

# Inquiry: The University of Arkansas Undergraduate Research Journal

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Fall 2023

## Inquiry: The University of Arkansas Undergraduate Research Journal - Volume 22 Issue 2 - Fall 2023

Inquiry Editors

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## ***Editor's Note***

Happy New Year, 2024! Welcome to the new issue [volume 22 (2)] of the *Inquiry Journal*. At the outset, we would like to thank Dr. Margaret Sova McCabe, Vice Chancellor of the Division of Research & Innovation (DRI) for her unflinching support to the Office of Undergraduate Research (OUR) in all its endeavors to improve the quality of undergraduate research on this campus. We would also like to express gratitude to Dr. Cynthia Sides, Assistant Vice Chancellor of DRI, and her staff for their relentless behind the scenes efforts to support the multitude of activities undertaken by OUR, including the publication of the *Inquiry Journal*. More importantly, I would like to welcome our new Undergraduate Research Coordinator, Amy Epps, aboard! She already has made significant contributions in bringing this issue of the *Inquiry Journal* about.

The Office of Scholarly Communications, University Libraries, kindly shared with us the current visibility of the articles published in the *Inquiry Journal* from Jan-May 2023. We are pleased to share with the readers the statistics of the viewership of articles published in the *Inquiry Journal* worldwide. In this context, we would like to congratulate both the undergraduate students and their faculty mentors for considering this journal as an avenue to publish their research. Given the impact, we urge the faculty on this campus to seriously consider publishing their best research in the *Inquiry Journal*. The *Inquiry Journal* is published in the digital repository ScholarWorks@UARK and is amenable to citation in research articles published in other research repositories. In this context, we would like to personally thank the faculty who had generously allocated their precious time to peer review research papers published in the *Inquiry Journal*. We believe that the academic rigor afforded via the peer-review process is one of the main reasons for the reliability and current high worldwide visibility of the journal. This issue features a research paper published by two undergraduate students, Suraj Kolluru and Kelli Ludwig. Suraj's undergraduate research paper reports a novel protein expression tag, RUBY-RUBY, for the overexpression of Anginex, a protein that is known to play a major role in the inhibition of tumor metastases. It is believed that that the RUBY-RUBY tag is likely to help in overcoming a major hurdle in the overexpression of biomedically relevant recombinant proteins. Kelli, in her undergraduate work entitled "Pop Goes the Weasel – How Greed and a Good Barbecue Hoodwinked a Small Town", narrates how some oil companies in Arkansas and its investors in Eureka Springs, AR, were presumably out to "fleece" the citizens located in the vicinity of these oil companies. We would like to congratulate both Suraj and Kelli for their excellent and thought-provoking undergraduate research. OUR has funded the research of 12 non-honors undergraduate students in this past academic year. We hope to continue funding the research of the bright and motivated non-honors undergraduate students on this campus.

We thank Ms. Sophia Nourani, our undergraduate student worker, who has tirelessly strived hard to interview the faculty who have shown their interest to provide opportunities to undergraduate students to get involved with their high-quality research. This issue highlights two such outstanding faculty members, Drs. Jennifer Webb and Laurence Hare, who have a wonderful track record of working with undergraduate students. We salute these faculty members for their commitment to support high quality undergraduate research on this campus.

Our special thanks also go to Dr. Suzanne McCray, Vice Provost, Office of Nationally Competitive Awards (ONCA) and Dr. Chelsea Hodge, Director of Grants and Research Innovation, for her constant support and encouragement in the publication of the *Inquiry Journal*. Our sincere thanks to Dr. Chelsea Hodge for her help with the information published in the Honors Corner. We also want to extend our deepest gratitude for Mae Switzer from Digital Commons for helping us

navigate ScholarWorks. This issue of the *Inquiry Journal* could not have been published without her diligent help and contributions. We hope to highlight additional new features in the forthcoming issues of the *Inquiry Journal*. So, please stay tuned!

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## *Faculty Highlights*

### **Dr. Jennifer Webb**

Dr. Jennifer Webb is an associate professor at the University of Arkansas as well as a professional interior designer. She earned her first two degrees at the University of Tennessee, Knoxville, and her Ph.D. at Oklahoma State University in Stillwater. Dr. Webb started at the University of Arkansas in 1999 and teaches third-year design studios in the Fay Jones School of Architecture and Design.

Dr. Webb initiated research on anticipated living environments for Arkansas residents and this investigation provided the pilot data for the Arkansas Health and Housing Survey (2006). She was recognized with the Joel Polsky Prize for contributions to the interior design profession for her work on *Just Below the Line: Disability, Housing, and Equity in the South* (Fayetteville: University of Arkansas Press, 2010). Dr. Webb has also made contributions to the *Universal Design Handbook* (McGraw Hill, 2010), a textbook on inclusive design (*Diversity and Design: Understanding the Hidden Consequences*, Routledge, 2015), and has a book on aesthetics and social justice underway.

Dr. Webb described her approach to interior design as an analysis of the things that people do, whether it's work, living or play. She emphasized that the environments we create must support those activities.



“It's not just that it looks good, right? It's got to work. And it's got to solve problems,” Dr. Webb said. “Depending on the space, we can raise blood pressure, we can encourage people to walk or drink more water, or we can help students focus on their test more effectively.” Dr. Webb's current research focuses on environments and spaces for people of all abilities.

In terms of undergraduate research at U of A, Dr. Webb stressed how special it is to have a research program at the Fay Jones school and how not many design schools provide such an opportunity.

“Students show up with their own unique idea and we completely empower them to investigate that idea,” Dr. Webb stated. “I hope that from the student perspective, that they find it empowering. For example, one student investigated campus auditoriums and the

impact of acoustics on students and faculty who have hearing loss. This project is now funded by a Women's Giving Circle Grant and these research outcomes will be shared across campus to improve U of A learning environments. Another student examined design interventions that support children with ADHD and there are plans to pursue a book publication.

In Dr. Webb's free time she loves to garden, cook, and has also recently picked up electric biking.

### **Dr. Laurence Hare**

Dr. J. Laurence Hare is an associate professor of history and was recently appointed Executive Director of Undergraduate Excellence and Global Engagement in the Fulbright College of Arts and Sciences at the University of Arkansas. In his present position, he oversees the Honors Program in Fulbright College and promotes global and experiential learning for undergraduate students. Dr. Hare is originally from Chattanooga, Tennessee. He completed his Ph.D. work in history at the University of North Carolina in Chapel Hill before coming to the University of Arkansas as an assistant professor in 2010. Dr. Hare teaches courses in modern European history with a specialization in German and Scandinavian culture. Additionally, he also instructs introductory courses in international and global studies as well as European integration.

Dr. Hare is the author of *Excavating Nations: Archaeology, Museums, and the German-Danish Borderlands*, published by the University of Toronto Press. He is also the co-author of *Essential Skills for Historians: A Practical Guide to Researching the Past*, which is geared toward helping undergraduate students navigate their own independent research projects. In addition to describing how to conceptualize and design a project, the book includes an examination of history as both a discipline and professional career. Currently, he is in the process of completing his third book, *The Discovery of the North: Scandinavia and the Making of Modern Germany*. His research focuses on the German fascination with Scandinavia, particularly Nordic myths and the Vikings. His publication also focuses on the origins of nationalism and white supremacy in those regions.





“In our field, students have to create their own projects in a lot of ways,” Dr. Hare explained. “So, what I try to do is create groups where we can interact and collaborate with one another when possible.”

Dr. Hare stressed the benefits of faculty mentorship while participating in research as an undergraduate, adding that it can help direct student’s career goals and aspirations.

“Research projects provide an opportunity to be part of the university’s mission to create new knowledge by applying what you've learned so far as a student on campus,” Dr. Hare added.

In his free time, Dr. Hare enjoys hiking and playing the bass guitar.



## ***Research Articles***

### **Purification of Anginex: An Inhibitor of Tumor Metastasis using RdRd tag**

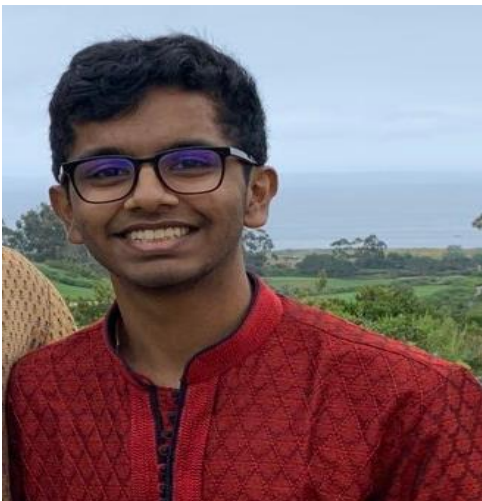
Suraj Kolluru, Patience Salvalina Okoto, Zeina Alraawi, Thallapuram Krishnaswamy Suresh Kumar

*J. William Fulbright College of Arts and Sciences, University of Arkansas, Chemistry and Biochemistry Department, Fayetteville, AR 72701*

#### **Abstract**

Anginex is a cytokine-like  $\beta$ -sheet forming peptide of 33 amino acids with potent anti-angiogenic activity. Anginex is essential in inhibiting abnormal processes caused by angiogenesis, such as tumor growth and blood vessel formation. However, Anginex has limitations, including poor stability, short half-life, complicated synthesis, and low purity. Rubredoxin dimer (RdRd) is used as a protein tag to improve stability and detection of Anginex during purification for the first time. A plasmid was designed to contain the RdRd-Anginex fusion protein. RdRd-Anginex plasmid was transformed and expressed in *E. coli* BL21star cells. The results show RdRd-Anginex has been purified using a Nickel Sepharose column. Enterokinase, a proteolytic enzyme, was then used to cleave between the RdRd from Anginex. The cleaved sample was placed on a Nickel Sepharose column where the Anginex sample was eluted.

## Profiles of the Authors



Suraj Kolluru graduated from the University of Arkansas in 2022, where he obtained a degree in Biochemistry from the Fulbright College of Arts & Sciences.



Dr. Patience Salvalina Okoto. Research Associate at Arkansas Integrative Metabolic Research Center. She is interested in metabolic studies, protein structure and dynamic and protein purification.



