

## **ABSTRACT GUIDELINES:**

Abstracts must include sufficient information for reviewers to judge the nature and significance of the topic, the adequacy of the investigative strategy, the nature of the results, and the conclusions. The abstract should summarize the substantive results of the work and not merely list topics to be discussed.

An abstract is an outline/brief summary of your paper and your whole project. It should have an intro, body and conclusion. It is a well-developed paragraph, should be exact in wording, and must be understandable to a wide audience. Abstracts should be no more than 250 words, formatted in Microsoft Word, and single-spaced, using size 12 Times New Roman font.

Abstracts highlight major points of your research and explain why your work is important; what your purpose was, how you went about your project, what you learned, and what you concluded.

If your title includes scientific notation, Greek letters, bold, italics, or other special characters/symbols, do make sure they appear correctly.

List all additional undergraduate co-authors, whether they are or are not presenting, if applicable.

List additional faculty mentors, if applicable.

## **SIX SAMPLE ABSTRACTS (Previous Participants)**

### **GRADUATE LEVEL**

*Researcher: Rita Asgeirsson*

**Presentation Title:** An Analysis of Yukon Delta Salmon Management

**Research focus:** Fisheries management related to Bering Sea fisheries and Yukon River salmon populations.

**School:** Western Washington University

**Student Level:** Masters

**Presentation Type:** Oral Presentation

### **Abstract:**

An Analysis of Yukon Delta Salmon Management  
Rita Asgeirsson, Western Washington University

The broad range of Pacific Alaskan salmon has resulted in the creation of a complex and multi-organizational system of management that includes the state of Alaska, various federal departments, a Congressionally-mandated fishery council, and a number of commercial and non-governmental fish organizations. In the Bering Sea salmon are caught by the commercial groundfish fleet as by-catch. On the Yukon River salmon are commercially and traditionally

harvested for both economic and cultural sustenance by the Yup'ik residents of the Yukon Delta. Declining salmon populations has driven scientific research which considers the effects of Bering Sea salmon by-catch.

My research findings indicate that Bering Sea fisheries occur where juvenile salmon mature, directly impacting Yukon River salmon populations. Further, the research reflects that although Yukon salmon populations have plummeted, a recent effort was made to open the northern Bering Sea, which includes the Yukon River coastal shelf, to deep-sea commercial fishing.

By researching the relationship of policy to cultural salmon dependence, it becomes evident that Alaskan salmon-tribes are excluded from salmon management and decision-making. Legal research reflects that three basic federal Indian concepts – inherent rights, Indian Country, and tribal right of occupancy – emerge as potential foundations that may allow Alaskan salmon-tribes to begin sharing legal responsibility over salmon.

Yukon River salmon are an international and anadromous species that require multi-organizational management. My research reflects that current management favors the Bering Sea commercial fishing industry, despite data indicating Bering Sea fisheries impact Yukon salmon populations and an overall downward trend in Yukon salmon populations.

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**Researcher:** *Alexandrea Bowman*

**Presentation Title:** Using GIS Site Suitability Analysis to Study Adaptability and Evolution of Life: Locating Springs in Mantle Units of Ophiolites

**Research focus:** BioGeoChemistry and Computer modelling

**School:** University of Rhode Island

**Student Level:** Masters

**Presentation Type:** Poster Presentation

**Abstract:**

Using GIS Site Suitability Analysis to Study Adaptability and Evolution of Life: Locating Springs in Mantle Units of Ophiolites  
Alexandrea Bowman, University of Rhode Island

