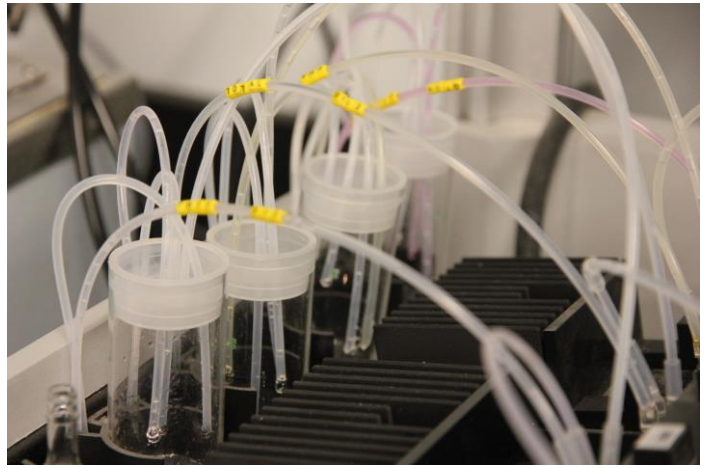
From Chemistry to Cryopreservation:
Contributions to Advancing Wine Quality in NS

2019 Grape & Wine Networking Conference

Old Orchard Inn, NS

May 24-25, 2019



Peggy Crawford

Office of Industry & Community Engagement, Acadia University

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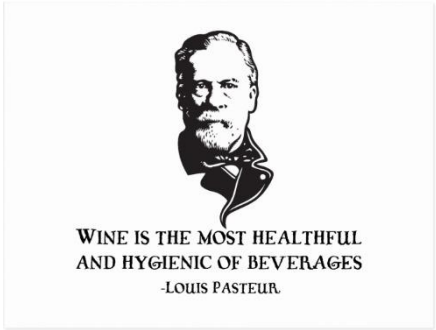
Wine Quality

- “It is far easier to detect a wine’s quality than define it.” (Amerine & Roessler, 1983)
- "Wisdom doesn't automatically come with old age. Nothing does - except wrinkles. It's true, some wines improve with age. But only if the grapes were good in the first place." (Abigail Van Buren)
- “Wine is the most healthful and most hygienic of beverages.” (Louis Pasteur)
- "Good wine praises itself." (Dutch Proverb)



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Impacting Wine Quality

- Impacts in the Vineyard
  - Development of a Grapevine Repository Program in NS (Dr. Robin Browne, Research Scientist, KC Irving Centre, Acadia U)
- Impacts in the Winery
  - Sensory Research & Services (Dr. Matt McSweeney, Food Scientist, Acadia School of Nutrition & Dietetics, and Director, Centre for the Sensory Research of Food, Acadia U)
  - Analytical Services & Research - Acadia Laboratory for Agri-food & Beverage (ALAB) (Dr. John Murimboh, Acting Director, ALAB, and Hayley Craig-Barnes, Technician, ALAB, Acadia U)

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Development of a Grapevine Repository Program in NS: Background

- Why the research?

  Industry needs:

  - Access to clean traceable planting stock for varieties of regional commercial interest
  - Eradication of pathogens that threaten productivity of vineyards
  - Faster availability of planting stock

- Why Dr. Browne?

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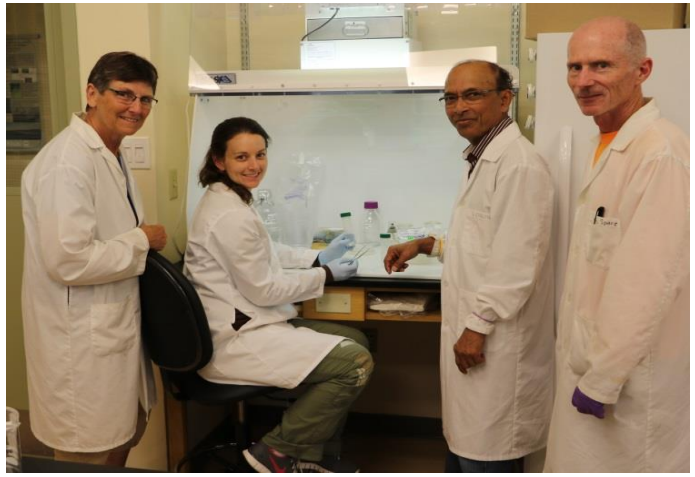
Funding & Partnerships