Dr. Thallapuram is a professor of Chemistry & Biochemistry with significant interest in design of novel fibroblast growth factor (FGF)-based rational design of therapeutic principles for chronic wound care, anti-diabetes, anti-obesity, and osteoporosis. His research is supported by several Federal grants (NIH/DOE/NSF/USDA). He currently serves as the NIH sponsored AIMRC Bioenergetics core. He also currently serves as the Director of the Office of Undergraduate Research (in DRI). He has published about 10 US patents and 175 peer-reviewed research papers in high impact Journals. He is the recipient of several teaching, research, and service awards including the Honors College Distinguished Faculty award, Honors College Faculty Gold medal, Collis Geren Outstanding Interdisciplinary Graduate Faculty award, elected as the member of the National Academy of Inventors, ARSC Master Teacher award. Golden Tusk Award, and the prestigious Nadine Baum Award for outstanding teaching. He is also the member of the University of Arkansas Teaching Academy. Dr. Thallapuram also regularly serves on the grant proposal review panel of Federal agencies such as NIH, NSF, and DOE. He currently serves as the Associate Editor of the *Frontiers of Molecular Biophysics* journal and on the Editorial Board of several peer-reviewed journals including the prestigious *Journal of Biological Chemistry*.



Dr. Zeina Alraawi is a postdoc at Chemistry and Biochemistry department/Arkansas university. She is interested in analysis the cell signaling of cytokines, protein therapeutics, utilizing biophysical techniques in structural protein analysis.

## Introduction

Angiogenesis is the formation of blood vessels from the existing vasculature. It involves the migration, growth, and differentiation of endothelial cell. It is essential for delivering oxygen to various tissues throughout the body. Although it is pivotal to human function, it can potentially lead to abnormal processes like tumor metastasis, arthritis, retinoids, and diabetic retinopathy [1]. Anginex is a cytokine-like  $\beta$ -sheet forming peptide 33 amino acids peptide with potent anti-angiogenic activity [2]. The search for angiogenic inhibitors has centered on controlling two processes that promote angiogenesis: 1) endothelial cell (EC) growth and 2) adhesion. EC is more accessible to pharmacological agents delivered via the blood than other cells. EC is also genetically stable and is not easily mutated into drug-resistant variants [1].

Anginex has been designed by utilizing basic folding principles and incorporating short sequences from  $\beta$ -sheet domains of anti-angiogenic agents: platelet factor-4, interleukin-8, and bactericidal-permeability increasing protein (BPI) [3]. Recent studies have indicated that Anginex might be utilized in gene therapy and radiation procedures to inhibit tumor growth [2,4]. Anginex has an amphiphilic and tetramer conformation. Anginex binds to the endothelial cell (EC) membrane and disrupts lipid bilayers through micellization and pore formation [5,6].

Anginex has been shown to help enhance the inhibitory effects of chemotherapy, and radiotherapy, and it has been shown that Anginex, with a suboptimal dose of radiation, can cause tumors to regress to an impalpable state [7]. Recombinant proteins were first synthesized in 1982 when recombinant human insulin became the first medication through recombinant DNA technology.

Recombinant proteins are expressed in a heterogeneous host to synthesize various drugs and conduct research [8]. However, there are many limitations which include low expression yields, difficult localization of the desired protein, and inclusion body formation. Inclusion bodies are misfolded proteins that are functionally inactive and insoluble. Many isolated proteins must be maintained at a specific pH and temperature to keep structure and functionality. If not placed in the appropriate environment, protein

aggregation may result [2,8,9].

Rubredoxin is a class of iron-containing metalloprotein with 80 acids, has 7KDa molecular weight, and is highly thermostable. It is characterized by having 4 conserved cysteine residues that coordinate an iron atom through the sulfur atom of the oxxCzthiol side chain [10]. Rubredoxin improves the efficiency of the expression and purification process by providing stability and easy visualization of the target protein due to its red color. The limitations of Anginex purification include poor stability, short half-life, complicated synthesis, and low purity. In this context, Rubredoxin dimer was used as a protein tag to enhance the purification of Anginex [10,11].

In our research, we used (RdRd) as a protein tag to purify Anginex. We aimed to utilize RdRd as a tag for Anginex to improve its stability, increase its half-life, and purify it with fewer contaminations. Moreover, Anginex might be used in pharmaceutical manufacturing.

## Methods

A pET 22b vector encoding for expression of recombinant RdRd-Anginex fusion protein was transformed into BL21\* (DE3) *E. coli* cell. Transformation was performed by adding 3 ml of plasmid to 100 ml of BL21\* (DE3) component cells in an Eppendorf tube. The solution was placed on ice for 30 minutes and transferred to 42°C for 45 seconds to heat shock the bacteria cells, allowing entry of the plasmid into the host cell. The solution was placed back on ice for 3 minutes. 800 mL Lysogeny broth (LB) media was added to the mixture for incubation on a New Brunswick Science Innova 4330 Refrigerated Incubator shaker at 37°C for 45 min at 225-250 rpm. Using a sterile spreader, 100 mL of the solution was spread on three LB agar plates with ampicillin. Once spread, the LB agar plates were placed upside down in an incubator for 12-16 hours.

Small scale expression: After incubation, a single colony of bacteria was transferred to 10 mL of sterile LB media with 10 mL of 100 mg/mL ampicillin where it grew for 12-16 hours in the New Brunswick Science Innova 4330 Incubator shaker at 37°C. 10 mL of sterile LB media was inoculated with 500 µL overnight culture and 10

mg/mL ampicillin. The unused overnight culture was placed in the -80°C freezer. The overnight culture was placed in the same refrigerated shaker for 1 to 1.5 hours. The optical density (OD) was determined by taking a 1 mL aliquot of the culture and measuring the absorbance at 600 nm using a UV-Vis Spectrophotometer. Once the desired OD of the culture reached (0.6 - 0.8.), 9 µL of 1M isopropyl β-D-1-thiogalactopyranoside (IPTG) was added to the culture and incubated in the same refrigerated incubator for 3.5 hours.. After the culture was incubated, it was centrifuged in a Thermo Scientific Sorvall Lynx 6000 centrifuge at 4500 rpm at 4°C for 15 minutes. The supernatant was separated from the pellet. The cell pellet was resuspended in buffer and sonicated in 10 second intervals using a Branson Sonicator 150 for 3 minutes. The sonicated cells were centrifuged in a Thermo Scientific Sorvall Legend Micro 21 Microcentrifuge at 13,000 rpm for 5 minutes. Samples from pre- and post-induction with IPTG were taken for the supernatant and pellet. The samples were prepared on a 15% sodium dodecyl sulfate polyacrylamide gel electrophoresis analysis to verify the presence of RdRd-Anginex. The SDS-PAGE gel should demonstrate a molecular weight around 17 kDa to verify the presence of RdRd-Anginex. Glycerol stocks were prepared by adding 3.5 mL of autoclaved 60% glycerol solution containing a bacteria culture to a falcon tube. 1 mL aliquots of the solution were placed in Eppendorf tubes and stored in an -80°C freezer.

Expression was performed with one 1L Erlenmeyer flask and four 2L Erlenmeyer flasks. 5g of LB media and 200 mL of DI water were added to the 1L flask, while 12.5g of LB media and 500 mL of DI water was added to each 2L flask. The flasks were autoclaved in a Thermo Scientific SG-120 Autoclave Sterilizer for 45 minutes at 121°C and 15 psi. After the flasks cooled down, two RdRd-Anginex glycerol stocks and 200mL of 100 mg/mL ampicillin were inoculated in 1L flask. The inoculated culture in the 1L flask was placed in the New Brunswick Scientifics Innova 4330 refrigerated incubator shaker where it was incubated 37°C for 14-16 hours. After incubating, 30 mL of the overnight culture was added into each of the four 2L flasks with 500 mL of Ampicillin. The four flasks were placed on the incubated shaker for 3.5 to 4 hours until the optical density (OD) reaches 0.6 to 0.8. Isopropyl-b-D-galactosidase, IPTG, was added before incubation to allow for cell



growth. The culture was transferred into centrifuge tubes and centrifuged at 6000 rpm for 25 minutes at 4°C in a Thermo Scientific Sorvall Lynx 6000 centrifuge with a JA-10 rotor. The supernatant from each of the centrifuge tubes was discarded. The pellets formed were suspended in 10-12 mL of 10 mM Phosphate buffer. The mixture was transferred to falcon tubes, which were centrifuged once again. The falcon tubes were centrifuged under the same parameters as before. After centrifuging, the supernatant was discarded and stored in the -20°C freezer until needed.

For purification, the pellets were sonicated in 35-40 mL of 10 mM Phosphate Buffer using a Scientific Industries Vortex-Genie 1 Touch Mixer and Branson Sonifier 150. Purification of RdRd-Anginex was accomplished through the Immobilized Metal Affinity Chromatography (IMAC) method using a Nickel-Sepharose column. The column was pre-equilibrated with deionized water and 10 mM Phosphate buffer before loading the sample. The recombinant RdRd-Anginex contains a 6 residue N-terminal histidine tag, which has a high affinity to the  $\text{Ni}^{2+}$  resin in the column. The supernatant was loaded onto the column at a 0.5 mL/min rate, and a Bio-Rad UV-Vis detector was used to monitor protein at 280 nm. RdRd-Anginex binding to the  $\text{Ni}^{2+}$  resin was apparent by the red and purple color in the column. Once all the supernatant has been loaded, 10 mM Phosphate Buffer was passed through the column at 1.5 mL/min until the absorbance baselines.  $\text{Ni}^{2+}$  resin was eluted with increasing concentrations of imidazole (20 mM, 50 mM, 100 mM, 250 mM, and 500 mM) to remove non-specific binding proteins and elute RdRd-Anginex.

**Enterokinase Cleavage of RdRd-Anginex:** Enterokinase is a proteolytic enzyme employed to cleave affinity tagged recombinant proteins. Enterokinase is produced by the cells of the duodenum in the small intestine and is involved in human digestion. It plays a role in activating trypsinogen to trypsin. Through activating the trypsinogen, it indirectly activates pancreatic digestive enzymes. Enterokinase cleaves peptides/proteins on the carboxyl side of lysine after lysine and the site-specific cleavage sequence is Asp-Asp-Asp-Lys. In this experiment, enterokinase was used to cleave the RdRd tag from the Anginex protein through breaking the peptide bond between alanine and aspartate as shown in Figure 1. In the figure, the cleavage site

is indicated by “||.” The red colored text represents the RdRd tag while the black colored text represents the Anginex protein (Figure 1).

