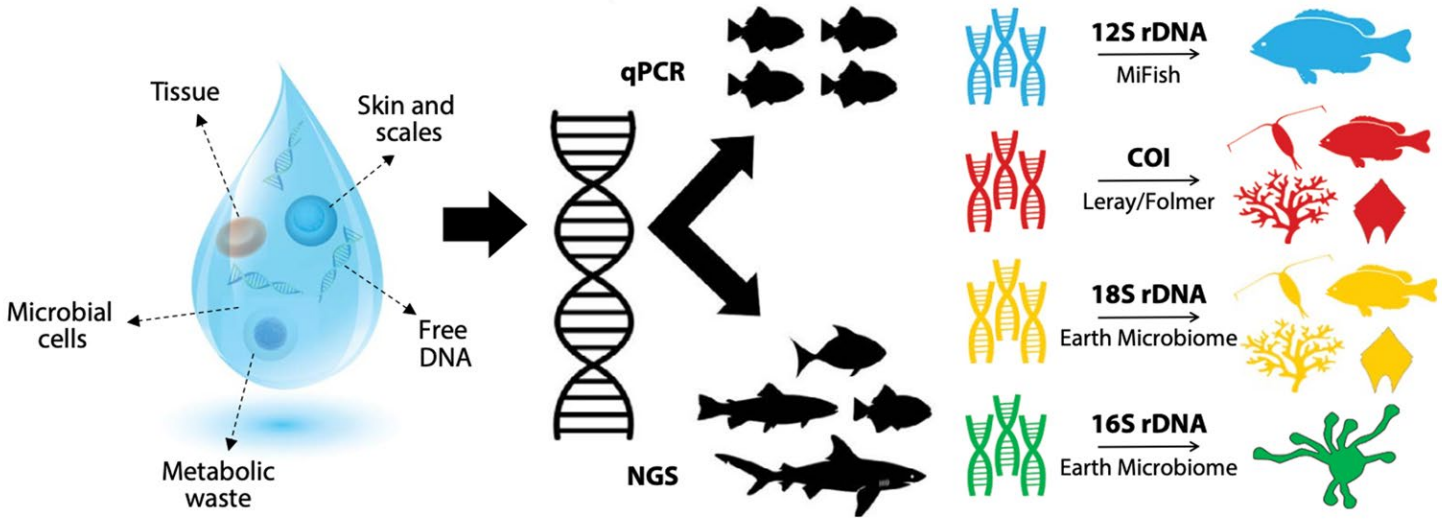


FIGURE 2. Marine eDNA suspended in seawater may contain living cells, metabolic waste, parts of organisms, or dissolved material. As part of the Marine Biodiversity Observation Network (MBON) projects described here, quantitative polymerase chain reaction (qPCR) and metabarcoding have been combined with so-called next generation sequencing. On the right are the primers used by the project with a representation of the range of organisms they detect. More detail can be found in the Materials and Methods section. *The eDNA droplet was designed and illustrated by Kevan Yamahara*

ARTICLE CITATION Chavez, F.P., M. Min, K. Pitz, N. Truelove, J. Baker, D. LaScala-Grunewald, M. Blum, K. Walz, C. Nye, A. Djurhuus, R.J. Miller, K.D. Goodwin, F.E. Muller-Karger, H.A. Ruhl, and C.A. Scholin. 2021. Observing life in the sea using environmental DNA. Oceanography 34(2):102–119, https://doi.org/10.5670/ oceanog.2021.218 .

Project Goals

- Identify invasive species in the Yukon River ecosystem (ex. Zebra Mussels, European Green Crab)

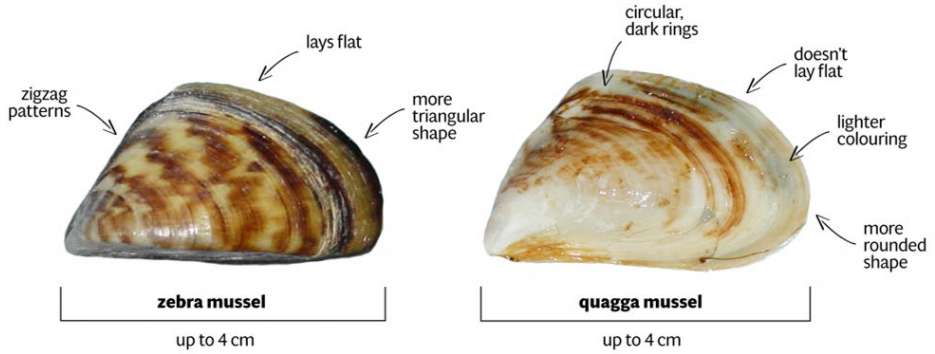
(Social+Economical Impacts)

