

BULLETIN

"An organization of people interested in the Natural Sciences"



July 2023; Vol. 77, #7

President's Message

This Fall, on Saturday, November 4th, we will host the **49th Annual RAS Fall Scientific Paper Session**. The paper session will be held at *Rochester Institute of Technology*. We now call for RAS Member Abstracts for topics on which you would like to present.

As a member of the Academy with scientific interests, you are invited to present a poster or short talk. Are you working on projects, made any discoveries or been active in a citizen science activity? Let us hear about it! Otherwise, plan to come to hear about the latest local research in fields of interest to you.

More information about the paper session and how you can sign up to present will be forthcoming on the

RAS website and in the August Bulletin. In the meantime, think about what you might present! Admission is free, as are morning refreshments, and lunch can be purchased. There will be many interesting activities including our annual Larry King Memorial Lecture. There will be oral presentations and posters covering all the natural sciences. There will be more to do and see than you expect.



Michael Grenier, RAS President

Volunteer Needed

We were gratified to add two new volunteers to our Student Grants Committee. We could use one more. This is one of our most important annual programs. See last month's issue for more details.

Classified Advertisement

↓ Employment Opportunity ↓

Grant Application Assessor

Rochester Academy of Science, Rochester, NY. Part-time volunteer to review & grade grant proposals from undergrad science students. Requires multi-disciplinary science background, critical eye, ability to apply standard criteria in scoring, & team-work to achieve consensus in awarding cash grants. Send note of interest - mgrenier@frontiernet.net.

RAS at 24th Annual ADK Outdoor Expo

We had a delightful time at this June 10 outreach event in Mendon Ponds Park with hundreds of visitors on a lovely day. Our Astronomy, Fossil, and Mineral Sections discussed their objectives and events and gave away Hubble photographs, fossils, and mineral specimens, respectively.

An unexpected Life Sciences Section exhibit was set up when a milk snake appeared and coiled under the ASRAS table. Visitors enjoyed seeing her as well. She stayed for several hours until the day ended, and then slithered off home. - MRG



A prospective member signs up for more information with David Bishop at the ASRAS table where a Moon globe and Mars globe were exhibited. (All three ADK photos taken by author)



Behind tables, from left, John Handley and Dan Krisher at the Fossil Section Table, David Bishop for ASRAS, and Jutta Dudley for Mineral Section.



Eastern Milk Snakes eat mice, voles, chipmunks, and juvenile rats. They aren't venomous, they are constrictors, relying on their strength instead of venom to kill prey. They are nocturnal and usually not seen around in the day.

Events for July 2023

NOT MEETING IN JULY

Anthropology Members

Astronomy Members

Come to RocheStarfest instead

Fossil Members

Life Sciences - Herbarium Workshop

Mineral Members

RAS Board

2 Sun: Astronomy Open House

Open House: 12:00 p.m. - 3:00 p.m.
Observatory tours and work parties.
Members may bring guests. Come out and learn to use some of the equipment available at the Farash Center! Farash Center for Observational Astronomy, 8355 County Road 14, Ionia, NY 14475. For weather related cancellations or changes contact site manager Roger McDonough at rdmcdogz@aol.com.

5 Wed: Astronomy Board Meeting

7:00 p.m. Farash Center in Ionia. ASRAS members are welcome. Contact: Anthony Golumbeck at semp@use.startmail.com.

7 Fri: Astronomy Public Observing

7:30 p.m. – 11:00 p.m. Deep sky observing. Open to the public. Farash Center for Observational Astronomy, 8355 County Road 14 Ionia, 14475.

8 Sat: Fossil Section Field Trip

The trip will visit Pompey Center and nearby roadcuts. The primary and first stop is a family friendly large road cut east of Syracuse. Collecting will be in the Delphi Station Member of the Skaneateles Formation. Bivalves, gastropods, trilobite parts and nautiloids are relatively common. Following this we will visit 1 or 2 other roadcuts which expose portions of the Onondaga Formation. For further information or to sign up, email DLKFossil@gmail.com.