- Three year project, funded December, 2017- December, 2020
- Funded by the Province of NS
- Other partners & collaborators:



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Agriculture and Agri-Food Canada

Plant & Food RESEARCH
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Agence canadienne d'inspection des aliments
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The Project

- To test plant tissue culture as a tool to initiate, maintain, multiply and supply clean planting stock
- To test cryogenics methods for application in 1) cryopreservation for long term germplasm storage, and 2) cryotherapy to eradicate viral pathogens

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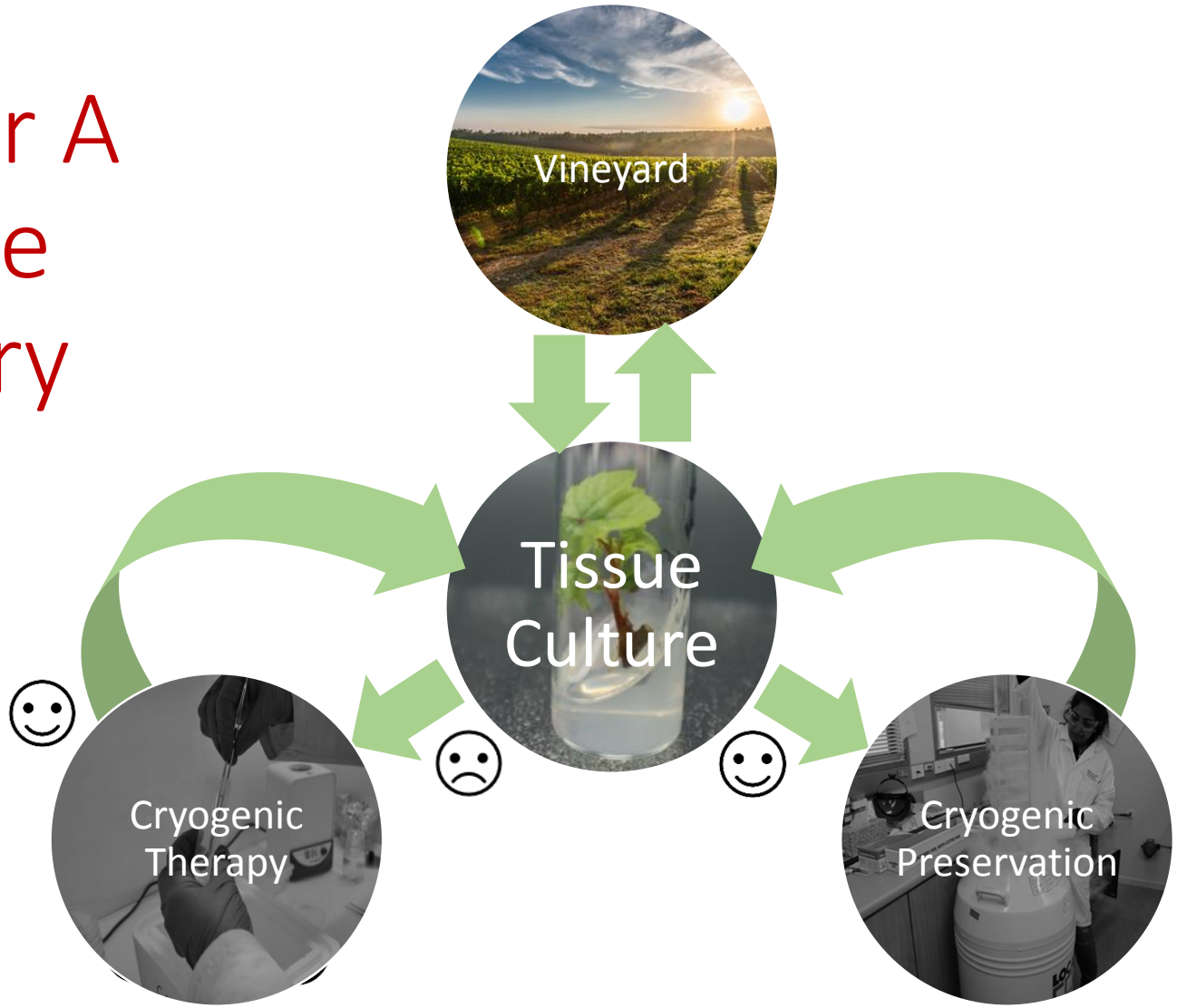
Definitions