- Track seasonal long term changes in salmon abundance

(Important For Religion + Ecosystem Health)

- Measure how Yukon River biodiversity of eukaryotes change over time

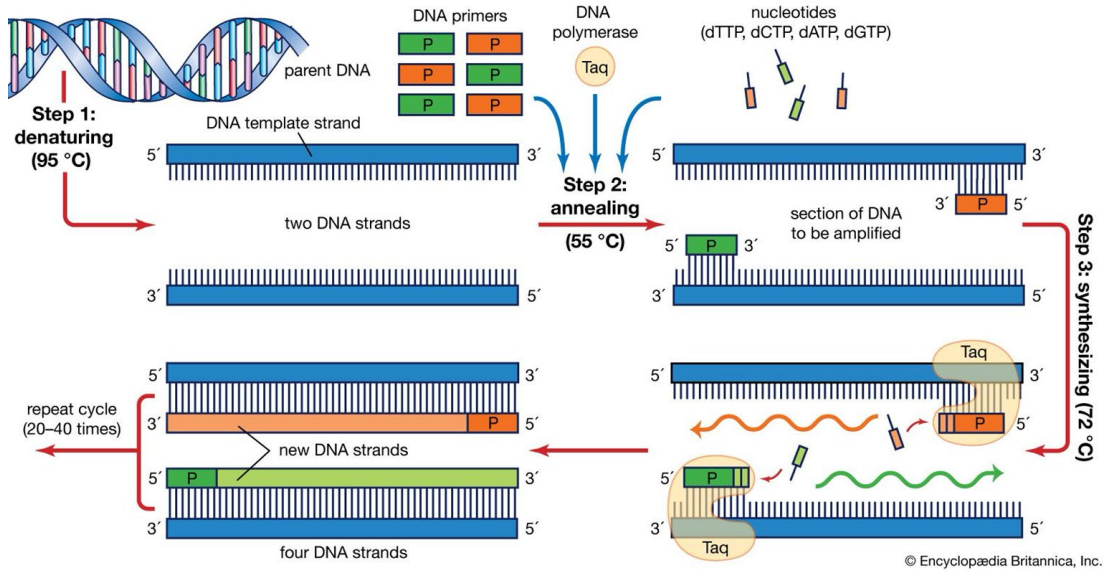
(Connects With Ecosystem health as a whole)