14 Fri – 15 Sat: Astronomy RocheStarfest

Friday evening and all-day Saturday. Farash Center for Observational Astronomy, Ionia, NY. See article inside or RochesterAstronomy.org for schedule of events. 2024 Total Solar Eclipse Theme.

15 Sat: Fossil Section Field Trip

The trip will visit the Jaycox Run site between Avon and Geneseo and the collecting will be in the Middle Devonian Jaycox Members of the Ludlowville Formation and Deep Run Member of the Moscow Formation. Corals, brachiopods, trilobites and a variety of other types are very common. For further information or to sign up, email DLKFossil@gmail.com.

27 Thur: Life Sciences - Otter Walk in Genesee Valley Park with the Seneca Park Zoo Society's Urban Ecologists. **All RAS welcome.** 6:00 - 7:30 p.m. Free. Meet outside the Genesee Waterways Center building, 149 Elmwood Avenue, Rochester, NY 14611. Tour departs at 6 p.m. sharp so arrive early. Contact M. Grenier at mgrenier@frontiernet.net or (585) 671-8738. Refreshments after.

OTHER EVENTS

1, 22, & 29 Sat: Strassenburgh Telescope Observing

7:00 p.m. till 9:30 p.m. Be prepared to walk up 61 steps to the roof. Free. Cancelled if cloudy. Call Jim Seidewand at (585) 703-9876.

28 Fri to Aug 2 Wed: Subcommittee on Devonian Stratigraphy International Conference

Stratigraphers and paleontologists from around the world share and discuss the latest findings in Devonian stratigraphy at SUNY Geneseo. The Fossil Section will have a large display on-hand for the duration of the event. Volunteers desired. For additional information contact Dan Krisher at DLKFossil@gmail.com.

2023 Eclipse Watch - Eclipse Glasses



As noted last issue, the **ONLY** safe way to look directly at a solar eclipse is through special-purpose solar filters, such as "eclipse glasses" or handheld specially-made solar viewers. NASA warns that when watching the partial phases of the solar eclipse directly with your eyes, which happens before and after totality, you must look through safe solar viewing glasses ("eclipse glasses") or a safe handheld solar viewer at ALL times. (<https://solarsystem.nasa.gov/eclipse/s/2024/apr-8-total/safety/>)

Eclipse glasses are NOT regular sunglasses; regular sunglasses, no matter how dark, are not safe for viewing the Sun. Safe solar viewers are thousands of times darker and



You can wear eclipse glasses to safely view the Sun during the partial eclipse phases of a solar eclipse, before and after totality. Credits: NASA/Mamta Patel Nagaraja

must comply with the ISO 12312-2 international standard. These must filter out 100% of harmful ultra-violet, 100% of harmful infrared, and 99.999% of intense visible light, making it safe for direct solar viewing. According to Doug Kostyk, this is 31,000 times darker than ordinary sunglasses. ASRAS

President Tony Golumbeck notes that variable shade welding goggles are NOT safe for solar viewing, but those rated 12 or 13 are useable (14 might be too dark).

Viewing any part of the bright Sun through a camera lens, binoculars, or a telescope without a special-purpose solar filter secured over the front of the optics will instantly cause severe eye injury. You cannot combine these with eclipse glasses. These devices require different types of special solar filters. Eclipse glasses will be available from the RMSC at a nominal cost and likely from ASRAS as well. More details on this in future issue of the *Bulletin* and ASRAS's *The Rochester Astronomer*. Make certain you have the right equipment for eclipse viewing. - MRG

2022-2023 Undergraduate Student Research Grant Award Winner

[Why this research is important.