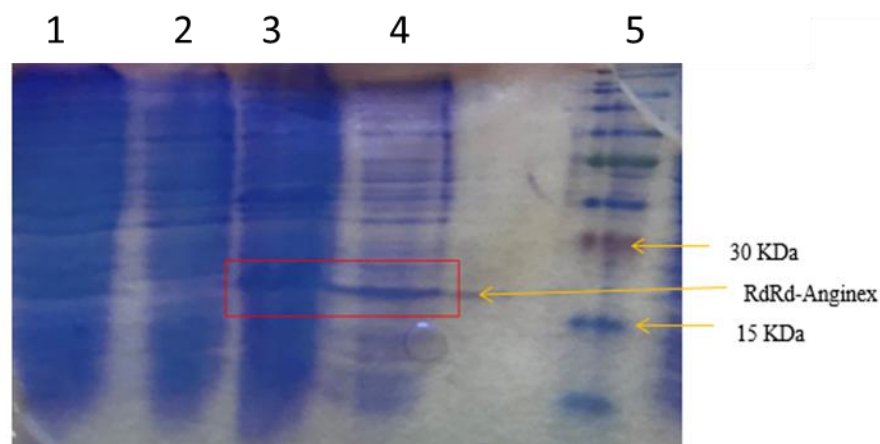
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KLED || ANIKLSVQMKLFRHLKWKIIVKLN DGRELSLD**

**Figure 1:** Sequence of Cleaved RdRd -Anginex: amino acids in red color represent the RdRd tag and the amino acids in black color represent the Anginex.

## Results

### Small scale expression of RdRd-Anginex

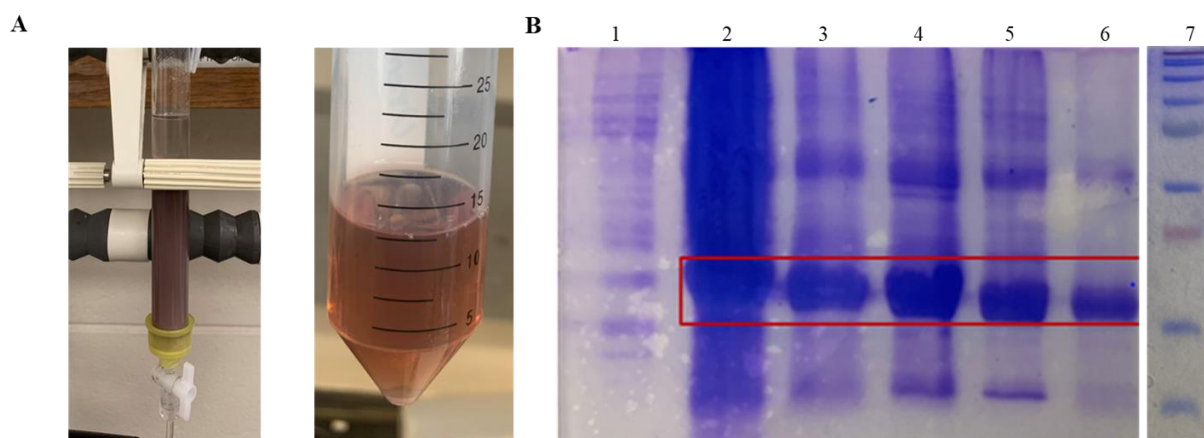
To express RdRd-Anginex on a larger scale, the plasmid was transformed into *E. coli* strain BL21\* (DE3). With a successful transformation, colonies were picked and expressed on a small scale. The harvested cells were sonicated, and samples were run on an SDS-PAGE to verify the molecular weight. The supernatant shows the expression of RdRd-Anginex (Figure 2).



**Figure 2:** SDS-PAGE of small-scale expression of RdRd-Anginex: Lane 1, Pellet; Lane 2, Uninduced; Lane 3- 4, Supernatant of RdRd-Anginex; Lane-5, Protein ladder

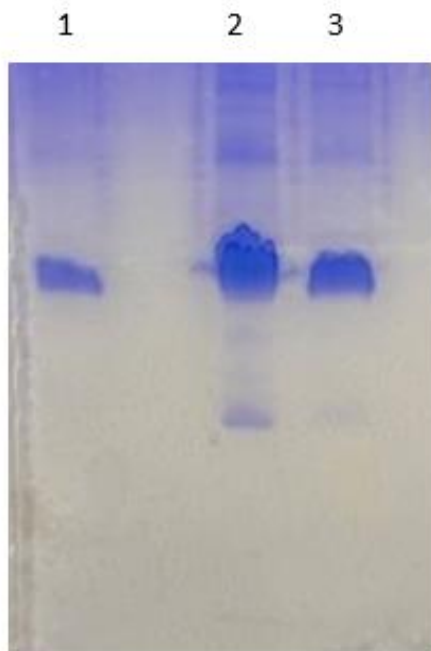
### Purification of RdRd-Anginex on Nickel Affinity Chromatography

RdRd-Anginex was purified using Nickel-Affinity Chromatography. The SDS-PAGE analysis shown in (Figure 3) illustrates that RdRd-Anginex elutes in the 50 mM Imidazole, 100 mM Imidazole, 250 mM Imidazole, 500 mM Imidazole, and Urea fractions as shown in lanes 2 to 6. The bands that are highlighted in lanes 2 to 6 indicate the presence of RdRd-Anginex at a molecular weight around 17 kDa. RdRd-Anginex is significantly eluted in the 100 mM Imidazole fraction due to it having the largest band in lane 4. However, in all lanes, there was evidence of higher and lower molecular weight contaminants (37KDa and 6KDa) present.



**Figure 3:** Purification of RdRd-Anginex from Nickel Sepharose chromatography. Panel A: RdRd-Anginex on Nickel Sepharose column, Panel B: Fractions eluted from purification of RdRd-Anginex on Nickel Sepharose. Lane-1, Flow through; Lane-2, 20Mm imidazole; Lane-3, 50mM imidazole; Lane-4, 100mM imidazole; Lane-5, 250mM imidazole; Lane-6, 500Mm imidazole; Lane-7, protein ladder.

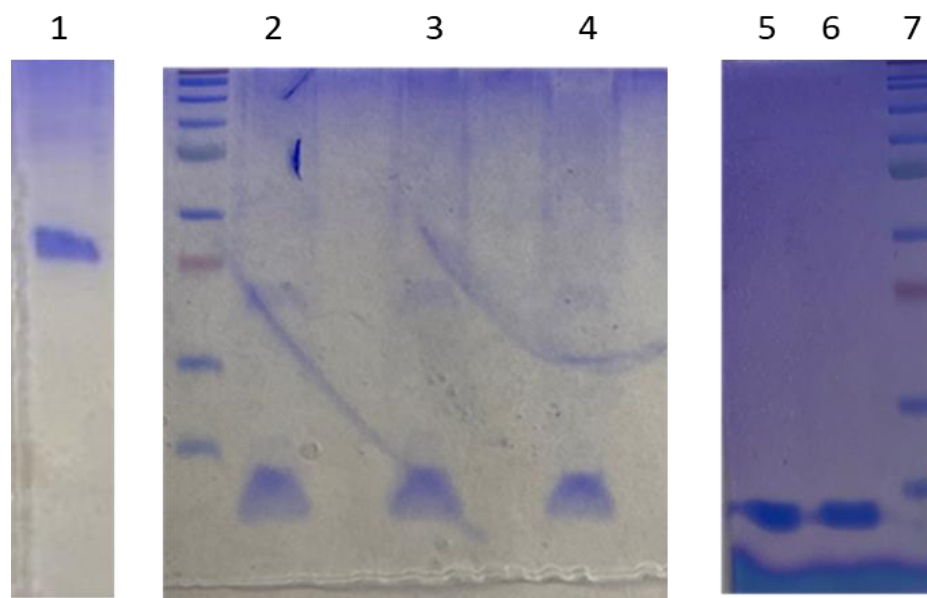
To obtain pure RdRd-Anginex protein, the flowthrough from each imidazole fraction was subjected to a buffer exchange using ultrafiltration. RdRd-Anginex following buffer exchange resulted in approximately 90% purity level for the 500mM imidazole fraction (Figure 4).



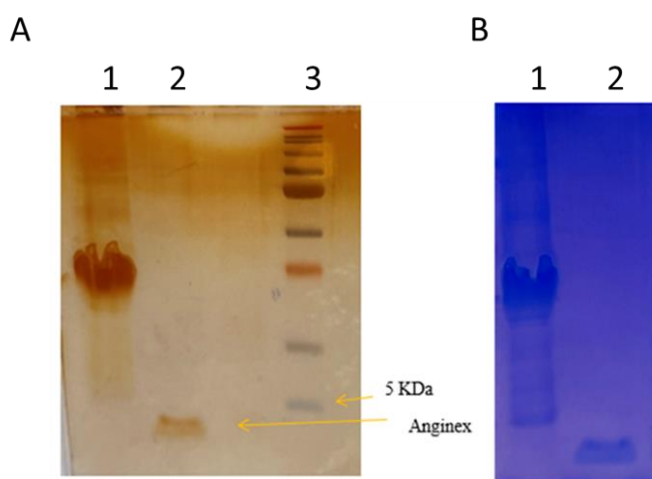
**Figure 4:** SDS-PAGE analysis after ultrafiltration of RdRd-Anginex: Lane 1, Buffer exchanged 500mM imidazole fraction; Lane 2, Buffer exchanged 100mM imidazole fraction; Lane 3, Buffer exchanged 250mM imidazole fraction.

### Enterokinase Cleavage

Typically, after the complete cleavage of a protein, two bands are observed on an SDS-PAGE; the target protein and the tag used. In the case of RdRd-Anginex, one protein band is observed after complete cleavage (Figure 5). Anginex, the target protein is 4KDa, and RdRd from previous work shows that it moves as approximately 5KDa on an SDS-PAGE. The one band observed on the gel might be Anginex and RdRd moving at the same molecular weight. MALDI-TOF MS on the cleavage products indicates the presence of both target proteins, Anginex and RdRd. The Silver stain was also employed to visualize the Anginex protein band (Figure 6). The results show that Anginex protein band appears as expected on an SDS-PAGE (Figure 6). Upon expressing RdRd-Anginex in 1 L of media, a yield of 2mg of Anginex protein was obtained.