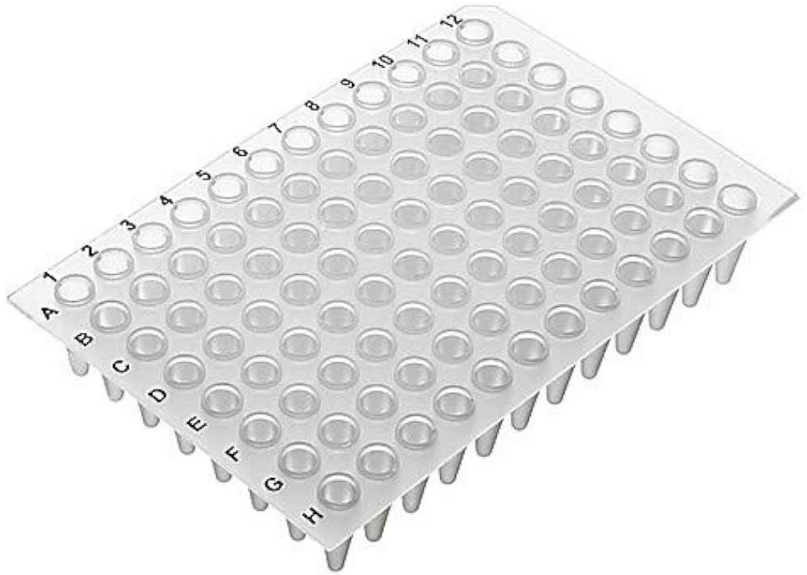


Current Progress

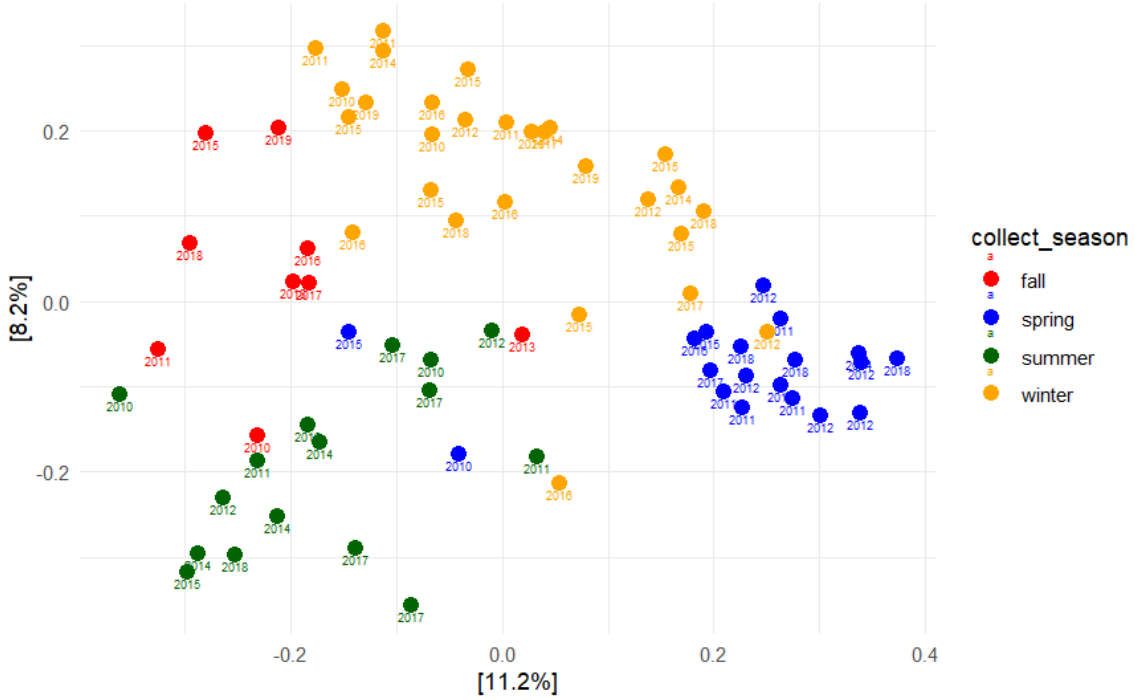
- [x] Research Yukon River Biodiversity
- [x] Write/ Submit thesis proposal
- [x] Columbia River Data Set (proof of concept)
- [x] AVITI DNA sequencing at Michigan State University (Just Finished)
- [ ] Analyze data set
- [ ] Complete thesis

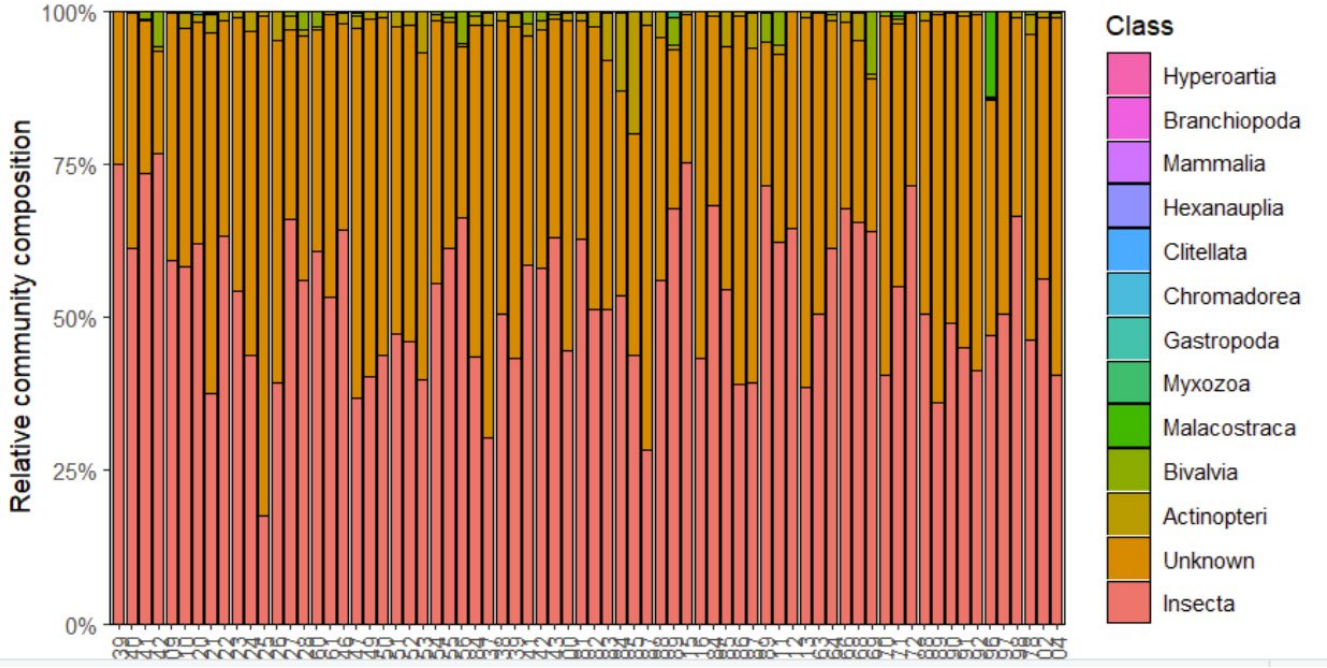
*Data should be fully prepared end of this term or early spring term to analyze





Columbia River Data Example





Seasonality graph of Metazoa communities in the Columbia River

Relative community composition of the different classes in the Columbia River

Acknowledgements

Thank you to the US Geological Survey who collected these samples for us through their National Water-Quality Assessment (NWQA) program.