Burning fossil fuels releases CO₂ from carbon sequestered millions of years ago, adding to the rising atmospheric CO₂ “greenhouse gas” concentration and increasing atmospheric and oceanic temperature. Biofuels are made from plant material taking CO₂ from the atmosphere, thereby cycling it with no net increase. Most biofuels are currently made from food crops, including corn grain, cane sugar and sorghum, and vegetable oils such as palm oil, sunflower, soybean, rapeseed, and castor oil. Although the most cost-effective “feedstock” for ethanol and biodiesel fuels, they divert food crops to energy production, reducing the amount of available food and increasing its cost. Processing plant waste (corn stalk, crushed sugar cane stalk, soy plants) to create ethanol from the left over cellulose, hemicellulose, and lignin is inefficient and not cost effective compared to fermenting simple sugars and starches. Finding ways to increase the efficiency in breaking down these materials such as with cellulase enzymes would increase the supply of biofuels and enable the use of new fast-growing cheap feedstock crops such as switchgrass, elephant grass, and poplar. – Editor]

β-Glucosidase Expression in Poplar

by Noor Zamamiri, Syracuse University. Advisor: Heather Coleman, Ph.D.

[Winner - \$500 2023 Undergraduate Student Research Grant Award from RAS. This research is on-going and will continue through the 2023-2024 school year.]

Introduction

Biofuel production from woody plants is less efficient and more expensive than grain-based sources due to the



Noor Zamamiri (courtesy Coleman Lab, <https://colemanlab.syr.edu>)

pretreatment required to make cellulose accessible. During production, microorganism-produced cellulases such as β-glucosidase access and break down cellulose into usable glucose. In a prior study, a β-glucosidase encoding gene was inserted in poplar and overexpressed in the poplar genome with the intent of reducing the resistance of the cell wall to breakdown.

My research is to determine the effectiveness of cellulase overexpression in planta and analyzing its effects on secondary cell wall structure. To do so, I am determining the transcript level of the β-glucosidase gene and extracting protein from transgenic poplar samples to analyze enzyme activity. This indicates whether the inserted gene is having the desired effect of producing the functional β-glucosidase enzyme, therefore theoretically increasing the efficiency at which biofuel can be produced.

Tissue culture maintenance and sterile techniques are necessary to ensure the survival and viability of poplar samples. In order to confirm the plants and analyze gene expression, it is necessary to perform DNA extractions, Polymerase Chain Reaction (PCR) tests, RNA extractions, and qualitative PCR assays (qPCRs). Bradford and β-glucosidase assays are used for enzyme analysis. The expense budget total is \$4500.

Background and Rationale

The use of lignocellulosic (woody), non-food feedstocks for biofuel production as opposed to traditional, grain-based sources such as corn reduces the stress biofuel production places on food supply. The secondary cell wall of lignocellulosic biomass is composed of cellulose, hemicellulose, and lignin, the former two of which can be broken into monosaccharides and fermented into ethanol.¹ At present, the process of lignocellulosic ethanol production is less efficient and more expensive than grain-based sources due to the thermochemical pretreatment and enzymatic hydrolysis required to make cellulose accessible. Pretreatment utilizes high temperatures or chemical treatment to break bonds within the hemicellulose and lignin matrix that impede access to the cellulose bundles located within it.²

Following pretreatment, it is possible for cellulases such as β-glucosidase to access and further break down the cellulose into usable glucose.¹ Cellulases for use in biofuel production are primarily generated in microorganisms, which is a very costly process. As such, it is difficult to scale the production of lignocellulosic ethanol and use it as an effective alternative to traditional biofuel.

Previously, a gene encoding a β-glucosidase from hyperthermophilic bacteria was expressed in poplar (*Populus alba* × *grandidentata*) with the intent of reducing the resistance of the cell wall to breakdown. The inserted β-glucosidase gene requires the presence of the Tobacco Yellow Dwarf Virus replicase initiation protein (Rep) to be transcribed. The expression of the Rep gene is under the control of an ethanol-induced promoter.³ The system is configured such that cell wall degrading genes are split and inactive until they are switched on through the application of ethanol. As such, plants with the

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ethanol-induced promoter require an ethanol spray to produce Rep and transcribe β -glucosidase. This inducible system allows for higher levels of enzyme accumulation in poplar leaf and stem tissue.³ The transgenic trees were grown in the greenhouse alongside positive controls lacking the split-gene configuration and negative controls lacking the ethanol-induced promoter system. Samples were collected for analysis on Day 0, Day 5, and Day 9, with ethanol being applied to the plants on Day 1.