- **Plant Tissue Culture** is the in vitro cultivation of plant parts/tissues in pathogen-free conditions generally to produce clones of a plant.
- **Micropropagation** is the technique of propagating plants by growing plantlets in tissue culture and then planting them out.
- **Germplasm** is living tissue from which new plants can be grown.
- **Cryopreservation/cryogenic preservation** is the storage of material at ultra-low temperatures of liquid nitrogen.
- **Cryotherapy** is the technique/treatment that uses ultra-low temperatures to eradicate microorganisms and pathogens.

Model for A Grapevine Repository



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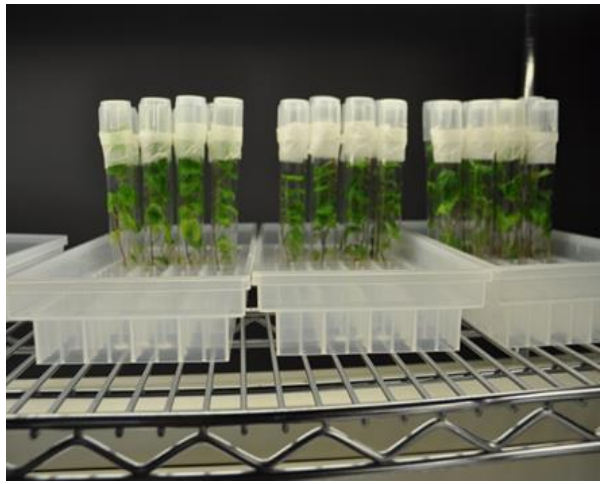
Year 1 Progress – Tissue Culture

- Tissue culture populations initiated for 14 commercial cultivars and 9 rootstocks
- Successful multiplication demonstrated for 5 cultivars and all 9 rootstocks (estimated potential for 150,000 + plants per line in 6 months)
- First populations of tissue culture derived plants ready for field trials



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Year 1 Progress - Cryogenics

- Successful recovery from liquid nitrogen exposure demonstrated for two cultivars
- Effects of antioxidants tested for one cultivar, with up to 28.1% recovery after cryogenic treatment
- Protocols developed for detection of several viruses, including Leafroll 1 and 3, Red Blotch, Fanleaf, Pinot Gris and Ruprestis
- Initial virus testing completed for samples of Marechal Foch, Riesling, L'Acadie Blanc, Chardonnay, Marquette, Vidal Blanc, New York Muscat, Pinot Noir

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Challenges/Years 2 & 3 Activities

- Improvements to tissue culture treatments
- Testing of virus infected lines
- Field trials with tissue culture material
- Ongoing collaborations with AAFC-KRDC and NZPFRI

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Sensory Research & Services: Background

- Why the research?

  The application of rigorous sensory evaluation for wine is become of increasing significance, especially in a global marketplace

  Because of the distinct grape varietals grown here in NS, local wines should have their own version of a *consumer language* to fully describe these unique varieties

- Why Dr. McSweeney?
  - Acadia Centre for the Sensory Research of Food
  - Food Formulation Lab
  - Project: Developing a Consumer Language for NS Wines