Oregon State University

Exposure to Non-Tuberculosis Mycobacteria (NTM) on Pre-Existing Inflammatory Cardiovascular Conditions in the Native American Population in Oregon

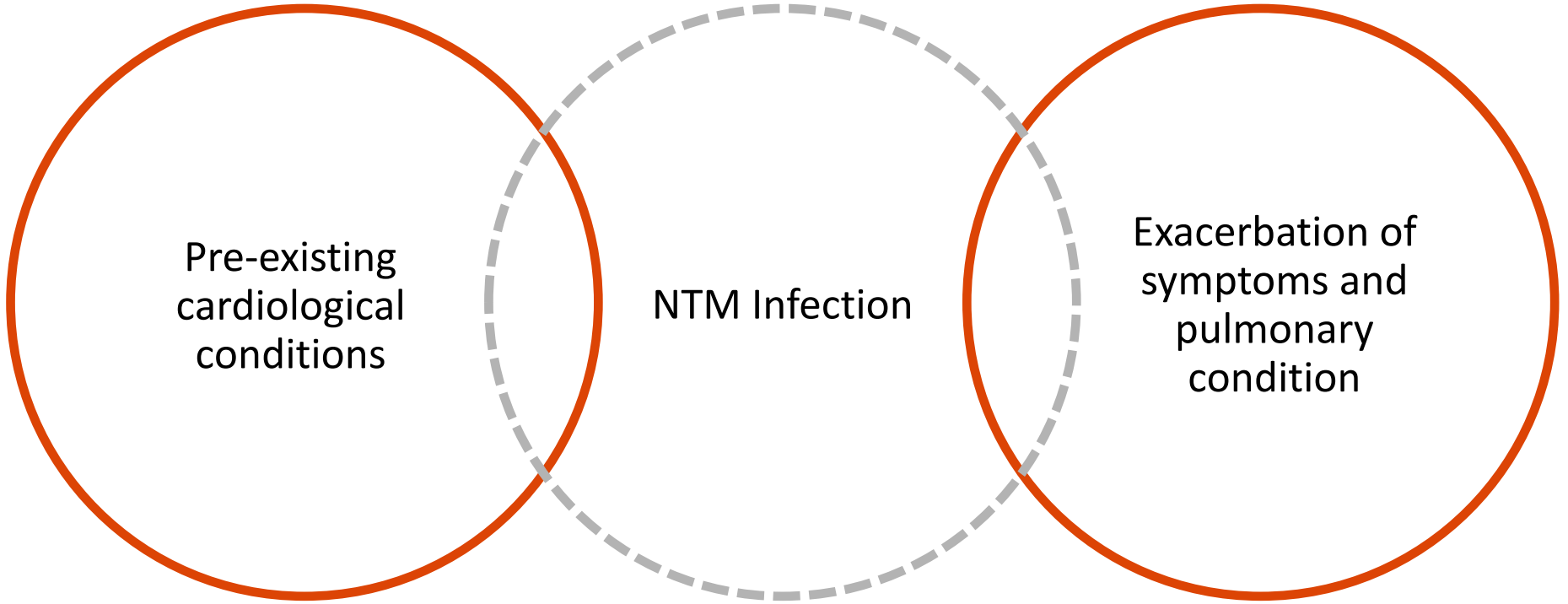
Kaiya Gantzer, Dr. Luiz Bermudez

Main ideas

1. **Native American populations in Oregon**
    I. Reservations and populated areas
    II. Social issues
    III. Habits and environment