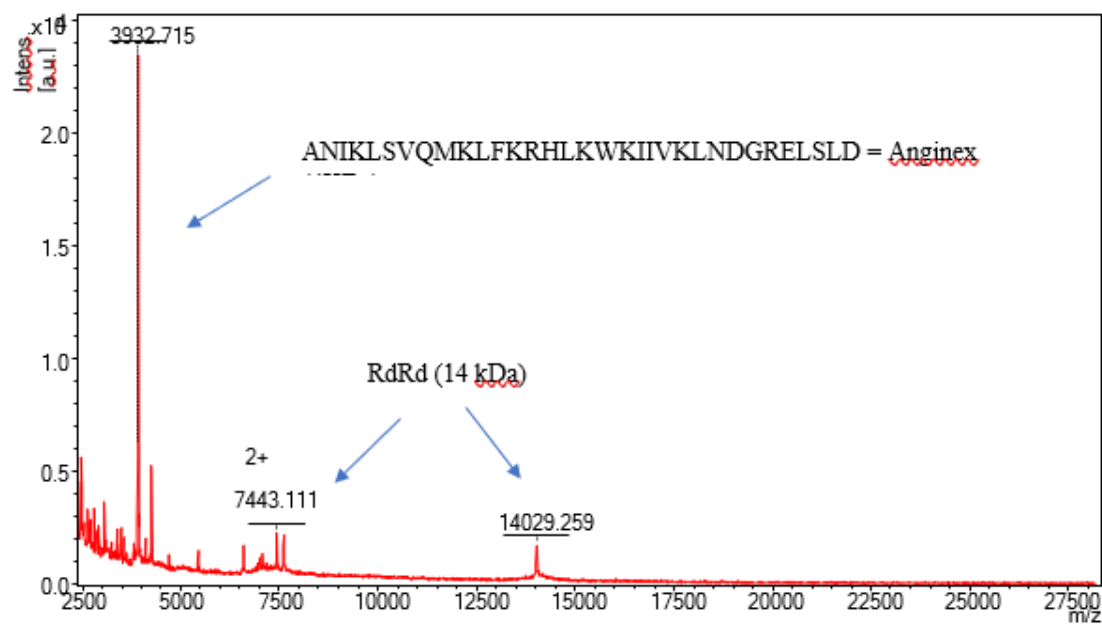
**Figure 5:** Cleavage of RdRd-Anginex. Lane 1, Buffer exchanged of 500mM imidazole fraction. Lane 2, Cleavage product; Lane 3, Anginex; Lane 4; RdRd; Lane 5-6, Buffer Exchanged Anginex; Lane 7, Protein ladder.



**Figure 6:** SDS-PAGE analysis gel of eluted Anginex: Panel A: Silver stain Panel B: Coomassie Blue Stain Lane 1, RdRd-Anginex; lane 2, Anginex; lane 3, protein ladder.

### Mass Spectroscopy of RdRd-Anginex

Due to the anomalous mobility of the RdRd-Anginex cleavage product on SDS-PAGE, the protein was analyzed using Matrix-assisted laser desorption-ionization time of flight mass spectrometry (MALDI-TOF MS) to confirm the molecular weight. MALDI-TOF MS is an analytical technique in which particles are ionized, separated according to their mass-to-charge ratio, and measured by determining the time it takes for the ions to travel to a detector at the end of a time-of-flight tube. (12) RdRd's molecular was confirmed to be approximately 14KDa and Anginex to be (4KDa) (Figure 7).



**Figure 7:** Mass Spectroscopy Spectrum of Cleaved RdRd-Anginex shows the molecular weight of Anginex and the molecular weight of RdRd

### Conclusion

In summary, recombinant Anginex with Rubredoxin tag was expressed and purified efficiently. The purification of RdRd-Anginex using affinity chromatography allows for easy visualization during and after the purification process due to the red color of RdRd. Also, the RdRd tag on Anginex allowed higher stability and expression of Anginex throughout the large-scale expression and purification process. Enterokinase was found to cleave RdRd and Anginex

effectively after about 48 to 60 hours without degradation. Future studies will reveal the anti-angiogenic activity of this recombinant Anginex.

### Acknowledgment

This work was supported by the Department of Energy (DE-FG02-01ER15161), the National Institute of General Medical Sciences of the National Institutes of Health (P20GM139768), the Arkansas Integrative Metabolic Research Center at the University of Arkansas, and the University of Arkansas Honors College for financial support. T.K.S.K. is the Mildred-Cooper Chair of Bioinformatics and would like to acknowledge this endowment grant gratefully.

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**Pop Goes the Weasel:  
How Greed and a Good Barbecue Hoodwinked a Small Town**

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**Abstract**

On October 4, 1921, Sure Pop Oil Company held a barbecue to celebrate the newly built oil derrick and attract new investors in Eureka Springs, Arkansas. The Eureka Springs Historical Museum has photos from the celebration. Local lore suggests that the oil company owners were "confidence men" who were out to "fleece" the citizens of Eureka Springs. A clearer picture of the Sure Pop Oil Company and its president can be attained by studying newspaper articles and census records. Start with the zeal after the discovery of oil in El Dorado, Arkansas, coupled with the lack of federal and state legislation protecting investors, and throw in a dash of human greed, and you have a recipe for disaster.

Keywords: Arkansas history, Arkansas oil speculation, Eureka Springs history, Eureka Springs, Arkansas

On October 4, 1921, over 2,500 people attended a barbecue picnic in Eureka Springs, Arkansas, to celebrate drilling a widely rumored oil reserve underneath the town, perched on the edges of the Salem and Springfield Plateaus. The Sure-Pop Oil Company hosted the picnic, and C. H. Harrison and Fred Thompson were in attendance to represent Sure-Pop. Ironically, Sure-Pop was to conduct the drilling and sampling on the land of Claude A. Fuller, an attorney and the Eureka Springs mayor. The real purpose of the picnic was to sell shares. On July 31, 1922, the oil derrick and drilling rig burnt to the ground, and Mr. Harrison left town to obtain a new rig in Dallas, Texas. He was never to return. Sure-Pop had no insurance to cover the loss. Eventually, the local Sure-Pop offices closed and released the employees. No investor recouped their investment. Various historical and political forces would intersect to create this small-town drama that foretold the Wall Street market crash. Perhaps the situation could have been avoided if the Securities Act of 1933 had been in place. While the intention to commit fraud by the president and officers of Sure-Pop Oil Company cannot be proven, the failure to find oil and have a return on their investment negatively impacted Eureka Springs at a time when it was already in economic and population decline due to World War I.

The late teens and early 20s were a time when many Americans were keen to invest. According to *Easy Money: Oil Promoters and Investors in the Jazz Age*, economic and cultural reasons created a national drive to get rich. First, post-war prosperity was caused by the United States diverting manufacturing and agriculture to the war effort. Additionally, the government had a strict ration program that prevented purchasing items for the home, like furniture and paint. Herbert Hoover restricted shoe and hat styles in addition to meat and flour rationing. Many consumers were saving money that they might have used for discretionary spending. The government allowed price inflation in goods and agricultural products. Despite this, most Americans had a feeling of optimism after the war. Another interesting phenomenon was that, for the first time, there was a concerted national effort through newspapers to market Liberty Bonds. The Liberty Bond campaign was the first time many rural or small-town dwellers could purchase an investment vehicle like a bond. Also, because of newspapers, advertisers could market goods through newspaper ads and investments. The only ones feeling a pinch during the war were those on fixed incomes, government workers, and farmers. While the price of agricultural commodities went up during the war, afterward, the prices plummeted, causing financial strain for farmers. Additionally, the price of land did not go up proportionately.

According to *Easy Money*,

“swarms of itinerant stock salesman rode the trains and drove the dusty rural roads of America to gather in the dollars of new investors. They accepted any purchase however, small. . . These stock peddlers were always ready to cultivate small investors. More reputable brokerage houses also dealt directly with the new crop of investors, sending them newsletters, tip sheets, telegrams, and promotional letters and following up with phone calls. Brokerage firms as well as individual promoters often selected certain groups for ventures. . . Farmer, factory workers, clergymen, and unmarried women were favorite targets.”<sup>1</sup>

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<sup>1</sup> Roger Olien and Diana Hinton, *Easy Money: Oil Promoters and Investors in the Jazz Age*, electronic (Chapel Hill, NC: University of North Carolina Press, 1990), 24.

Since the end of the Civil War, Eureka Springs had been a respite for the unwell. Many doctors recommended taking the cure at Eureka Springs, and many hospitals, spas, and resorts catered to the needs of medical tourists. It would also find itself the home to many retirees and widowed women on restricted income. With travel restricted because of the war, Eureka Springs found its prosperity waning while the rest of the country was experiencing a surfeit. This economic downturn, coupled with increased marketing pressure, may have been the catalyst that allowed Sure-Pop Oil Co. promoters to take advantage of this pool of small investors.

1921 kicked off the Arkansas oil boom when Bruce Hunt discovered oil one mile southwest of El Dorado.<sup>2</sup> By June of that year, Arkansas produced 908,000 barrels of oil. According to the February 3, 1921, *Eureka Springs Flashlight* headline "Oil Making Millionaires: Gusher Turns to Gold Flood."<sup>3</sup> The story details how three men made money on the first well in El Dorado; Dr. Samuel Busey, a medical doctor and geologist, partnered with David Armstrong, a farmer who believed his land contained oil, and Wang Hing, a "Chinese laundryman," invested in the oil operation.

Interestingly, a secondary market for land leases started. The same article stated, "Lease-traders gather at the Confederate monument in town every day for their 'curb-market' . . . A merchant made \$1,500,000 through trade leases."<sup>4</sup> Although legislators took a special train from Little Rock to inspect the well, there is little evidence of concern over the rapid inflation occurring. In an additional article from February 23, the *Flashlight* states, "Oil at El Dorado Puts Arkansas where She Belongs."<sup>5</sup> Although disparaging the greed and insecurity of oil speculation, the article talks about the oil speculators and townspeople making money in El Dorado, whetting the appetite of a town already used to speculation and oil of a different variety, snake oil.