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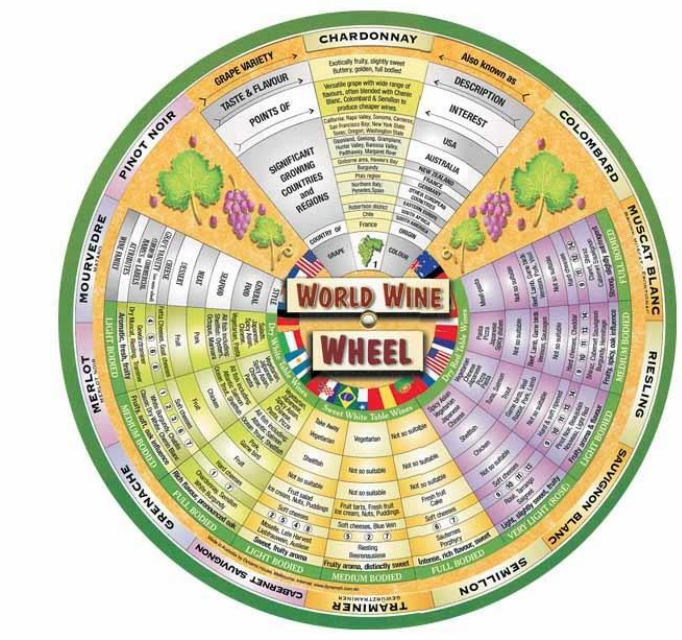
The Project: Developing a Consumer Language for NS Wines (the Wine Wheel Project)

- Evaluate the sensory properties of selected Nova Scotia wines to:
  - Categorize their flavours
  - Determine consumer suitability of the wines



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Funding

- Three year project, funded March, 2017- March, 2020
- Funded by the Province of NS

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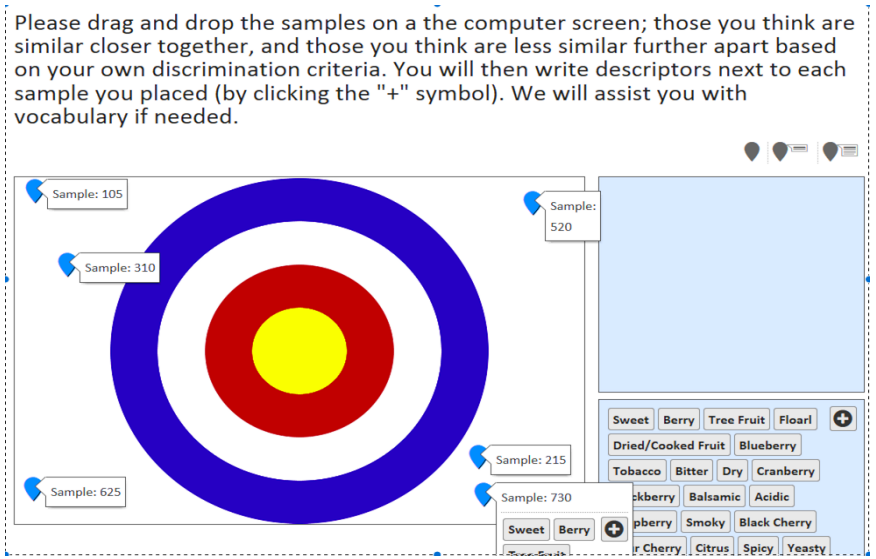

Slightly Bitter
Bitter
Bitter Aftertaste
Medium Body
Heavy/Full Body
Light Taste
Semi Sweet
Sweet
Very Sweet
Semi Dry
Dry
Very Dry
Mild
Sugary
Fruity
Astringent
Peppery
Smoky
Cranberry
Lingering
Musty
Tobacco
Black Cherry
Sour Cherry
Black currant
Vanilla
Blackberry
Red Fruit
Black Fruit
Dried Fruit
Raisin
Berry
Citrus - Lime
Citrus
Sharp
Sour
Mild Acidity
Acidic
Tangy
Floral

Blueberry
Balsamic
Vinegar
Coffee
Black Tea
Spicy
Blackberry
Tart
Tart Aftertaste
Rounded
Pineapple
Oak
Raspberry
Earthy

Update (Year 2)