Poplar Trees in Syracuse University Coleman Lab Greenhouse (courtesy Noor Zamamiri)

Methods

β -glucosidase Transcription Level

The first goal of the project is to determine the level of β -glucosidase transcription. To ensure the correct functioning of the primer sets, qPCRs were performed using a serial dilution of plasmid DNA concentrations as trial sets with the same proportion and dilution of primers. Primer concentration optimization was additionally performed to determine the correct proportion of the forward and reverse primers relative to one another.

Following the confirmation of the correct functioning and proportion of

the β -glucosidase primer set, individual β -glucosidase lines were analyzed using cDNA which had previously been synthesized from the extracted RNA of harvested greenhouse plants. The individual β -glucosidase lines each represent a trial set, and this series of qPCRs indicate which lines are successfully expressing the β -glucosidase gene. The expression levels of β -glucosidase are then normalized using the expression level of two specific housekeeping genes, which act as a baseline for gene expression in a plant. A portion of plants are then selected for further enzyme activity analysis.

β -glucosidase Enzyme Activity

While qPCR analysis indicates the relative level at which β -glucosidase is being transcribed, further enzyme analysis is necessary to indicate the influence of this transcription on levels of β -glucosidase enzyme production and activity.

A protein extraction will first be completed to isolate protein from poplar tissue samples. A Bradford assay will then be conducted to determine the total protein concentration within the sample and a β -glucosidase assay to determine the level of β -glucosidase production in poplar samples. The proportion of total protein and β -glucosidase levels can then be used as a measure of β -glucosidase production and activity, and act as a comparison across individual lines.

Status (as of June 2023)

Since receiving the Rochester Academy of Sciences award in January 2023, I have been trained in performing a 2-day RNA extraction procedure which is necessary to isolate RNA from more complex greenhouse tissues. I was then able to extract RNA from all previously harvested mature leaf samples for the Day 0 and Day 9 plants. Following RNA extraction, I synthesized cDNA for all samples and ran a series of qPCRs with both housekeeping and β -

glucosidase primer sets. The qPCRs indicated levels of housekeeping gene expression similar to a wild-type plant control but indicated very low levels of β -glucosidase expression compared to a plasmid control. Because the expression of housekeeping genes is as expected, it is likely that the RNA extraction and cDNA synthesis were effective, but there is either very low expression of β -glucosidase in mature leaf tissues or a problem with the primer set.

This coming fall, I will focus on extracting RNA from developing xylem as opposed to mature leaf to determine whether there are levels of β -glucosidase expression more similar to the high levels of the plasmid control. Because developing xylem tissue is less complex than mature leaf tissue, a shorter RNA extraction procedure can be used which will allow me to analyze more samples in a shorter amount of time. The levels of β -glucosidase expression can then be compared to the baseline levels of housekeeping gene expression for each individual plant, and the fold expression can then be compared across the plants possessing the split-gene, ethanol-induced promoter system and the positive and negative controls. It is anticipated that the first of the three will demonstrate the highest levels of transcription and enzymatic activity.

A representative subset of these plants will then undergo enzyme analysis in the spring of 2024. I will complete a Bradford assay and a β -glucosidase assay to indicate the levels of total protein and β -glucosidase respectively. The proportion of total protein and β -glucosidase levels can then be used as a measure of β -glucosidase production and activity, and act as a comparison across individual lines. The estimated date of completion is May 2024. My research will be combined with previous work looking at the plant phenotype to determine the impact of β -glucosidase

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expression on plant growth, cell wall development, and resistance to breakdown. This research has the potential of lowering the cost of biofuel production, thus making it more competitive with traditional, environmentally hazardous fuel sources.

