



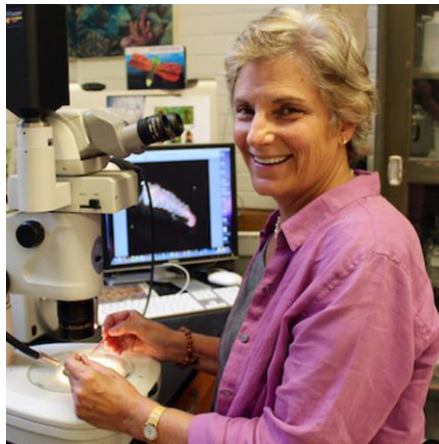
President’s Message

The Rochester Academy of Science Annual Meeting & Spring Lecture is Tuesday, April 13, 7:30 p.m.

This meeting will be virtual, with directions to be sent in March. After a short introduction, the Board of Directors election results will be announced at the business meeting. A ballot is included on this page. Please show us your support by printing and mailing your completed ballot. Although we cannot take email ballots, we will send proxy directions next month.

The Spring Lecture will follow the business meeting. We are delighted to have as our guest speaker, Dr. Sara Lewis from Tufts University, one of the world’s foremost firefly researchers. A recent paper with her as lead author in *BioScience*, “A global perspective on firefly extinction threats” was covered in the popular press. She will discuss those findings and other research.

**Spring Lecture
Tuesday, April 13, 2021
The Wondrous World of Fireflies
Presented by Dr. Sara Lewis**



About Our Speaker

Dr. Lewis heads the Lewis Lab of evolutionary ecology at Tufts University. Dr. Lewis is also the author of over 80 scientific papers, as well as the popular book: *Silent Sparks: The Wondrous World of Fireflies; unveiling the science behind the spectacle.*

Sara Lewis has spent the past thirty years chasing fireflies across the fields

of New England, among the mountains of Tennessee, and along the mangrove rivers of South East Asia. In addition to numerous scientific articles, Lewis has a [TED Talk](#) and has written popular articles on firefly conservation and evolution for [Scientific American](#), [Undark](#), [CNN](#), [The Guardian](#), and [Natural History](#).

Dr. Lewis writes: “Fireflies are surely among the greatest ambassadors for Earth’s natural magic. For centuries, their ethereal beauty has sparked wonder and inspired poets, artists, and children of all ages, and their bioluminescent courtship displays make them a popular sight. Yet fireflies often remain shrouded in mystery: *How did they evolve their light-producing talents? What’s the purpose behind all that flashing? Are fireflies really disappearing?* Exploring the latest scientific discoveries, Lewis dives into their luminous lives to reveal stories of courtship and romance sprinkled with poison, murder, and deceit. Come explore their remarkably diverse lifestyles, hear how human activities such as habitat loss, light pollution, and pesticide use put fireflies at risk, and learn what you can do to help protect these charismatic insects.”

*

Speaking of talks, if you missed our Fall lecture on “Origin and Evolution of Dogs” by Dr. Abby Grace Drake from the Department of Ecology and Evolutionary Biology at Cornell University, it was recorded and is available to be viewed on YouTube at:

<https://youtu.be/i4NVuBGryYk>

Michael Grenier, President RAS

**ROCHESTER ACADEMY OF SCIENCE
BALLOT FOR JUNE 2021 – MAY 2022 OFFICERS**

OFFICE	NAME	✓	WRITE-IN CANDIDATE
President:	Michael Grenier		
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Member, Board of Directors (2021-2024)	Michael Richmond, Ph.D.		

Completed ballots must be mailed c/o the RAS Secretary: Rochester Academy of Science, PO Box 92642, Rochester NY 14692-0642.

Table 1: RAS board of directors ballot

Featured Article

2020-2021 First Place Undergraduate Student Research Grant Award Winner

Juliana South, University of Rochester. *Attenuation in Granular Materials*. Sponsor: Alice Quillen, Ph.D., Professor of Physics and Astronomy.