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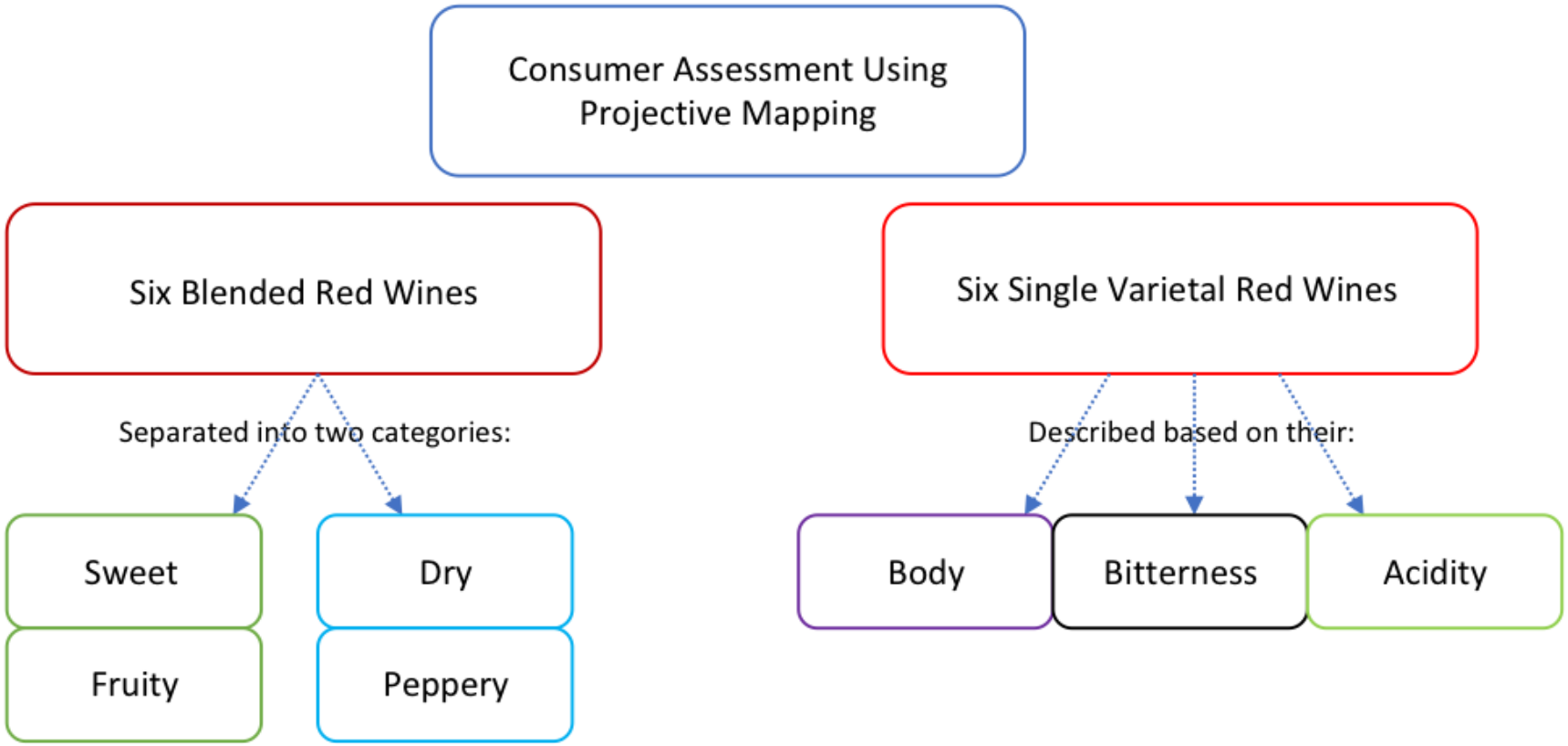
NS Red Wine



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Acadia Laboratory for Agri-food & Beverage (ALAB)

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Funding & Partnerships

- Phase #1 Growing Forward 2 Program (Building Industry Capacity Stream) (2016)

Canada NOVA SCOTIA

- Phase #2 Three year project (March, 2017- March, 2020)
- Funded by the Province of NS

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- Phase #3 MOU with Perennia on Wine Quality Specialist