GIS is a powerful tool that can be used to locate springs sourced in ophiolites. The unique features associated with these springs include a reducing subsurface environment reacting at low temperatures producing high pH, Ca-rich formation fluids with high dissolved hydrogen and methane. Because of their unique chemical characteristics, these areas are often associated with microbes and are thought to be similar to the features that enabled life to evolve on Earth. Locating and sampling these springs could offer a deeper look into Earth's deep biosphere and the history of life on Earth. Springs have traditionally been located using expensive and time consuming field techniques. Field work can be dangerous. The goal of this study was to develop a model that could locate these unique geological features without first going into the field, thus

saving time, money and reducing the risks associated with remote field localities. A GIS site suitability analysis works by overlaying existing geo-referenced data into a computer program and adding the different data sets after assigning a numerical value to the important fields. For this project, I used surface and ground water maps, geologic maps, a soil map, and a fault map for four counties in Northern California. The model has demonstrated that it is possible to use this time of model and apply it to a complex geologic area to produce a usable field map for future field work.

## **UNDERGRADUATE LEVEL**

*Researcher: Deneen Cole*

**Presentation Title:** Characterization of Iron Deposition in Recombinant Heteropolymer Ferritins

**Research Focus:** Chemistry

**School:** SUNY Potsdam

**Presentation Type:** Poster Presentation

### **Abstract:**

Characterization of Iron Deposition in Recombinant Heteropolymer Ferritins

Deneen Cole, Dr. Fadi Bou-Abdallah, SUNY Potsdam (NY, USA), Dr. Paolo Arosio, University of Brescia (Italy), Dr. Sonia Levi, Vita-Salute San Raffaele University (Italy)

Ferritin is a ubiquitous iron storage and detoxification protein found highly conserved in species from bacteria to plants to humans. In mammals, ferritin is composed of two functionally and genetically distinct subunit types, H (heavy, ~21,000 Da) and L (light, ~19,000 Da) subunits which co-assemble in various ratios with tissue specific distribution to form a shell-like protein. The H-subunit is responsible for the fast conversion of Fe(II) to Fe(III) by dioxygen (or H<sub>2</sub>O<sub>2</sub>) whereas the L-subunit is thought to contribute to the nucleation of the iron core. In the present work, we investigated the iron oxidation and deposition mechanism in two recombinant heteropolymer ferritin samples of ~20H:4L (termed H/L) and ~22L:2H (termed L/H) ratios. Data indicates that iron oxidation occurs mainly on the H-subunit with a stoichiometry of 2Fe(II):1O<sub>2</sub>, suggesting formation of H<sub>2</sub>O<sub>2</sub>. The H/L sample completely regenerates its ferroxidase activity within a short period of time suggesting rapid movement of Fe(III) from the ferroxidase center to the cavity to form the mineral core, consistent with the role of L-chain in facilitating iron turn-over at the ferroxidase center of the H-subunit. In L/H, Fe(II) oxidation and mineralization appears to occur by two simultaneous pathways at all levels of iron additions: a ferroxidation pathway with a 2Fe(II)/1O<sub>2</sub> ratio and a mineralization pathway with a 4Fe(II)/1O<sub>2</sub> resulting in an average net stoichiometry of ~3Fe(II)/1O<sub>2</sub>.

These results illustrate how recombinant heteropolymer ferritins control iron and oxygen toxicity while providing a safe reservoir for reversible uptake and release of iron for use by the cell.

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*Researcher: Joaquin Ray Gallegos*

**Presentation Title:** An Assessment of Oral Health on the Pine Ridge Indian Reservation

**Research Focus:** Oral Health

**School:** University of Colorado Denver | Anschutz Medical Campus

**Presentation Type:** Poster and Oral Presentations

**Abstract:**

An Assessment of Oral Health on the Pine Ridge Indian Reservation

Joaquin R Gallegos, Terry Batliner, DDS, MBA, John T Brinton, MS, Dallas M Daniels, RDH, BS, Anne Wilson, DDS, MS, Maxine Janis, MPH, RDH, Kimberly E Lind, MPH, Deborah H Glueck, PhD, Judith Albino, PhD.