Abstract

To improve understanding of the transmission of energy in granular materials, we propose to carry out laboratory attenuation experiments on dry gravel through the administration of pulses and signals. With the current conflict between the jolt and seismic reverberation attenuation models in the literature we aim to differentiate between the two models in our regime by making a precise measurement of attenuation.

Additionally, by making attenuation measurements of materials with various densities and grain sizes we can better understand how seismic impacts would effect granular bodies, such as rubble-pile asteroids.

Motivation

Attenuation is an area of great interest and research in earth science, however, studies done in earth science focus on wet materials. Much less research has been conducted around attenuation in dry granular material. Additionally, there is

conflict in the current literature around attenuation in granular material. The rapidly attenuated seismic pulse or 'jolt' model [4, 5, 6, 10] is consistent with strong attenuation in laboratory granular materials at kHz frequencies [7] but qualitatively differs from the slowly attenuating seismic reverberation model [2, 1, 8, 9] that is supported by measurements of slow seismic attenuation rates in lunar regolith [3, 11]. This is a complex problem due to the forces between particle contacts in the material. These contacts create force networks, and interactions between the particles are influenced by packing structure [13]. Due to the complex nature of the problem and the conflicting models in the literature we believe it is important to make more precise laboratory measurements of attenuation in these materials to clarify future research using those materials.

Applications of such research are numerous and exciting. Of primary interest is the dynamics of rubble-pile asteroids, which are loosely held-together structures of granular material [12]. Research into attenuation in this material could tell us more about the structure of these asteroids. Better understanding of these asteroids could in turn inform better mission design for future sample return missions, such as [Osiris-REx](#) and [Hyabusa-2](#). These missions are currently studying rubble-pile asteroids and rely upon an understanding of their dynamics in order to successfully land and gather samples.

Finally, [DART \(Double Asteroid Re-direction Test\)](#) is a mission that intends to deflect asteroids that are earthbound. One of DART's purposes is to better understand how asteroids react to an impact. A better understanding of attenuation in these asteroids could benefit programs such as this, which depend on impacts. Attenuation experiments measure impact responses so our results are relevant to deflection strategies for the DART mission.

Goals

We aim to assess attenuation in granular materials of different porosities and densities. Both of these properties affect contact points in the material, and therefore the forces between them. In the future further experiments could repeat our procedures in vacuum in order to determine if our results are upheld in a setting with no air, such as space.

Procedure

Work for this project began in November 2020. Data was taken by attaching piezoelectric tabs to the inside walls of a wooden trough filled with granular material. A pulse was then administered to the material by hitting the side of the trough with a weight. One piezoelectric tab received the signal before it went through the granular material, and one received the signal after it went through the material. The tabs were connected to separate channels of an oscilloscope. Measurements were then taken for various amounts of material by varying the length of the trough and filling it in with more material (see Figure 1 on page 3). Varying the length of the trough gives much better measurements than attempting to place the receivers in the material itself and is a similar method to that used in [13].

In the future we plan to repeat these experiments with more controlled conditions. With aluminum materials we will construct a trough and scaffolding so that the setup can be maneuvered into more positions to make pulses easier to create and better defined. Utilizing a metal trough also allows us to better estimate how the pulse will travel through the trough itself and how those signals can be mitigated. In the future non-destructive testing transducers can be used to produce various types of signals, such as a sine wave, chirp, or pulse, which can be used to analyze the attenuation of many frequencies in granular materials.

(Continued on p.3)

Juliana South

(Continued from p.2)

Through these experiments we expect to find how different densities and grain sizes effect attenuation in granular materials. We also expect to make a Q measurement that is of sufficient precision to differentiate between the two attenuation models of jolt and reverberation in our regime. We expect to complete these laboratory experiments by May 2021.

Grant Funding

The grant award was used to purchase granular materials, piezoelectric vibration sensors, and materials used to construct the trough experiment.