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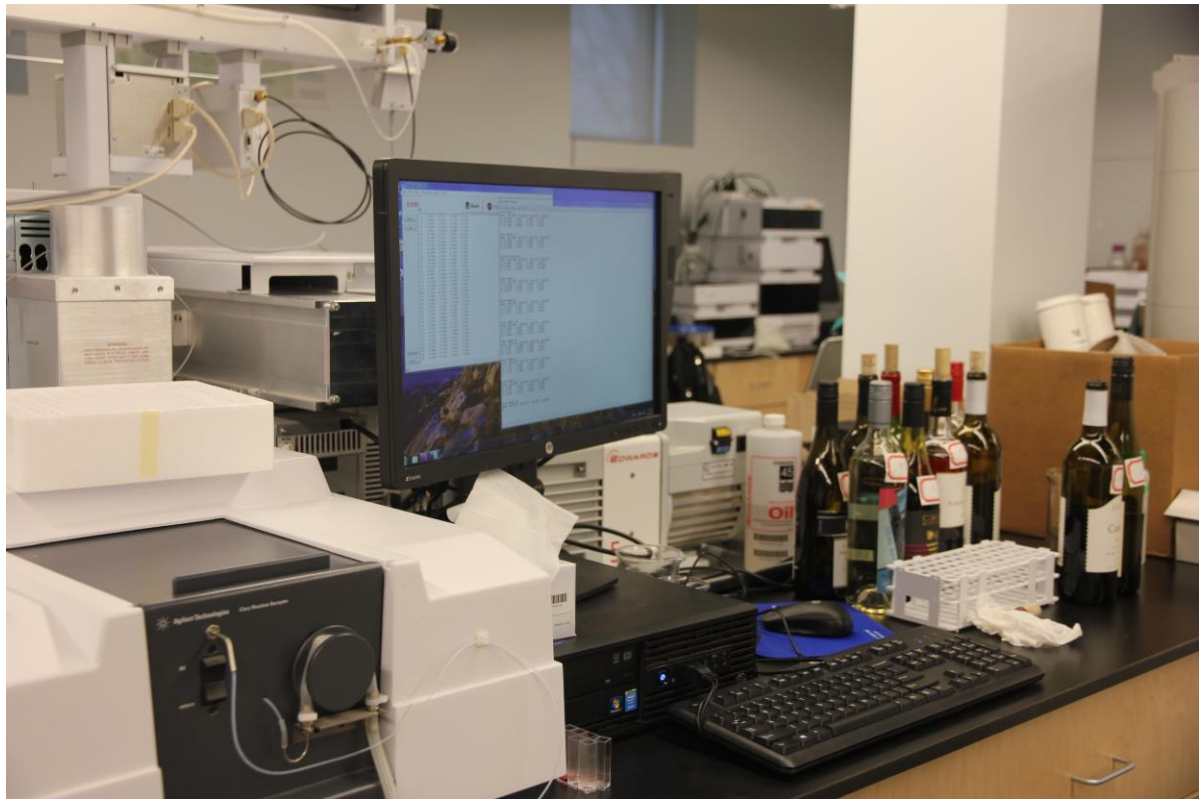