As early as 1917, the *Flashlight* wrote that a Major F. A. Porter had purchased 200 acres of land outside of Eureka Springs, believing he would find oil, and had developed plans to begin exploration. The paper stated that if oil flowed in Eureka like the water, then "there will be such a boom, that the boom of 1879 will seem as nothing."<sup>6</sup> In 1919, an F. Prudom, a real estate investor, developer, and hotel owner, boasted, "I don't think there is oil here. I know there is oil here."<sup>7</sup> The real estate boom of Eureka was twenty years prior, and many Eurekaans were looking for the city to "blossom again like a rose."<sup>8</sup>

While oil companies discovered black gold in Arkansas, a man from Waco, Texas, started drilling for oil in Burkburnett, Texas. His name was Charles Homer (C. H.) Harrison (early census records show Harrison going by Homer while draft registrations show him as Charles Homer Harrison). The oil company he founded was called Sure-Pop Oil Company. A partner in his company was George Frederick Thompson, also of Waco. Harrison was the son of John Franklin Harrison, owner of a Dallas construction company, and had a brother in the oil business. On February 9, 1919, in the Corpus Christi Caller, an advertisement appeared for Sure-Pop Oil

<sup>2</sup> Emon Mahony, "THE DISCOVERY OF OIL IN EL DORADO, ARKANSAS," *El Dorado News-Times*, January 10, 2021, <https://www.eldoradonews.com/news/2021/jan/10/discovery-oil-el-dorado-arkansas/>.

<sup>3</sup> S.A. Diehl, ed., "Oil Making Millionaires; Gusher Turns to Gold Flood," *Eureka Springs Flashlight*, February 3, 1921, 7.

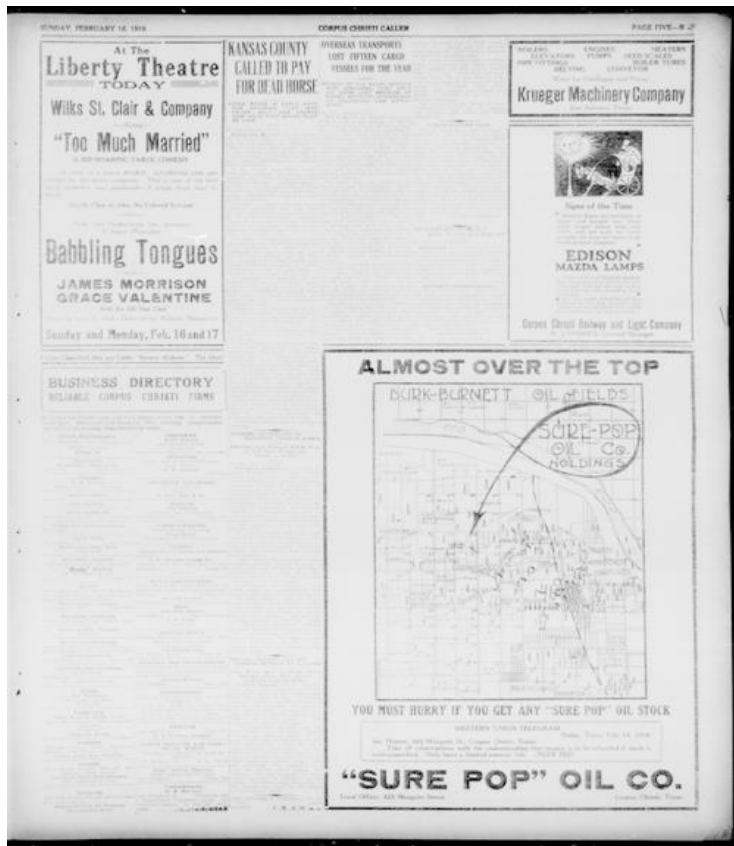
<sup>4</sup> Diehl, ed., "Oil," 7.

<sup>5</sup> S.A. Diehl, ed., "Oil at El Dorado Puts Arkansas Where She Belongs," *Eureka Springs Flashlight*, February 24, 1921.

<sup>6</sup> S.A. Diehl, ed., "Good Things in Store for Eureka Springs," *Eureka Springs Flashlight*, January 25, 1917.

<sup>7</sup> S.A. Diehl, ed., "F. Prudom Still Boosting for E.S.," *Eureka Springs Flashlight*, May 15, 1919.

<sup>8</sup> Diehl, ed., "F."



Co. shares in block 74 of the Burkburnett Oil Fields in Wichita County, Texas.<sup>9</sup> A follow-up ad with a map appears in the February 16 edition. (Fig. 1)

Figure 1. Almost Over the Top. Advertisement for Sure Pop Oil Co. Corpus Christi Caller. February 16, 1919. University of North Texas Libraries, The Portal to Texas

<sup>9</sup> "Advertisement for Sure-Pop Oil Shares for the 'Burkburnett Oil Pool' Found in February 19, 1919 Corpus Christi Caller" (Washington D.C., n.d.), accessed March 26, 2022.

In May 1919, reports came in on the drilling activity of the Sure-Pop well in Lot 74 in newspapers across Texas. By May 24, they are drilling at 1,750 feet with 12 feet of sand. On May 28, 1919, an item appeared in the social column of the *Tallahatchie Herald*,

"Mr. Frank Provine, who has been spending some weeks in the oil fields of Texas, retired home last evening. Mr. Provine and his brother-in-law, Mr. Harrison, recently promoted the "Sure-Pop" Oil Company and the company had the good luck this week of striking a "gusher," a well that is among the best in the section and which it is reported will yield some twenty-five hundred barrels of crude oil per day. About one twentieth of the capital stock was placed in Charleston and since the lucky strike it is no trouble now to behold millionaires in Charleston. While the editor of this paper had no such luck, we join with the many friends of the lucky fellows in rejoicing over their good fortune."<sup>10</sup>

The visit was good news for the family of Mr. Provine, and the June 9 *El Paso Herald* reports that Well No. 1 is drilling at 1,760 feet and standardized, a term used when the well is producing. Then, on June 10, an advertisement appeared in the *Fort Worth Record*. (Fig. 2)

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<sup>10</sup> "Mr. Frank Provine. . .," *The Tallahatchie Herald*, May 28, 1919.

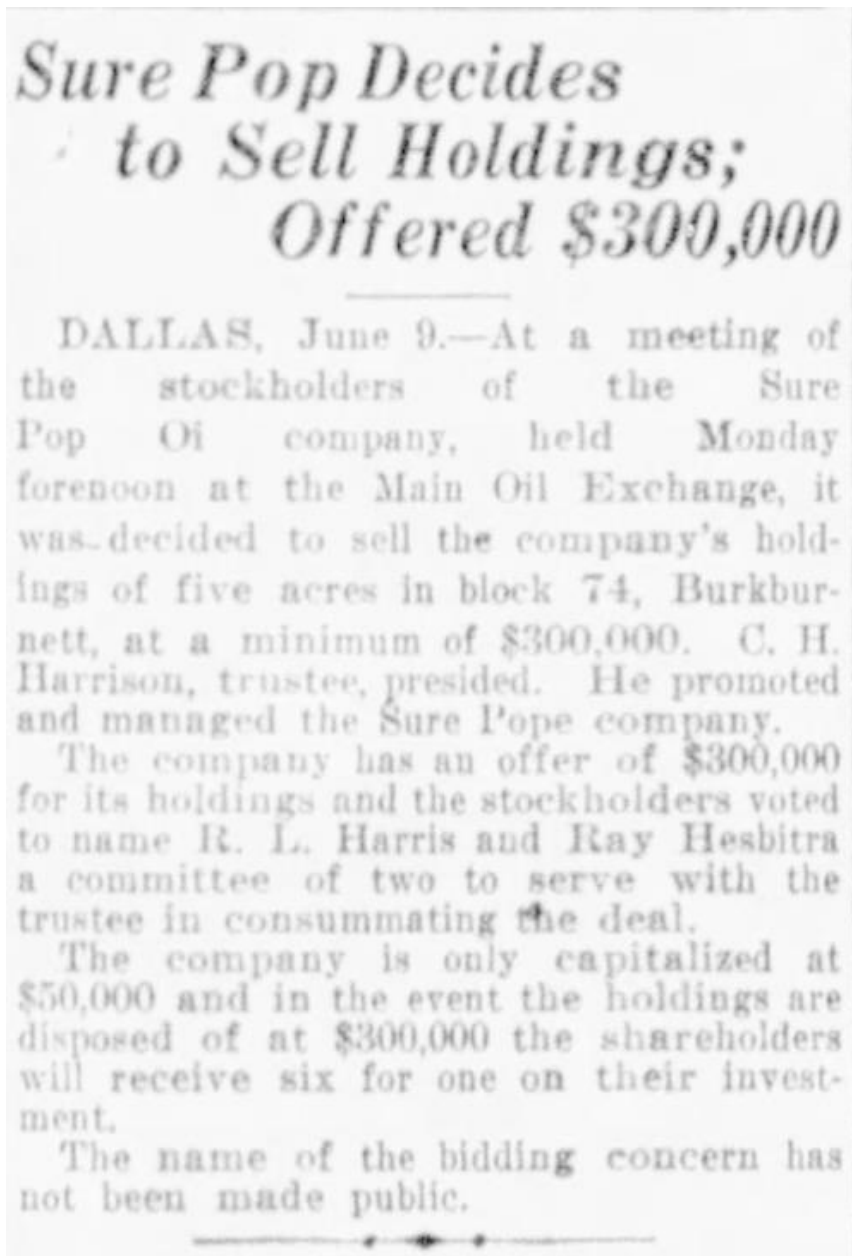


Figure 2. *Sure Pop Decides to Sell Holdings; Offered \$300,000.* *Fort Worth Record*, June 10, 1919. *newspapers.com*

The same notice appeared in the June 14, 1919, edition of *The Nebraska Daily Press*. Interestingly, the *Daily Press* clip had a notation at the bottom for when the article should run. On June 13, the *Daily Oklahoman* reported that Sure-Pop was paying dividends of \$5.00. On June 16, the *El Paso Herald* reported that Well No. 1 produces 25 barrels a day, while other wells at the Burkburnett site reported 2,500 barrels per day. On June 17, in the *Pine Bluff Daily Graphic*, Texas Crude Oil Company also advertised "for the benefit of stockholders" the



intended takeover of Sure-Pop Oil Co. and "Duke of Dublin" property in block 74.<sup>11</sup> They announced that the acquisition of both these wells would increase production by between 5,000-8,000 barrels. The Duke of Dublin well constituted 3,000 of that production. Again, this same ad would appear in the *Fort Worth Record* with the addition of where to buy more shares. While the Sure-Pop Well No. 1 produced oil, there was a disconnect between what the Fort Worth paper and what the *El Paso Herald* reported. C. H. Harrison lauded himself as a promoter and manager, so the duplicate articles blanketing the papers originated probably from him, while the Herald used third-party reporting. What was the purpose of the press releases? The purpose was to acquire fresh funding for a new project.