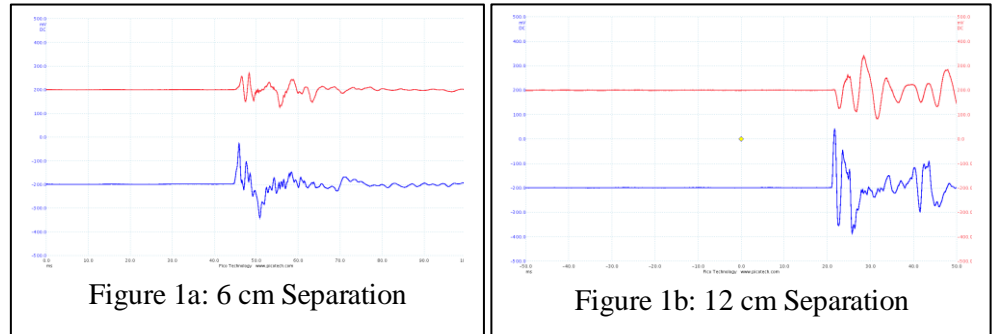


Figure 1: These graphs show a pulse measured by two piezoelectric tabs, one at the beginning of the material (blue) and one at the end (red). Figure 1a shows the measurements with a separation of 6 cm between the two tabs and figure 1b shows the measurements with a separation of 12 cm between the tabs. Both figures show a clear delay in time between the two measurements of the pulse. Both figures also show a broadening of the pulse by the time it reaches the end of the trough, indicating that the pulse has spread out through the material. Both figures also show a decrease in pulse energy by the second measurement. The second figure shows a bigger delay in measurements, as the pulse took a longer time to travel through the longer trough. These graphs indicate that we can measure attenuation using our procedures.

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Anthropology Featured Article

Understanding the “Roman” in Roman Empire

By Dr. Alexander Smith,
Anthropology Section

The Romans loom large over archaeology in the Mediterranean region. Unlike the Phoenicians, Carthaginians, or even the Greeks, Rome’s domination of the Mediterranean was absolute. The term *Mare Nostrum*, meaning “our sea,” signified that Rome controlled the entire Mediterranean by the first century B.C.E. Many of us learn from early on in school that when Rome conquered an area, they changed the region to reflect Roman values. This is the concept of “Romanization,” which has been critically questioned for decades by scholars, especially among those studying the provinces of Rome. The concept of “Roman” is just too unstable over time and space. In reality, the Roman Empire tactically

made space for differing identities and cultural proclivities. It helped solidify the empire. So, despite the differences of appearance in archaeological sites that run counter to our notion of “Roman,” they too were part of an imperial system that we understand today as “Rome.” They too were part of *Mare Nostrum*.

In this capacity, the Romans are really confusing. When describing the Western Mediterranean in particular, scholars are often confronted with the question, “what is Roman?” Of course, there are pottery types and styles of architecture that are specific to the Roman Republican or Imperial time periods, but we often forget that Rome was both a cosmopolitan identity and an empire. Sure, there are many iconic examples of Roman architecture among Western Mediterranean islands, such as aqueducts and baths. But for every bath complex (see Figure 1), there are multiple indigenous sites covered

with Roman material culture and domestic structures (see Figure 2). As a survey archaeologist, I have spent my career looking through agricultural fields on the Italian island of Sardinia and the Spanish island of Menorca. It is rare to find a collection of Phoenician and Punic artifacts in Sardinia without some Roman pottery mixed in. On Menorca, every megalithic, indigenous archaeological site has some Roman material culture present. The Romans are always present, sometimes annoyingly so. A better question might be, “what isn’t Roman?” The Roman Empire was itself not really a monolithic culture. It was a hodgepodge of cultural attributes from its territories and was also very much regionally differentiated. In other words, being a Roman in Egypt was very different from being a Roman in Italy, or Britain, or Spain for that matter. The ideas we use to discuss “Roman culture” are mostly derived from a specific group of aristocratic

(Continued on P. 5)



Figure 1: The bath complex of Fordongianus in Western Sardinia, built by Trajan in the second century B.C.E.