Expected Outcomes

A small portion of the ethanol-treated samples with the ethanol-induced promoter system representing two individual transgenic lines amplified following a qPCR with β -glucosidase primers. Because β -glucosidase is not naturally produced in poplar trees, the untreated and control samples each demonstrated no amplification at all. As such, even the low levels of β -glucosidase expression detected in some ethanol-treated mature leaf samples is an indication of successful insertion and overexpression of the gene of interest.

I will complete the analysis of β -glucosidase transcription levels and perform enzyme analysis on plants with high transcript levels to determine the functionality and activity of the β -glucosidase protein. I can then compare results across lines possessing the split-gene, ethanol-

induced promoter and the positive and negative controls. It is anticipated that the first of the three will demonstrate the highest levels of transcription and enzymatic activity.

My research will be combined with previous work looking at the plant phenotype to determine the impact of β -glucosidase expression on plant growth, cell wall development, and resistance to breakdown. This research has the potential of lowering the cost of biofuel production, thus making it more competitive with traditional, environmentally hazardous fuel sources.

References

1. Kumari, D. & Singh, R. (2018). Pretreatment of lignocellulosic wastes for biofuel production: A critical review. *Renewable and Sustainable Energy Reviews*. 90, p. 877-891. (Paper available from editor on request.)
2. Xiao, Y., He, H., Ojeda Lassalle, Y., Poovaiah, C., & Coleman, H. (2018). Expression of a hyperthermophilic endoglucanase in hybrid poplar modifies the plant cell wall and enhances digestibility. *Biotechnology for Biofuels*. 11(225), p. 1-15. <https://link.springer.com/article/10.1186/s13068-018-1224-7>
3. Dugdale, B., Mortimer, C., Kato, M., James, T., Harding, R., & Dale, J. (2013). In Plant Activation: An Inducible, Hyperexpression Platform for Recombinant Protein Production in Plants. *The Plant Cell*. 25(7), p. 2429-2443.

<https://academic.oup.com/plcell/article/25/7/2429/6098133>

Syracuse University Greenhouse

If you go to Syracuse University and find yourself near the Life Sciences complex. Look up! Most of the west wing fifth floor of the building is covered by a large greenhouse.



This facility is used by many of the researchers and labs, including the lab run by Dr. Heather Coleman in which Ms. Zamamiri studies. The greenhouse not only supports many lines of plant study; it also encompasses insect research.

Research in the Coleman Lab focuses on understanding how plant cell walls are formed and the various internal and external factors which influence their characteristics, particularly in terms of composition and structure. For more, see

<https://news.syr.edu/blog/2014/02/12/whats-growing-inside-the-life-sciences-greenhouse-72890/> -MRG

RocheStar Fest 2023 Open to ALL RAS Members

July 14 – 16, 2023, Marian and Max Farash Center for Observational Astronomy, Ionia, NY.



Attendees at RocheStar Fest 2022 (Photo courtesy of Peter Blackwood)

The Astronomy Section of the Rochester Academy of Science (ASRAS) will hold the 26th annual RocheStar Fest on July 14th to July 16th. This weekend-long event features astronomy, lectures, demonstrations, and camping at ASRAS's Ionia, NY observing grounds. A picnic dinner will be held on

Saturday. Door prizes and a silent auction add to the fun. Proceeds benefit ASRAS, a non-profit organization devoted to education and public outreach in the fields of astronomy and space sciences. Camping arrangements are available at no charge, tents and small campers permitted. These are primitive camping sites - no electric hookups, water hookups, or showers are available. No pets or ground fires are allowed.

Featured Speakers in a Panel

Discussion Saturday at 8:00pm

with Bob Berman & Valerie Rapson. Bob is one of the most widely read astronomers in the world, Astronomy Editor for the Old Farmer's Almanac,

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and a Contributing Editor at Astronomy magazine. Valerie is an Asst. Prof. of Physics & Astronomy at SUNY Oneonta, earned her PhD in Astrophysical Sciences and Technology at RIT, and a Past-President of ASRAS.