In the June 20 edition of the *Fort Worth Star-Telegram*, a line item appeared in a status report on oil wells and drilling operations in Wichita County, Texas, "Sure-Pop Oil Company's No. 2 Vogel, Block 74, Rig."<sup>12</sup> On September 12, Sure-Pop is asking for \$200 per barrel of oil. This article in the *El Paso Herald* includes data provided by a third-party service, J. S. Curtiss and Co.<sup>13</sup> It may explain why the data provided varies from the self-reported Sure-Pop data. On September 17, the *Herald* reported that Well No. 2 had a casing set. The *Petroleum Journal* concurred. Then on September 26, a notice appeared in the *Arizona Daily Star*, "Sure-Pop to Pay Fifty Per Cent Dividend."<sup>14</sup> By December 12, Well No. 2 produced 1,200 barrels per day, and \$300 per barrel was the asking price, but the Sure-Pop Stock is trading at \$2.00 per share. On February 20, 1920, the *Fort Worth Record* published an article on the leading oil producers in Texas compiled from state tax returns from the fourth quarter of 1919. The largest producer was Texas Oil Company, with oil valued at \$5,489,504. Sure-Pop produced oil valued at \$59,982.50.

A pattern developed in newspaper coverage as Sure-Pop Oil Co. sought to extend itself after achieving moderate success. An advertisement or society column announcement advertising Sure-Pop Oil Co.'s newest oil lease, followed by status reports on how the well was progressing, then there would be an offer from a consortium to buy out investors. On August 29, 1920, an article in the *Fort Worth Star-Telegram* reported that Sure-Pop Oil Co. acquired the Scott Oil Lease in Vernon, Texas, in Wilbarger County. On September 14, *The Evening Index* of San Bernardino, California, reported,

"The Hub rooming house on I street changed hands this week, the new owners taking possession yesterday. Mr. and Mrs. Prather, who bought the roaming house about a year ago, have moved to Riverside, where they will make their home. Mr. Prather is representing the Sure-Pop Oil Co. of Texas and will open an office in Riverside."<sup>15</sup>

By October 17, the Wilbarger Scott Lease Well No. 1 collapsed, and drilling had begun on a new hole. On January 9, 1921, Sure-Pop Scott Lease Well No. 2 was drilling at 2,136 feet. However, on February 21, 1921, the *Fort Worth Record* wrote that the Sure-Pop Oil Co. "abandoned their No. 2 Scott." After Sure-Pop's success in Wichita Falls, we see a failure in Vernon, Texas, and a no-show in Riverside, California.

<sup>11</sup> "Advertisement for "Texas Crude Oil Co. For the Benefit of Stockholders. . . .," *Pine Bluff Daily Graphic*, July 17, 1919, <http://www.newspapers.com/>.

<sup>12</sup> "Completions in Waggoner Pool Add 12,000 Barrels to Daily Production at Burkburnett," *Fort Worth Star-Telegram*, June 20, 1919, <http://www.newspapers.com/>.

<sup>13</sup> H.D. Slater, "Oil Quotations," *El Paso Herald*, September 12, 1919

<sup>14</sup> "Sure Pop Company to Pay Fifty Per Cent Dividend," *Arizona Daily Star*, September 26, 1919, <http://www.newspapers.com/>.

<sup>15</sup> "Colton Realty Shows More Activity," *The Evening Index*, September 14, 1920, <http://www.newspapers.com/>.

In May 1921, C.H. Harrison and Fred Thompson arrived in Eureka Springs to promote drilling an oil well. The local business community raised \$10,000 to purchase a tract of land from Claude A. Fuller. Mr. Fuller was twice the mayor of Eureka Springs and would later serve in the Arkansas House of Representatives and then represent Arkansas as a United States Congressman. The business owners purchased the land at the behest of Hugh A. Tucker, a geologist from Dallas. There is evidence that local citizens besides Mr. Fuller leased property to Sure-Pop. Figure 3 is a check written by Sure-Pop and signed by Harrison to T.J. Walker for \$50 for a lease. (Fig. 3)

D-52

Oct 18<sup>th</sup> 1921

C. H. HARRISON, Trustee  
Sure Pop Oil Company  
DALLAS, TEXAS  
EUREKA SPRINGS, ARKANSAS

Please find herewith attached (CHECK) for \$ 50 payable to your order, for which you are requested to send me duly acknowledged assignment of that part of an oil and gas lease covering 10 acres out of NE 10<sup>th</sup> Sec 36 SE 1/4 of SE 1/4

Section 36 Township 21 North, Range 27 West, in Carroll County, Arkansas.

Copy of lease assignment appears on reverse side.  
Should this check not reach you before advance in price I agree to its return.

Make all checks payable to the SURE POP OIL CO.  
Received the above settlement in trust for the SURE POP OIL CO.

Salesman / Witness { W. Coulson

NAME T. J. Walker and  
STREET E. C. Burton  
CITY Eureka Springs, Ark

CECIL WALKER  
EUREKA SPRINGS, ARK

Figure 3. Sure Pop Check written to T.J. Walker for Land Lease. Document from the archives of the Eureka Springs Historical Museum. D-S2

By July, contractors had begun work on the rig and scaffolding. By August, C. H. Harrison's promotion machine was in full swing. Harrison sent weekly status reports to the local papers. Harrison reportedly sent a recommendation letter from Col. George Thompson (Fred's father), a fellow oil speculator and investor. Sure-Pop began a brisk business selling "leases" or shares to the public. (Figs. 5 & 6)



Figure 4. Sure-Pop Share Certificate No. 1601. Document in the archives of the Eureka Springs Historical Museum. D-S2-75-2-1



Figure 5. Sure-Pop Share Certificate No. 1609. Document in the archives of the Eureka Springs Historical Museum. DS-2-75-2-4



On September 17, 1921, a news item appeared in the *Daily Arkansas Gazette*. The article indicated that Sure-Pop Oil Co. would resume drilling on the C.A. Fuller farm near the White River Bridge. (Fig. 7) In October, the *Joplin Globe* reported that drilling had begun on the 10,000-acre oil lease. On October 28, it was reported in the *Star Progress* of Berryville that a "good showing of gas had been encountered." Col. Thompson was waiting in readiness for Sure-Pop to strike oil, and he would immediately send the standardized drill rig and additional equipment to Eureka.



Figure 6. Grey, Lucien. *White River Near Eureka Springs, Ark.* Postcard from the archives of the Eureka Springs Historical Museum. PC-69-S

On October 4, the people of Eureka Springs attended a picnic at the Sure-Pop Oil Co. to view their oil well. On November 3, the *Eureka Springs Flashlight* published a photo of the crowd at the rig. (Fig. 8) An interesting aspect of this narrative is the barbecue. According to the Oliens in *Easy Money*, farmers were frequently a target of investment schemes. The book talks of a tire and rubber company promoters who threw a barbecue in 1921 to attract farmers in Henry County, Missouri. The idea of free food was so attractive that the farmers left University of Missouri College of Education agriculture experts waiting on a railroad siding to attend the barbecue.<sup>16</sup>

On November 11, the casing for the oil well arrived in Eureka Springs, and the well was drilling at 540 feet. Also, Sure-Pop announced in November that they would no longer be selling shares and that a leasing deal with a consortium named Associated Bankers Association was on

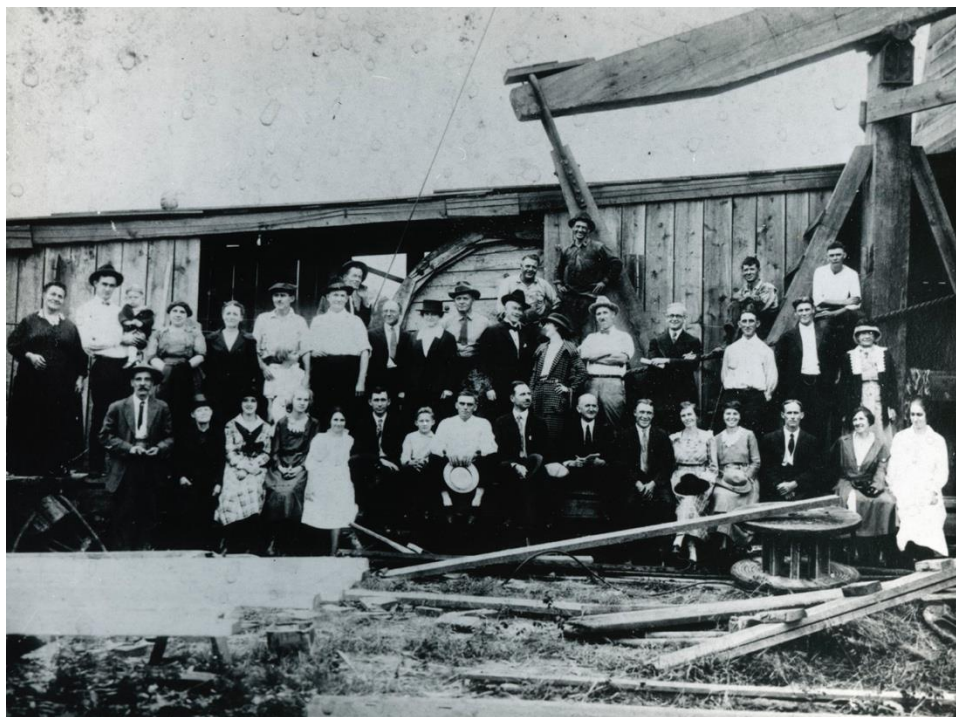


Figure 7. Deep Test for Oil and Gas Sure Pop Oil Co. Photograph from the archives of the Eureka Spring Historical Museum. BES-06-111