(Image © Michel Royon/Wikimedia Commons)

Roman Empire

(Continued from p. 4)



Figure 2: A circular house on the site of Torre d'en Galmés on Menorca. Some of these structures were continuously occupied and modified for centuries after conquest of the island.

(Image by the Consell Insular de Menorca under Creative Commons Attribution-Share Alike 4.0 International license.)

elites in Rome. But to the vast majority of Roman subjects, being “Roman” was very much about being part of the imperial network, not so much about embodying the toga, bath house, or gladiatorial lifestyle that we imagine today.

You might ask, “well, what about Roman citizenship?” For an idea of this, we can look to the Social War of 91-87 B.C.E. This was a war over citizenship, as peninsular Italy wanted a say in Roman government. After the war, citizenship expanded throughout the peninsula, yet Italy remained regionally very distinct as it is today. Over the centuries of Roman power, citizenship was selectively granted to regions to either facilitate conquest or quell unrest. Politically speaking, citizenship was a tool of the Roman Empire, not necessarily a mark of

being part of Roman culture. It did not really matter how many aqueducts you had or how much you loved *garum* (a tangy fermented fish sauce). So, if we think of being “Roman” as being part of that larger imperial network, then everything from traditional basket weaving in Spain to the worship of Isis in Egypt was part of the Roman world and thus “Roman.”

Returning to the islands where I work, it is fascinating to think about the continuous occupation of sites through distinctive time periods, particularly the shift to Roman rule. Sardinia was annexed by Rome just after the First Punic War in 238 B.C.E. and Menorca was conquered in 123 B.C.E. Yet in both cases, you could argue that not much changed immediately because of Roman rule.

Over the centuries, increased exposure to other Mediterranean commodities, cultural attributes, and external rulers did slowly alter the look of these societies. But to say they just eventually became culturally “Roman” is a bit of an oversimplification. Yes, they did become part of the Roman Empire, but in this imperial network there was space for small island cultures with peculiar attributes. And so Menorcans continued to construct houses out of massive rocks instead of Roman bricks, and Sardinians continued agricultural and artisanal practices that were decidedly Carthaginian. They did all this despite being part of the Roman world. In the end, they were just one kind of Roman in the larger Roman Empire.

Citizen Science

Publicly Accessible Robotic Telescopes,

By Theodore W. Lechman,
RAS Bulletin Editor

This series will present a few robotic radio and optical telescopes that are available to the general public.

SALSA

SALSA means "Such a lovely small antenna" (or in Swedish: "Sicken Attans Liten Söt Antenn") and refers to their small (2.3m) radio telescopes situated at [Onsala Space Observatory](#) in Sweden. Anyone may control these telescopes via internet for free. SALSA is a part of the European Hands-On Universe project, [EU-HOU](#), to bring front-line interactive astronomy to the classroom. Most SALSA users observe emission from hydrogen in the spiral arms of our galaxy, the Milky Way. These observations can be done via your web browser during daytime as well as night-time, and even in bad weather. Using SALSA, you can make a rough map of the spiral structure of our galaxy by yourself. You may also find evidence for dark matter! For more information on how to use the telescope, please see the documentation available at [this page](#).



Figure 1: A pair of 2.3m Radio Telescopes operated by SALSA.
(Courtesy: SALSA)

Green Bank Observatory, West Virginia

A 20-meter radio antenna is accessible to members of [SARA](#), the Society of Amateur Radio Astronomers, which charge a

nominal fee and offer training online.



Figure 2: 20m Green Bank Radio Telescope

SKYNET

[Skynet](#) is a global network of fully automated, or robotic, telescopes serving professional astronomers, students of all ages, graduate through elementary school, and the public over the internet. SKYNET is headquartered at the [University of North Carolina](#) (UNC) and funded primarily by the [National Science Foundation](#), [NASA](#), and private donations.