2. **Non-Tuberculosis Mycobacterium (NTM)**
    I. M. avium
    II. Infection

Conceptual Progression of NTM infection



M. avium disease

- NTM and biofilm, infections, chronic conditions

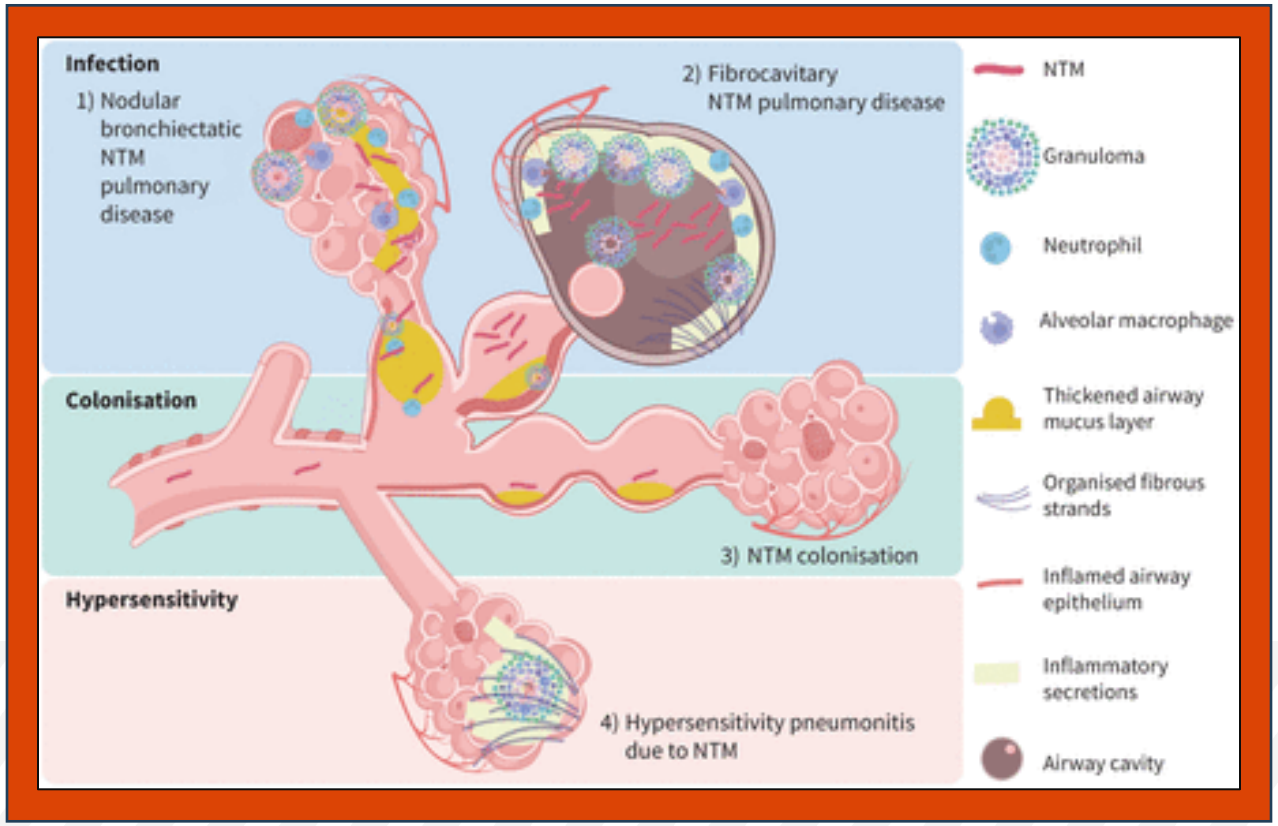


Fig. 1

Fig. 2

Discussion

- Why is this important?
- Next steps

Citations

1. Braeckel, E. V., & Bosteels, C. (2024). Growing from common ground: Nontuberculous mycobacteria and bronchiectasis. *European Respiratory Review*, *33*(173). https://doi.org/10.1183/16000617.0058-2024
2. *Mycobacterium Chimaera Bacteria #2 by Kateryna Kon / Science Photo Library*. (n.d.). Fine Art America. Retrieved February 24, 2026, from https://fineartamerica.com/featured/2-mycobacterium-chimaera-bacteria-kateryna-konscience-photo-library.html

THANK YOU

Questions?