Schedule of Events

Friday, July 14th

6:00 pm Arrival for camping, Astro-Jeopardy and music trivia contest (rain or shine), observing (beginning at dark, weather permitting)

Saturday, July 15rd

11:00 am Registration begins – pick up Door Prize tickets at Registration table; hot dogs will be available for purchase or bring your own lunch, drinks available at modest cost

1:00 – 4:30 pm Talks, Demonstrations, & Experiments – All are in Education Center: Meeting Room. See following list.

Mark Minarich “ASRAS & the Astronomical League”

Bob Easterly “2024 Total Solar Eclipse - A Once in a Lifetime Event Near Home.” What the Amateur Astronomer should know about a solar eclipse.

David H. “Observing with Mount Wilson Telescopes.”

Tony Golubeck & Craig Kaplan “New Solar Observers.” Thinking about getting started observing our closest star. Tony and Craig are here to provide the basics.

Nick Lamendola & Bill Schlein “Solar Filters.”

1:00 – 5:00 pm Silent auction, door prizes

4:30 pm Members Reception (bring appetizers to share if you’d like)

5:15 pm Door Prizes followed by group photo.

6:00 pm Barbeque Dinner at Ionia Volunteer Firehouse

Beef brisket, pulled pork, smoked turkey, hamburgers, hot dogs, potato salad, baked beans, pasta salad, and veggies. Bring your signature dish or dessert if you’d like.

8:00 pm Featured speaker: Bob Berman & Valerie Rapson Observing to follow, weather permitting.

Sunday, July 16th

10:00 am - Noon Cleanup (breakfast at 9:00 am)

For general information, Program ideas, and offers to help, contact Lori Englund at (585) 820-5012. If you can donate a door prize, contact Carol Latta at 585-230-9548. For camping arrangements, contact Roger McDonough at (585) 519-9121 Check out all the other ASRAS summer activities, at www.rochesterastronomy.org !!



Registration due by Friday, July 7, 2023

Day of registrations will be accepted: dinner purchases available but not guaranteed.

Complete and mail this form with your payment (checks made out to ASRAS) to Lori Englund, Attn: RocheStar Fest Registration, P.O. Box 20292 Rochester, NY 14602