Although access to Skynet is mostly limited to the institutions that have contributed to the telescopes (each ~\$100K or more), Skynet is also open to anyone who takes the tuition-free, self-paced [Astronomy with Skynet courses through Skynet University!](#)

Skynet's [telescopes](#) span four continents. Recently, non-UNC telescopes have been joining Skynet as well. Users include professional astronomers, students of all ages from graduate through elementary school, and the public. A short list of SKYNET telescopes that UNC has majority access to include:

PROMPT C1-C8, Cerro Tololo Inter-American Observatory, Chile. These consist of [six 16-inch diameter telescopes](#) that were [built](#) in 2004 and 2005, some of which have been upgraded to 24-inch diameter telescopes, and a 32-inch diameter telescope that was [built](#) in 2012 in partnership with [Astro Optik](#), and a 24-inch diameter telescope that was [built](#) in 2013 in partnership with [NARIT](#).



Figure 3: PROMPT Chile series telescope in Chile.
(Courtesy PROMPT Chile)

[PROMPT A1- A4, Siding Spring Observatory](#), Australia, consists of four 17-inch diameter telescopes that were built in 2013. In combination with PROMPT-Chile, UNC and SKYNET are able to observe objects nearly continuously as Earth rotates. Users are also able to observe objects during the day from the western hemisphere.



Figure 4: PROMPT Siding Spring Observatory, Australia

PROMPT-Meckering Australia, consists of a 16-inch diameter telescope that is being built in partnership with the [Australian Space Academy](#) on the western side of Australia.



Figure 5: PROMPT Meckering Australia 16"

Events for March 2021

For updates to events, check the Academy website <http://www.rasny.org> and section websites.

Not meeting in March: Life Sciences Field Trips, Herbarium Group, Astronomy Star Parties, Strassenburgh Observatory, RAS Winterfest Activities

2 Tue: Fossil Section Meeting

7:30 p.m. The meeting will feature a presentation by Dr. Dale Hess speaking on “*Drumlins of New York State - What They Tell Us About Our Changing Climate*”. Meeting open to the public via [ZOOM](#). For an invitation link contact Michael Grenier at paleo@frontier.com.

5 Fri: Astronomy Section Meeting

7:30 p.m. Meeting held remotely via [BigBlueButton](#). Speaker: Joseph Eakin, Technical Director & Designer-Ho Tung Visualization Lab and Planetarium, Colgate University, will speak on Star Charting. Meeting details will be shared via email. Contact: Mark Minarich at mminaric@rochester.rr.com.

10 Wed: Astronomy Board Meeting

7:00 p.m. Meeting to be held remotely via [BigBlueButton](#). Meeting details will be shared via email. Contact: Mark Minarich at mminaric@rochester.rr.com.

13 Sat: Astronomy Public Open House

12:00 p.m. - 4:00 p.m. (or later, if skies are clear). Observing from dusk till ? . Outdoors only. Observing social distancing and masks as appropriate. Specific rules for bathroom are posted at the facility. Members may bring guests, but all must sign in at [Wolk Building](#) to facilitate contact tracing. Farash Center for Observational Astronomy, 8355 County Road 14 Ionia, NY 14475. Sledding, weather permitting. For weather related cancellations or changes contact Mark Minarich: (585) 257-6042 or see www.rochesterastronomy.org/calendar-of-events.



[Sundog](#) photo taken by ASRAS member Kevin Zwiebel at sunset over Long Pond in Greece, NY on Feb 17th, 2021.

13 Sat: Astronomy Messier Marthon

After sunset. Farash Center for Observational Astronomy, 8355 County Road 14 Ionia, NY 14475. Weather cancellation date: April 10th, 2021. Contact Mark Minarich at mminaric@rochester.rr.com.