Centers for American Indian and Alaska Native Health, University of Colorado, Colorado School of Public Health

We assessed the oral health of the Pine Ridge Oglala Lakota people, described a new oral health assessment tool for Indigenous people, and suggested ways to improve Native oral health. The Check Up Study team of dentist and dental hygienists performed examinations of teeth and oral soft tissue for a convenience sample of 292 adults and children. Screening personnel counted the number of decayed, filled, sealed and total teeth, used probes to measure periodontal disease, and screened for oral lesions. Half of adults had 27 or fewer teeth. Sixteen percent of adults had at least one tooth with a pocket depth > 6mm. Participants had higher numbers of decayed teeth ( $p < 0.0001$ ), and lower numbers of filled teeth ( $p < 0.0001$ ) than those reflected in Indian Health Service cross-tribe aggregated data from 1999. Amongst Lakota people of Pine Ridge, our study documented a high prevalence of caries and periodontal disease, numerous people with missing teeth, and many unmet dental needs. Future studies of oral health related behaviors, and access to oral health care are needed to explain the dental, periodontal, and soft tissue problems that adversely affect the Oglala Lakota.

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**HIGH SCHOOL**

*Researcher: Wyatt Dunham*

**Presentation Title:** The Citrus Solution: Phase II

**Research Focus:** Utilizing citrus pectin and citrus peels as filtrates for heavy metal pollutants found in a Superfund Site and the effects on *Daphnia magna* before and after filtration.

**School:** Grove High School

**Presentation Type:** Poster Presentation

**Abstract:**

The purpose of this experiment was to test the effectiveness of composite filters made from citrus peels and citrus pectin along with charcoal and sand on removing heavy metal pollutants from the waters of Tar Creek. A toxicity test was also done before and after filtration using *Daphnia magna*. Charcoal and sand were used as filtrates to decrease the TDS and neutralize the

pH of the water after filtration. *Daphnia magna* were used as toxicity test before and after filtration.

It was hypothesized that the composite filters (citrus + sand + charcoal) will decrease the heavy metal concentration, neutralize the pH, and decrease the TDS after filtration. It was also hypothesized that a higher percentage of *Daphnia magna* will survive in the filtered water as compared to the unfiltered water.

Water samples were collected from four different sites at Tar Creek. Each water sample went through four different citrus filters plus one control (sand + charcoal). All the citrus filters decreased the heavy metal concentration after filtration. All of the filters neutralized the pH. The citrus peel filters for Site 4 were the only filters to have a pH of 7 after filtration. Only 25% of the citrus filters decreased the TDS after filtration, while 50% of the control filters decreased the TDS after filtration. A higher percentage of *Daphnia magna* survived after filtration. The orange peel had the overall highest survival of *Daphnia* after filtration. The correlation observed before and after filtration was cadmium was most toxic to *Daphnia magna*.

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**Researcher:** *Oletha Hope Gould*

**Presentation Title:** Insect Repellent Potential of Juniper Berry (Di'zad' - Navajo name) Essential Oil

**Research Focus:** Medicine and Health Science

**School:** Newcomb High School

**Presentation Type:** Poster Presentation

**Abstract:**

The Southwest shrub *Juniperus communis* (Juniper Berry) has many significant medicinal value in the Native American culture that has not been proven scientifically. One of the popular uses of Juniper berries aside from its detoxifying action is its potential to repel insects. This study focuses on the development of insect repellent from its essential oil obtained through steam distillation. 50 g of fresh berries was collected and dried for 5 days and is placed in a still tank with 100 mL of water for steam distillation using the Flinn Scientific Borosilicate Lab Kit. Gather the extracted oil and dilute 70% in three separate containers to be transferred into spray bottles. Testing involved the spraying of the dilute sample into a class jar with *Anopheles juidthae* (common NM mosquito) and compared this to the effect of a commercial insect repellent. After testing and comparing the result, the commercial insect repellent significantly showed that it is a better insect repellent compared to the *J. communis* diluted essential oil. However, the essential oil has also an insect repellent potential.