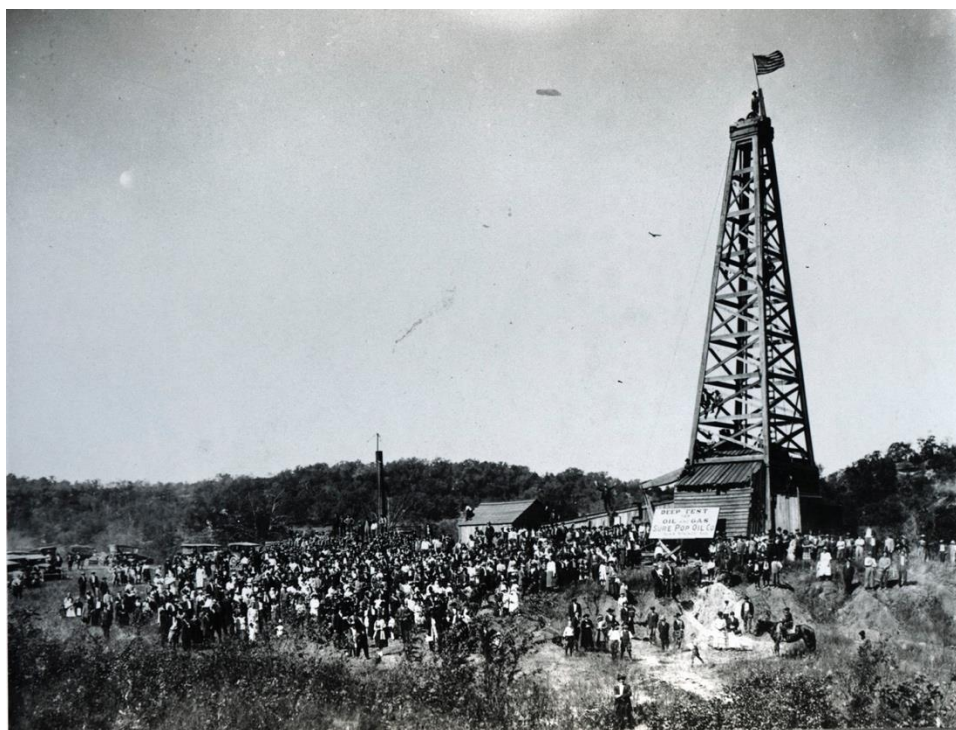
the horizon. The consortium deal was much like that of Texas Crude Oil Company, where a company with C. H. Harrison as trustee bought out the oil leases. Fred Thompson would be traveling to Chicago to close the deal. Fred Thompson would represent both Associated Bankers and local Sure-Pop interests. By December 2, the drilling was at 750 feet, and there were indications of oil in the water used in the drilling process. On December 16, the *Star Progress* reported that oil had been struck at 1,000 feet, but not how much oil it was.

<sup>16</sup> Roger Olien and Diana Hinton, *Easy Money: Oil Promoters and Investors in the Jazz Age*, electronic (Chapel Hill, NC: University of North Carolina Press, 1990), 24-25.





*Figure 8. Men, women, and children posed by Sure-Pop rig and pump jack, 1921. Photograph from the archives of the Eureka Springs Historical Museum. BES 11-210*



*Figure 9. Crowd Gathered in Front of Sure-Pop Oil Rig, 1921. Photograph from the archives of the Eureka Springs Historical Museum. PH-105-CSL*

Then misfortune fell. On January 13, 1922, the *Star Progress* reported, "We understand the drill has become wedged in the bottom of the Sure-Pop oil well over near Eureka Springs, and after two weeks tugging at the tool it is still tighter than Dick's hatband, all efforts to loosen it is proving unavailing."<sup>17</sup> On January 22, C.H. Harrison arrived back in Eureka Springs after spending the holidays on Texas. In February, Sure-Pop circulated a newspaper advertisement throughout the country asking for "high class salesmen and brokers." The ad appeared in the *Daily Arkansas Gazette*, the *Times-Dispatch* in Richmond, *The Nashville Banner*, and *The Raleigh News and Observer*. The *Eureka Springs Times-Echo* and *Flashlight* are silent because they are missing from the archives for these dates.

Suddenly, on Monday, July 31, 1922, a flurry of news activity started again. The *Fayetteville Daily Democrat* reported on the front page that the derrick and equipment belonging to Sure-Pop Oil Company of Eureka Springs burned to the ground. A fire occurred between 2:00 a.m. and 4:00 a.m. on July 31, 1922. The fire loss was estimated at \$20,000, and no insurance exists. Reportedly, Harrison sent for additional drilling equipment, and Sure-Pop was excited to resume operations as they have been drilling around 1,350 feet. The same day, Harrison left for Texas. The Sure-Pop office in Eureka would stay open and it would be business as usual. In September, Mr. Harrison said that the well in Texas was in total production, and Sure-Pop would use money from those wells to restart work in Eureka Springs. Within a short time, the local office closed its doors. No record of Mr. Harrison or Mr. Thompson returning to Eureka exists. Both local books on Sure-Pop report Mr. Harrison completely disappearing from the record.

However, that is not the end of the story. On August 4, 1924, the heirs of George Thompson (including Fred Thompson) sued C. H. Harrison for not paying back monies invested in a joint-stock venture as Sure-Pop Oil Company in Wichita County, Texas. The 1940 United States Federal Census showed a Homer C. Harrison living at 210 Madison Street in Vandalia, Illinois. His previous address was in Dallas, Texas. The entry listed his occupation as "Oil Lease Producer." By 1942, he lived on Main Street in Mount Vernon, Illinois. His World War II draft card showed his employment in a "self-oil business." The local newspaper wrote of Mr. Harrison donating to the community chest and taking frequent trips with his wife. He was an active member of the Mt. Vernon Christian Science church. On May 19, 1956, his obituary appeared in the Mount Vernon Register-News. It does not appear that Harrison was living a life of anonymity.

The question remains. Did Mr. Harrison and George Thompson purposely defraud the citizens of Eureka Springs? Or were they just out of funding for their multiple projects and using Eureka Springs Sure-Pop money to pay for other oil drilling projects? Access to financial records is necessary to say with 100% certainty. However, there are distinct similarities with an oil promotion fraud called the "Home-Stake Oil Swindle" Robert Trippet perpetrated in the 1950s through 1970s out of Tulsa, Oklahoma. In the case of Home Stake, Trippet used his family connections to lend credibility to his scheme. Mr. Trippet's father was a bank president and state banking regulator in Oklahoma, while Harrison's father was in construction in Texas. Robert Trippet roped in his brother-in-law to assist him in organizing what appeared to be a legitimate business; so did Harrison. Harrison used his brother-in-law, Frank Provine, as an investment salesman selling shares in Sure-Pop's ventures.

Another similarity was how investment money was collected and used. In the case of Home-Stake and Sure-Pop, each company promised an astronomical return on investment to lure

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<sup>17</sup> "We Understand the Drill. . .," *The Star Progress*, January 22, 1922, <http://www.newspapers.com/>.



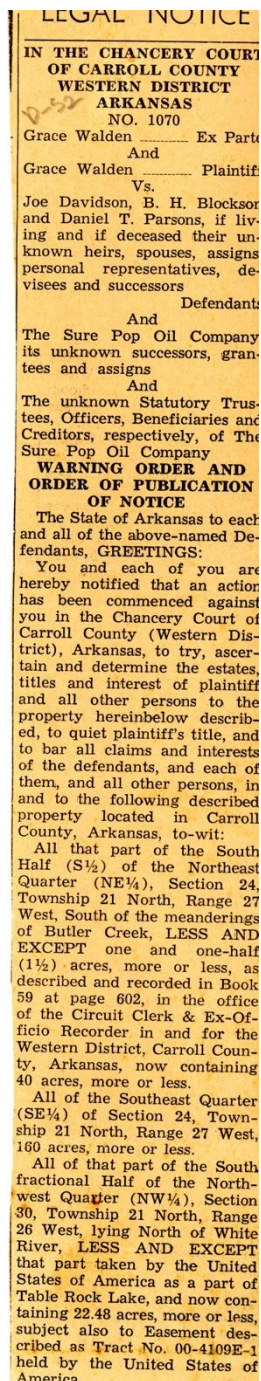


Figure 10. Newspaper Clipping of Legal Notice from 1967 vs. Sure-Pop Oil Co.

in investors. Both used investment money to pay for the drilling. A typical oil promotion fraud is to overcharge for drilling costs and, when the exploration does not find oil, to not refund the difference to investors between what they paid and the actual costs. An employee of Home-Stake had perpetrated this type of fraud before working for Home-Stake.<sup>18</sup> There is no way of knowing if Sure-Pop also inflated drilling costs. What can be known is that Sure-Pop, like Home-Stake, paid investors back on earlier speculative schemes with money from current investors. This use of investors' money is a hallmark of a Ponzi scheme.

This type of scheme lures investors by making promises of high returns on their investments. However, instead of using the investor's contribution to invest in profitable ventures, the fraudster uses the money to pay off earlier investors. As the scheme grows, recruiting new investors to pay off the earlier investors becomes increasingly complex, leading to the scheme's collapse.<sup>19</sup>

The Ponzi scheme has been illegal since the 1930s when the U.S. Securities and Exchange Commission (SEC) was established and granted the authority to regulate and enforce laws related to investment fraud. The SEC works to protect investors and maintain fair, orderly, and efficient markets. It investigates and prosecutes cases of investment fraud, including Ponzi schemes, to bring justice to victims and prevent future occurrences. In the case of Robert Trippet, he was found guilty of ten felony counts of fraud, sentenced to three years of probation, and fined \$100,000.<sup>20</sup> Harrison was never charged with or convicted of fraud. However, a yellowed newspaper clipping from 1967 in the Eureka Springs Historical Museum show Eureka Springs investors filing suit against Sure-Pop and Harrison to recover financial losses and reclaim land. The Sure-Pop Oil Company scheme had repercussions as late as 1967. (The newspaper these legal notices were cut from is not known at this time. These clippings were in the personal archives of Cecil Walker and donated to the Eureka Springs Historical Museum.) (Fig. 11)

America.  
All of that part of the Southeast Quarter (SE $\frac{1}{4}$ ) of Northeast Quarter (NE $\frac{1}{4}$ ) of Section 25, Township 21 North, Range 27 West, North of White River, LESS AND EXCEPT that part taken by the United States of America as a part of Table Rock Lake, and now containing 16.82 acres, more or less, subject also to Easement described as Tract No. 00-4109E-1 held by the United States of America.  
All of the Northeast Quarter (NE $\frac{1}{4}$ ) of the Northeast Quarter (NE $\frac{1}{4}$ ), Section 25, Township 21 North, Range 27 West, containing 40 acres, more or less.  
The East part of the West Half (W $\frac{1}{2}$ ) of the Northeast Quarter (NE $\frac{1}{4}$ ), East of Branch, the conditional line, Section 25, Township 21 North, Range 27 West, LESS AND EXCEPT that part taken by the United States of America as a part of Table Rock Lake, now containing 30.90 acres, more or less, subject also to Easement described as Tract Nos. 00-4109E-1 and 00-4109E-2 held by the United States of America.  
You and each of you are further notified that unless you file an answer or other pleading, or shall otherwise appear and defend against the aforesaid Petition within thirty (30) days after the 2nd day of February, 1967, judgment by default will enter against you and each of you.  
WITNESS my hand and seal of the Chancery Court of Carroll County, Arkansas, this 1st day of February, 1967.  
Eileen Harvey,  
Chancery Clerk  
By Ruby Bailey  
Deputy Clerk  
Pub. Feb. 2, 9, 16, 23, 1967

<sup>18</sup> David McClintick, *Stealing From the Rich: The Home-Stake Oil Swindle* (New York, NY: M. Evans, 1977), 29.