16 Tue: Mineral Virtual Meeting

7:00 p.m. [ZOOM](#) meeting. Dan Robertson will tell stories of experiences in the mineral industry from around the world in *Lucky, Good, or Both: Their roles in mineral exploration and discovery*. Members will receive information by email. Contact: J. Dudley at juttasd@aol.com.

17 Wed: RAS Board Meeting

7:00 p.m. Meeting to be held remotely via [ZOOM](#). Meeting details will be shared via email. Contact: Michael Grenier at mgrenier@frontiernet.net.

PLEASE
Renew Membership
(form below)
by March 31.

2021 Rochester Academy of Science, Inc.							
Membership Form <u>Mail to:</u> R.A.S. c/o William L. Hallahan 6658 North Avon Rd. Honeoye Falls, NY 14472 <input type="checkbox"/> New <input type="checkbox"/> Renewal	Name _____ E-mail _____ Street _____ Phone _____ City _____ State _____ Zip _____						
For your convenience, please pay your dues to the R.A.S. and its sections with a single check. Make check payable to: Rochester Academy of Science CIRCLE the amount you are paying for an Academy category (shaded column) and for the Section(s) in which you wish membership.							
Membership Categories <i>R.A.S. dues are a prerequisite for section membership</i>	Rochester Academy of Science	Anthropology Section	Astronomy Section	Life Sciences Section	Fossil Section	Mineral Section	Total
Member (Individual over age 18)	\$10.00	\$2.00	\$25.00	\$2.00	\$10.00	\$5.00	
Family (Including students to age 18)	\$15.00	\$3.00	\$30.00	\$3.00	\$10.00	\$6.00	
Student (Through full-time undergrad.)	\$5.00	\$1.00	\$5.00	\$1.00	\$5.00	\$2.00	
Supporting (Individual or family)	\$20.00	*****	\$40.00	\$10.00	\$20.00	\$10.00	
Patron (Individual or family)	\$30.00	*****	\$50.00	\$20.00	\$30.00	\$20.00	
Life (Individual only)	\$200.00	*****	\$300.00	\$40.00	*****	*****	
Gift (Thank you!) Fill in amount ⇄							
<i>If you are away part of the year, please indicate the months:</i>							

Rochester Research in Review

[Feb 16, 2021. Cornell. Slow motion precursors give earthquakes the fast slip.](#)

[Feb 16, 2021. Cornell. Star employees get most of the credit - and blame](#)

[Feb 12, 2021, University at Buffalo, Study contradicts belief that whales learn songs from one another](#)

[Feb 12, 2021, RPI, Green tea compound aids p53, 'guardian of the genome' and tumor suppressor](#)

[Feb 11, 2021. Cornell. Family ties explain mysterious social life of coral gobies.](#)

[Feb 11, 2021. Cornell Ornithology. Study finds even the common house sparrow is declining. Citizen scientists provide the research data.](#)



[Classical drumlin](#) with farm shown above it for scale. See March 2nd Fossil Section meeting for discussion of *“Drumlins of New York State - What They Tell Us About Our Changing Climate”*.

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 e-mail 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>.

This **“BULLETIN”** is produced monthly, except July and September, by the Astronomy Section, Rochester Academy of Science. Submissions are due by the 10th of the month and may be emailed to editor@rasny.org.

The Academy postal address is P.O. Box 92642, Rochester NY 14692-0642.

[Feb 8, 2021, URMC, Brain changed by caffeine in utero](#)

[Feb 8, 2021, University at Buffalo, What rules govern the structure of membraneless organelles?](#)

[Jan 26, 2021. Cornell. Researchers simplify the study of gene-environment interactions](#)

[Jan 19, 2021, RIT. Astronomers dissect the anatomy of planetary nebulae using Hubble Space Telescope images](#)



[Sundog](#) photo taken by ASRAS member Kevin Lyons at sunset Feb 17th, 2021. Sundogs are due to refraction by atmospheric ice crystals

ROCHESTER ACADEMY OF SCIENCE CONTACTS

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