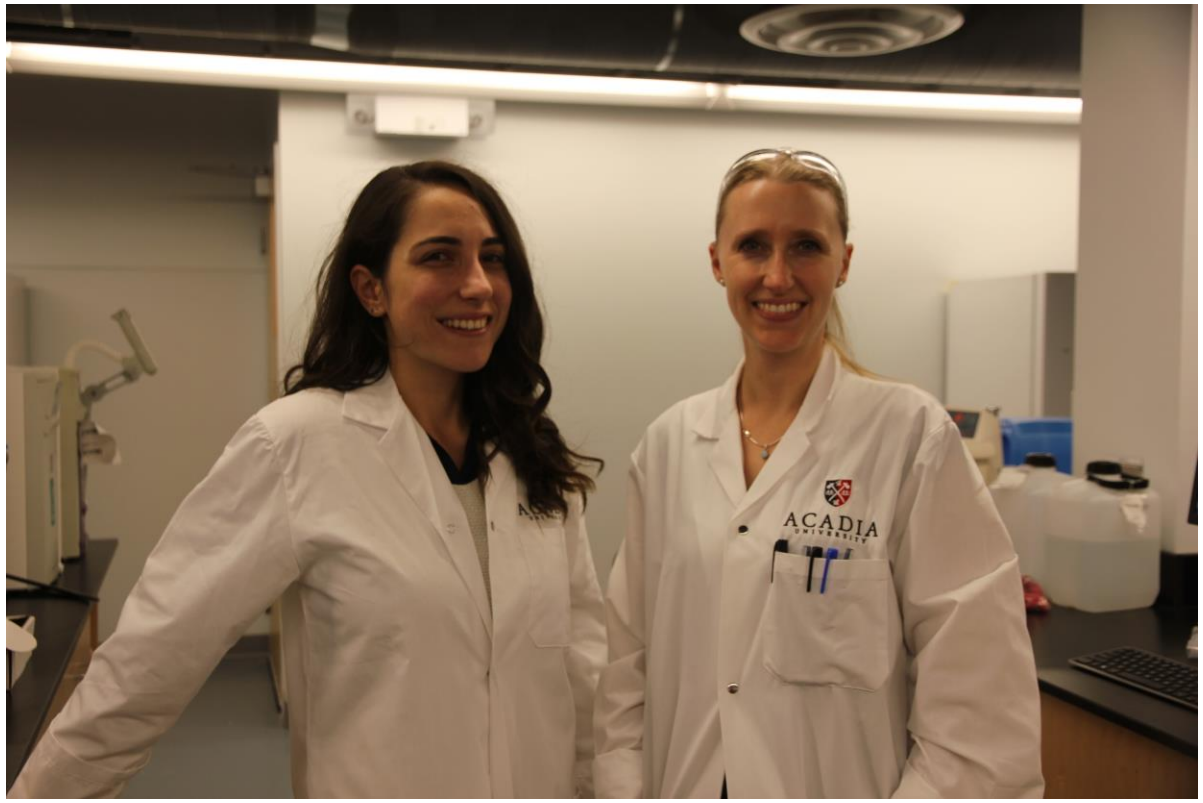

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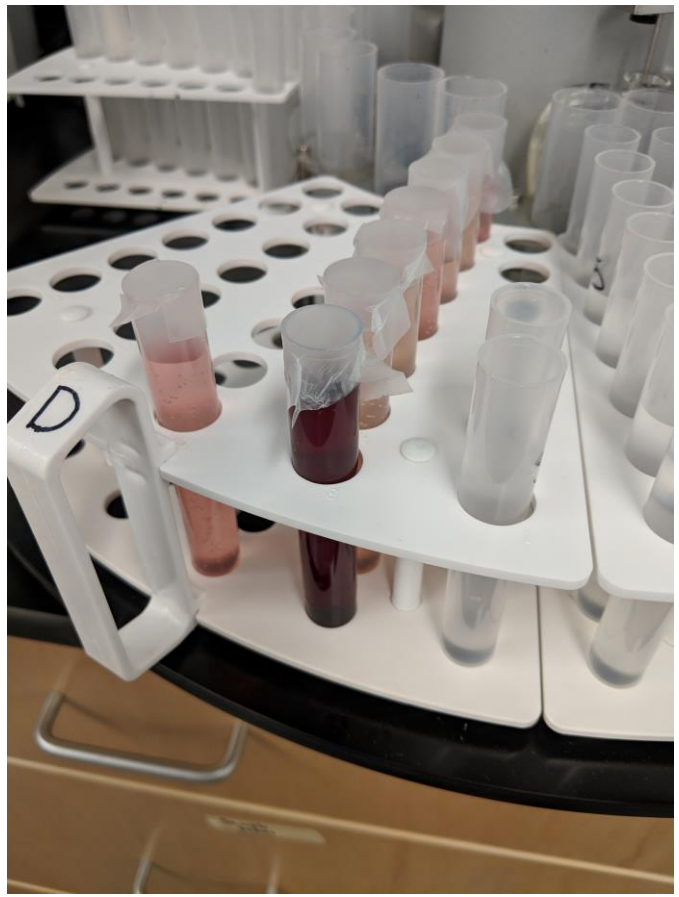

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