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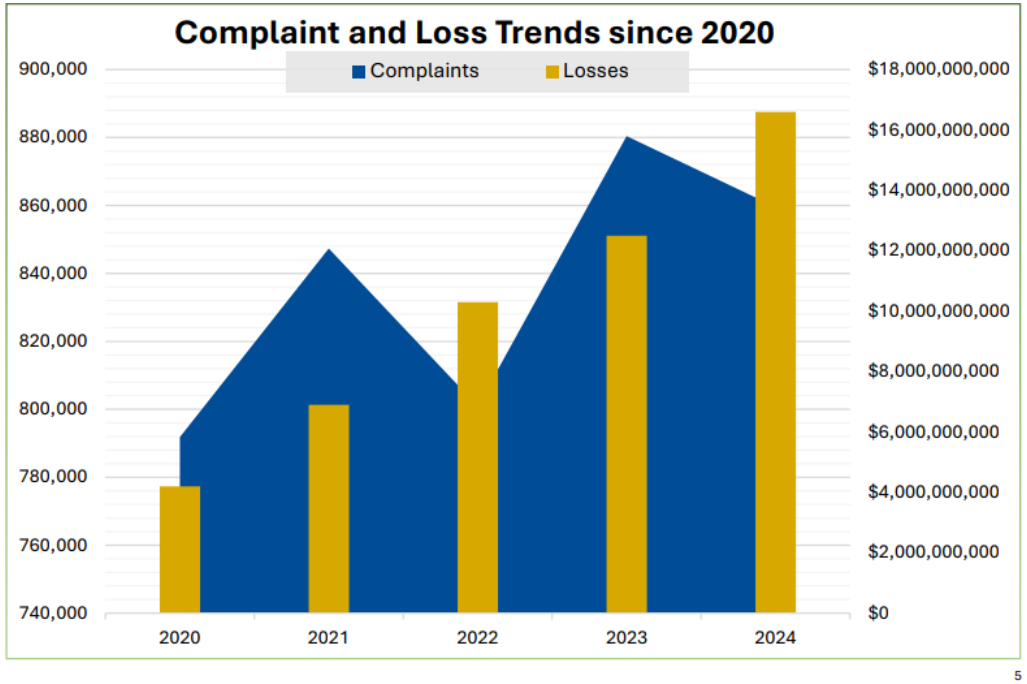
Creating Threat Profiles of Cybercriminal Organizations Using Automation

By Jenna Cook

Mentor: Brandon Ellis

Major: Computer Science

Cybercrime Statistics



Source: [1]

"A 2024 survey among chief information security officers (CISO) in the United States showed that almost 9 in 10 organizations were at risk of a material cyberattack in the following 12 months." [2]

1 Internet Crime Complaint Center, "Federal Bureau of Investigation Internet Crime Report 2024," Federal Bureau of Investigation, 2024. [Online]. Available: https://www.ic3.gov/AnnualReport/Reports/2024_IC3Report.pdf.

2 Statista Research Department, "Share of organizations in the United States that are at risk of a material cyberattack according to CISOs from 2021 to 2024," Statista, 2 February 2026. [Online]. Available: https://www.statista.com/statistics/1448307/companies-at-material-cyberattack-risk-us/.

Scraped Rhysida DLS

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College of Engineering

rhysidafohrhyy2aszi7bm32tnjat5xri65fopcxkdfxhi4tidsg7cad.onion/archive.php

Phoenix Art Museum
Phoenix Art Museum is an art museum that showcases art from around the U.S. in Phoenix, Arizona.

Documents (part 1) Documents (part 2) Data Catalog: 3,6 Tb, 1 035 417 Files

100%

All files was uploaded to public access, data hunters, enjoy

More

AGS
Today, Accelerated Global Solutions (AGS) is a rapid-growing global company headquartered in New York, NY that manages a service network of freight stations and fulfillment operations providing coverage across major gateway cities in the United States, Canada & China.

Documents Data Catalog: 33 Gb, 45 720 Files

5%

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More

Lakeside Union School District
The Lakeside Union School District in California serves preschool through 8th-grade students, focusing on a safe, nurturing environment that promotes academic success, personal growth, and responsible citizenship.

Documents (part 1) Documents (part 2) Documents (part 3) Documents (part 4) Data Catalog: 585 Gb, 1 670 126 Files

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More

Transferring data from rhysidafohrhyy2aszi7bm32tnjat5xri65fopcxkdfxhi4tidsg7cad.onion…