Name: _____

Address: _____

Phone #: _____

Email address (optional): _____

Number of adults attending: _____

Number of children attending (under 12): _____

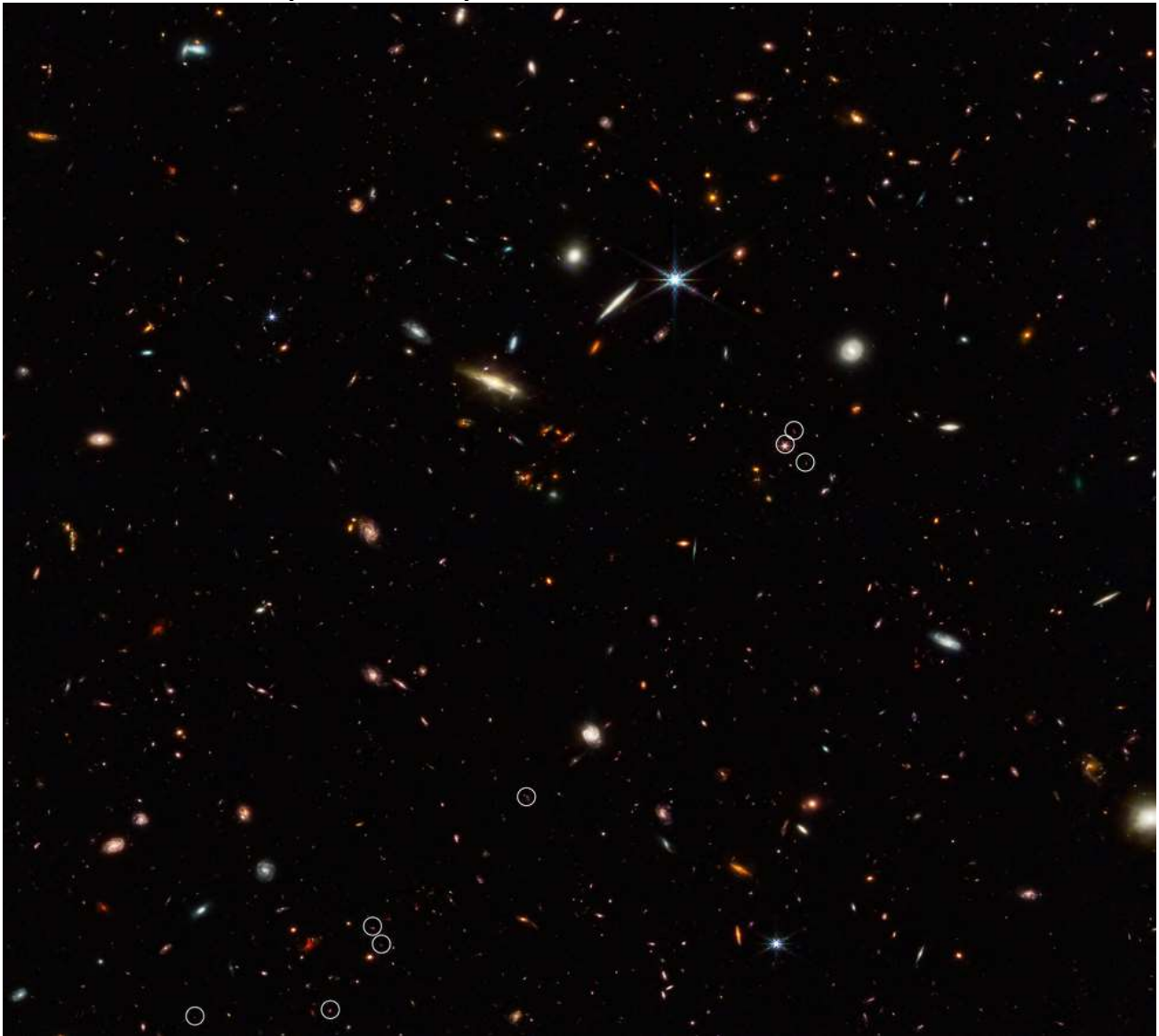
Total number attending: _____

Camping? Yes No (Tents and small campers allowed; no hookups are available.)

Early-Bird Event Fee:	\$15 for individuals or \$25 for families	Amount due.	\$ _____
Dinners:	Number of adult dinners: _____ x \$10		\$ _____
	Children 6 thru 12 (5 and under FREE) _____ x \$5		\$ _____
	Children 5 and under _____ free	Total	\$ _____

Day of Registration Fees:	
(July 15, 2023)	
Individual:	\$20
Family:	\$30

NASA's James Webb Space Telescope Identifies the Earliest Strands of the Cosmic Web



This deep galaxy field from Webb's NIRCam (Near-Infrared Camera) shows an arrangement of 10 distant galaxies marked by eight white circles in a diagonal, thread-like line. (Two of the circles contain more than one galaxy.) This 3 million light-year-long filament is anchored by a very distant and luminous quasar – a galaxy with an active, supermassive black hole at its core. The quasar, called J0305-3150, appears in the middle of the cluster of three circles on the right side of the image. Its brightness outshines its host galaxy. The 10 marked galaxies existed just 830 million years after the big bang. The team believes the filament will eventually evolve into a massive cluster of galaxies. Credits: NASA, ESA, CSA, Feige Wang (University of Arizona), and Joseph DePasquale (STScI)

[Download the full-resolution, uncompressed version and supporting visuals from the Space Telescope Science Institute.](#)

Galaxies are not scattered randomly across the universe. They gather together not only into clusters, but into vast interconnected filamentary structures with gigantic barren voids in between. This “cosmic web” started out tenuous and became more distinct over time as gravity drew matter together.