<sup>19</sup> McClintick, *Stealing*. . . , 56-57.

<sup>20</sup> McClintick, *Stealing*. . . , 293.

The difference between the two schemes is in who they targeted as investors. Robert Trippet focused on wealthy individuals seeking investments to avoid federal income tax. C.H. Harrison focused on every Eureka Springs, Arkansas, citizen regardless of age or wealth. In a 1976 oral history interview with the Eureka Springs Historical Museum, Clyde Perkins recounts that Sure-Pop sold investments to "poor widow women" who would "scrape together \$50." He also talked about a friend, Thomas Littrell, who invested \$700 he had saved to start a business. An oil promoter approached Perkins about buying shares. Perkins was 15 years old then and said he did not care to buy something he could not see. Perkins shared that Littrell "rode him" about investing in the company, but given Littrell's losses, he was glad he did not invest. The photos in the Eureka Springs Historical Museum archives show a festive atmosphere on the day of the barbecue. Men, women, and children are in attendance. How many of them would lose money to Sure-Pop? No records exist to calculate the losses incurred by the people of Eureka Springs. Anecdotal evidence from newspaper clippings and interviews shed light on the desperation felt. The editor of the Flashlight begged in an editorial column for Harrison to send word. Harrison never replied. No investors received compensation. The only citizen who seemed to make money was Clyde Fuller.

The town was dependent on medical tourism economically. As medicine advanced, the use of healing springs declined. The population of Eureka Springs also declined until the 1980s, when the first bed and breakfast inn in Arkansas opened, and tourism rediscovered the quaintness of this small town.

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## *Honors Corner Fall 2023*

In October 2023, the Honors College partnered with the Office of Nationally Competitive Awards and the Office of Undergraduate Research to assist students applying for the State Undergraduate Research Fellowship (SURF). The SURF, awarded by the Arkansas Department of Higher Education, is a competition between students from colleges and universities across the state of Arkansas. 161 students applied! Such a high number speaks to the exciting amount of undergraduate research that is happening at the University of Arkansas. 35 students were awarded a SURF (34 of whom are honors students). The Honors College awarded Honors College Research Grants to 96 honors students, 10 of whom are also alternates for SURF. The Office of Undergraduate Research awarded funds to 13 students.

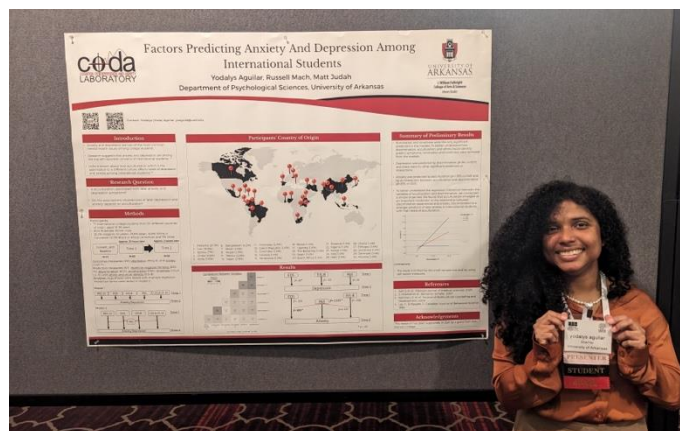
In the Fall 2023 semester, the Honors College saw a notable increase in the number of honors students presenting research at regional and national conferences. After a big dip during the pandemic, we are happy that students are once again able to travel to exciting places and share their research findings. Twenty-three students received Honors College Conference Travel Grants this semester. Students traveled to all corners of the country, from Seattle and San Francisco to Baltimore and Philadelphia, and many places in-between.

Conference presentations serve many purposes for students. These opportunities are important additions to students' resumes, demonstrating that their research has value to a larger audience. They also practice explaining their research succinctly and fielding questions about their work. These skills are invaluable for their eventual thesis defense and graduate or professional school interviews. Returning students comment on the constructive feedback they receive from conference attendees and how this has helped them think about their research in new ways. Finally, conferences give students the opportunity to network with potential graduate school mentors, fellow scholars in the field, and academics and professionals.

In this Honors Corner, we are featuring seven honors students who presented their research this semester, including a brief quote from each about the value of their experience.

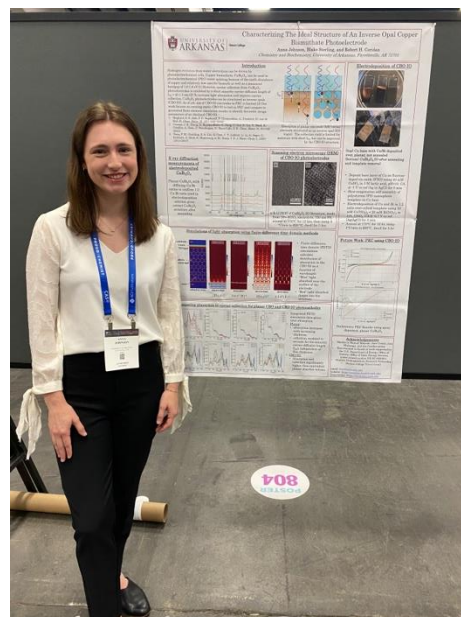
**Yodalys Aguilar**, Honors Psychology  
Mentor: Matt Judah  
National Latinx Psychological Association  
Chicago, IL

“This conference was totally different from any other conference I have attended. This conference was full of culture, traditions, and diversity. As I walked in, I could see people I could identify with. For the first time in my life, I felt I belonged at a scientific conference. This conference felt like a community where everyone cares for one another. I met people who provided feedback on my research analysis, like considering that international students who are close to graduation may feel more overwhelmed due to immigration policies.”



**Anna Johnson**, Honors Chemistry  
Mentor: Robert Coridan  
American Chemical Society Meeting  
San Francisco, CA

“Attending this conference and presenting my research project will help me prepare for defending an Honors Thesis in the upcoming spring semester. I became more confident in my ability to present my project, and I learned how to field and answer questions, which will prove invaluable tools for the near future and beyond. It was an enriching experience, and the encounters I had will impact my future research endeavors.”



**Terrell Page**, Honors English Education  
Mentor: David Fredrick  
Serious Play Conference  
Toronto, Canada

“Though some presentations were from K-12 instructors, many were from university professors, therapists, and other professionals. I learned from all of them, and I will bring what I learned into my future classroom. I hope to even bring some of it into my upcoming student teaching internship next semester! ... Presenting at this conference gave me some much-needed confidence for when I present at the UARK COEHP Honors Symposium in Spring 2024. I presented in a track reserved for graduate students inside of a larger conference full of mid-career experts...as an undergraduate student! Regarding this research, I feel prepared to handle any challenge that comes my way!”



**Olivia Peterson**, Honors Public Health  
Mentor: Page Dobbs  
American Public Health Association Conference  
Atlanta, GA

“One of the most enriching aspects of the conference was the opportunity to gain insight into the latest developments of e-cigarette usage globally. The presentations and exposition provided me with a fresh perspective on my research, inspiring innovative ideas in which I plan to integrate. Hearing from organizations like The Truth Initiative, a nonprofit inspiring life free from vaping, only deepened my passion for this research.”



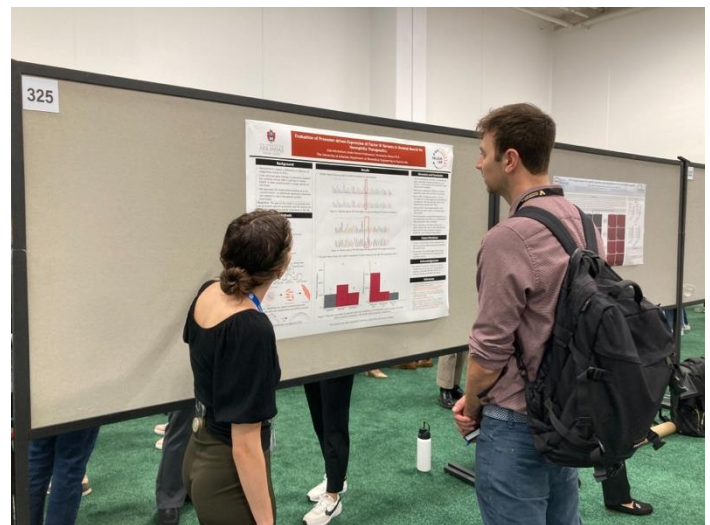
**Ethan Weems**, Honors Mechanical Engineering  
Mentor: Han Hu  
American Society of Mechanical Engineers  
Summer Heat Transfer Conference  
Washington D.C.

“I found the conference to be enormously beneficial to my career planning. I attended countless technical presentations and was introduced to several research topics that I had never been exposed to before... I would recommend all students attend a conference within their field of study and/or interest because the work being done is truly remarkable...the conference allowed me to establish new professional connections, listen to world experts present their work, and develop closer relationships with the other members of my lab.”



**Gabrielle Bulliard**, Honors Biomedical Engineering  
Mentor: Chris Nelson  
Biomedical Engineering Society Annual Meeting  
Seattle, WA

“Meeting with other scientists who were interested in my work was an uplifting experience. It showed me the community that I am a part of and the wonderful people that are in it. Attending this conference further cemented my plans and highlighted my love for the research that I do. I aim to continue pushing the efficacy of genetic engineering in my graduate career, and I now feel prepared to find a graduate school that is the right match for me.”





**Sydney Buford**, Honors Apparel Merchandising and Product Development  
Mentor: Eunjoo Cho  
International Textile and Apparel Association Annual Conference  
Baltimore, MD

“One of the most exciting points of the conference was meeting researchers that I had cited in my research. It was truly amazing to talk to them about how they got to where they are today and how they became interested in that topic. I also heard multiple researchers reference my mentor’s research, which made me really proud...Presenting undergraduate research at an international conference was an incredible experience that I will always cherish.”