Threat Profile Script Flow

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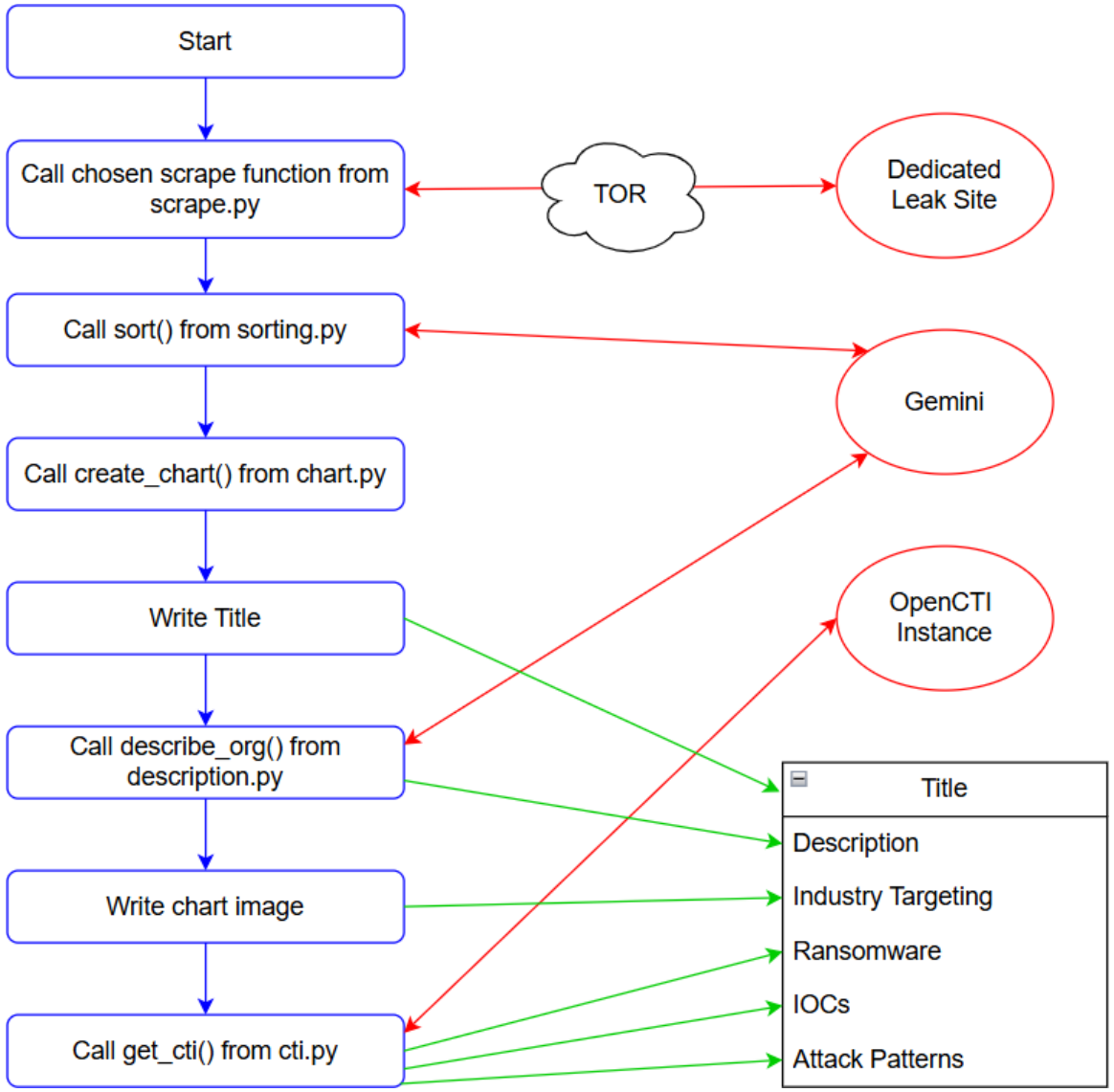

Industry Targeting

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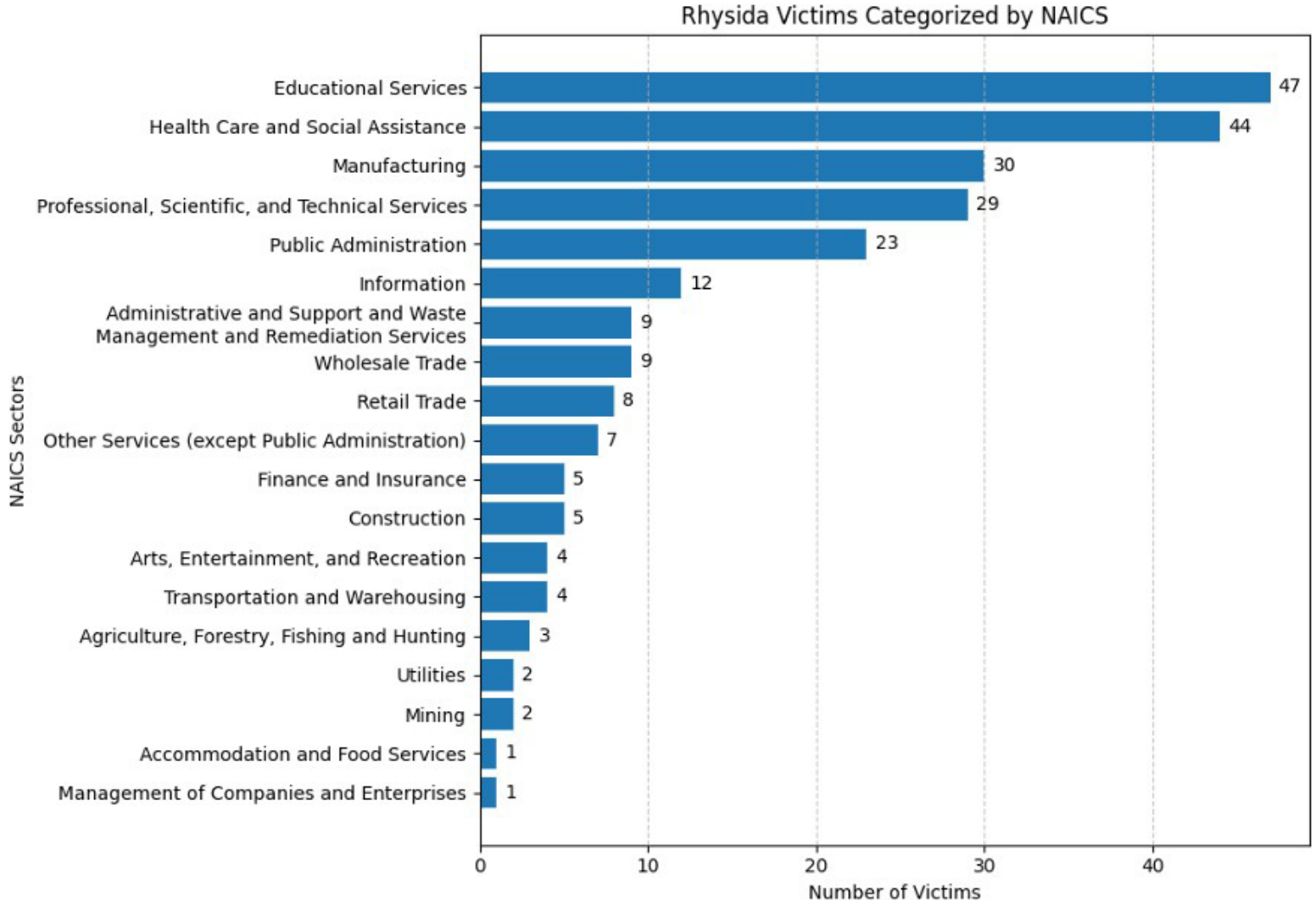