Astronomers using NASA's James Webb Space Telescope have discovered a thread-like arrangement of 10 galaxies that existed just 830 million years after

the big bang. The 3 million light-year-long structure is anchored by a luminous [quasar](#) – a galaxy with an active, supermassive black hole at its core. The team believes the filament will eventually evolve into a massive cluster of galaxies, much like the well-known [Coma Cluster](#) in the nearby universe.

This discovery is from the [ASPIRE](#) project (A Spectroscopic survey of biased halos in the Reionization Era), whose main goal is to study the

cosmic environments of the earliest black holes. In total, the program will observe 25 quasars that existed within the first billion years after the big bang, a time known as the [Epoch of Reionization](#).

“The last two decades of cosmology research have given us a robust understanding of how the cosmic web forms and evolves. ASPIRE aims to understand how to incorporate the emergence of the earliest massive

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black holes into our current story of the formation of cosmic structure,” explained team member Joseph Hennawi of the University of California, Santa Barbara.

Growing Monsters

Another part of the study investigates the properties of eight quasars in the young universe. The team confirmed that their central black holes, which existed less than a billion years after the big bang, range in mass from 600 million to 2 billion times the mass of our Sun. Astronomers continue seeking evidence to explain how these black holes could grow so large so fast.

These unprecedented observations are providing important clues about how black holes are assembled. The team has learned that these black holes are situated in massive young galaxies that provide the reservoir of fuel for their growth. More at <https://www.nasa.gov/feature/goddard/2023/nasa-s-webb-identifies-the-earliest-strands-of-the-cosmic-web>

Rochester Research in Review

[Prediction may be key to eye-and-hand coordination. June 5, 2023. University of Rochester.](#)

[A chance observation finds potential hearing biomarker for Alzheimer's disease. June 7, 2023. University of Rochester.](#)

[AI helps show how the brain's fluids flow: New research targets diseases including Alzheimer's. June 14, 2023. University of Rochester.](#)

[New microcomb device advances photonic technology. June 21, 2023. University of Rochester.](#)

[An unexpected doorway into the ear opens new possibilities for hearing restoration. June 28, 2023. University of Rochester.](#)

[Scientists edge toward scalable quantum simulations on a photonic chip. June 29, 2023. University of Rochester.](#)

[Exoplanet may reveal secrets about the edge of habitability. June 21, 2023. Cornell University.](#)

[Wildfire smoke downwind affects health, wealth, mortality. June 21, 2023. Cornell University.](#)

[Researcher uses pressure to understand RNA dynamics. High pressure induces excited states, suggests role in HIV infection. June 22, 2023. Rensselaer Polytechnic Institute.](#)

[Climate change could lead to 'widespread chaos' for insect communities. June 21, 2023. Binghamton University.](#)

[New method traces ancestry of hybrid plants and animals. June 13, 2023. Binghamton University.](#)

[A machine learning approach to freshwater analysis. June 14, 2023. Syracuse University.](#)

[Quest for alien signals in the heart of the Milky Way takes off. May 30, 2023. Cornell University.](#)

[Adult friendships can triumph over childhood trauma, even in baboons. May 18, 2023. SUNY Oswego.](#)

ABOUT THE ACADEMY

The Rochester Academy of Science™, Inc. is an organization that has been promoting interest in the natural sciences since 1881, with special focus on the western New York state region. Membership is open to anyone with an interest in science. Dues are minimal for the Academy and are listed in the [membership application online](#). Each Section also sets dues to cover Section-related publications and mailings. We are recognized as a 501(c)3 organization.

For information, contact President Michael Grenier at (585) 671-8738 or by email paleo@frontier.com.

The Academy Internet website is <http://www.rasny.org> or see us on Facebook at <https://www.facebook.com/Rochester-Academy-of-Science-792700687474549>.

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