Threat Profile Tables

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Ransomware

	Name
0	ransomware
1	OysterLoader
2	CleanUpLoader
3	Latrodectus
4	ChrGetPdsi
5	Rhysida
6	PortStarter

Indicators of Compromise

	Type	Name
3	SHA-256	0c89de2e1d6449ab5c192d383ebb2bfbb3df4fd6c1f2beaff9804b8e10cc0db0
4	SHA-256	382af3f71da0480e279fc7be35159aba4cd0ff303672ac9b506031d0d0825b36
5	SHA-256	88e9c1f5026834ebcdaed98f56d52b5f23547ac2c03aa43c5e50e7d8e1b82b3a
6	SHA-256	37d0bda4af155625931d030c23594d450a272549ddb32380d3c5ee94feb03a25
7	Domain-Name	teams-install.icu
8	SHA-256	1c20550543d4bca865c92f66f4a10d6c2f5348d0638f93854a0ba6ae0715a37f
9	SHA-256	6147f86e79bdcbae37e724ada941c5129b8ef904fc9e3c498a3923c69937d99c
10	SHA-256	fad9aa1c52f3a9453bccb343626aa5cf3e37d09109bed07c20bf1dd3027088a5
11	SHA-256	b52dddf4022ee45243ad01705d5a8d5070cd62aa89174f1ab83f5b58f66d577a
12	SHA-256	49af54b21ac46de4d87b2c1067bf3f62d379800fb8616d0a4b3500ae7656ac71
13	SHA-256	6bfaa362a46f0c5e7b10f43575523628b36c69a1086c5acd1c512db5465ed12e
14	SHA-256	b0bed317b0288fdedc2f122876f37284d6f654c0fbedd525a0f396069a304e9e
15	SHA-256	328a8fb3ff41093c3b3352a6b3771e1d3351a04861ee73c7260ecb0e84aa51ff
16	SHA-256	9ac7c82eba9200fb11ac047bf259f30d4e6929e1f8a472557a3a81cdd1a492db
17	SHA-256	65d50bb63d3d0176059ec26a63cd781aad016202b51cb6e4477f36ca6d1e7f82
18	SHA-256	76b87bf2b60a62af93b9a711e59d90dfbd871c3c86f2740336b802b5db6a9f7f
19	SHA-256	2f9f61ceaf909adfa0cee2c4d30cda175609819bc10ece8776e2d69e11097076
20	Domain-Name	veloraio.com

Attack Patterns

	Name	MITRE ID
0	Remote Access Tools	T1219
1	Process Injection	T1055
2	Spearphishing Link	T1566.002
3	Domains	T1583.001
4	Exploit Public-Facing Application	T1190
5	Malware	T1587.001
6	Scheduled Task/Job	T1053
7	Code Signing	T1553.002
8	Obfuscated Files or Information	T1027
9	Exploitation for Client Execution	T1203

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Thank you!