



## President's Message

### ANNUAL MEETING

Your RAS Board of Directors has rescheduled the Annual Meeting, and **this** is your official notice. The meeting will be held on July 18, 2020, about 7:00 p.m. at the Ionia Fire House, 8338 County Road 14, Ionia, NY 14475.

This will sound familiar to our Astronomy Section (ASRAS) members as it is also the Annual **RocheSTAR Fest** hosted by that section. So many of our members will already be there and, with the advantage of an outstanding speaker, this is an excellent opportunity for us all.

Non-ASRAS members will be welcome and will pay the ASRAS meeting fee of \$25. For this, you get an amazing barbeque dinner at 6:30 p.m. cooked on-site, can take advantage of many scientific programs throughout the day Saturday, and enjoy Dr. Nicholas Warner (SUNY Geneseo) talk on the "Mars Insight Rover" at 8:00 p.m. Dr. Warner is a planetary lead geologist of this NASA program. More on all this next month!

Balloting for the election of officers and directors will remain open. You may mail in a ballot or vote at the meeting.

I look forward to our return to normalcy and hope it will be in time to keep this meeting date. Meanwhile, take all necessary steps to protect your physical health and do science education for mental health and growth.

*Michael Grenier,*  
*RAS President*

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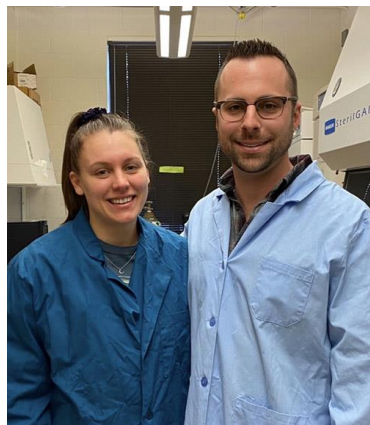
## Notice

### ALL RAS PUBLIC EVENTS IN MAY ARE CANCELLED!!!

#### 2019-2020 Undergraduate Student Research Grant Winner:

Cassandra Robataille, Hartwick College. *Interleukin- $\beta$ -induced Loss of Endothelial Barrier Function and the Role of Orexin-A.*

Sponsor: Joshua Garrett, Ph.D.



Cassandra Robataille, left. Dr. Joshua Garrett, right. Hartwick College

The endothelium is a single layer of cells that form a semi-permeable barrier regulating the transport of macro-molecules and water between the circulating blood and the underlying interstitium. The endothelial adherens junction is an important protein complex that promotes a strong barrier. During acute respiratory distress syndrome (ARDS), levels of the inflammatory cytokine Interleukin- $1\beta$  (IL- $1\beta$ ) rise resulting in a loss of adherens junctions, weakening of the barrier, and an increase in permeability of the lung vasculature. Ultimately, this permeability increase leads to

pulmonary edema and a loss of lung function. Orexin-A is a hormone made by the hypothalamus during sleep that has been shown to play an anti-inflammatory role within the endothelium. The objective of this research is to determine if there is a link between sleep and inflammation. Specifically, we will determine if there is a role for Orexin-A in preventing the increase in endothelial permeability caused by IL- $1\beta$  by protecting the adherens junction. This will be accomplished using human endothelial cells in an *in vitro* assay known as the XPerT assay to assess permeability and immuno-fluorescence to assess adherens junction levels.

This information will help to provide links between sleep disorders and risk of ARDS. Furthermore, this research may help to elucidate the therapeutic potential of using Orexin-A as a pharmacological treatment to restore the endothelial barrier during ARDS.

"I would like to thank the Rochester Academy of Science for funding our research, as well as the grants committee for selecting our project. Because of your generosity we are able to purchase all of the necessary materials that are needed for our research. Words can't express how grateful we are for the support that has been shown towards the undergraduate scientific community."

- Cassandra Robataille

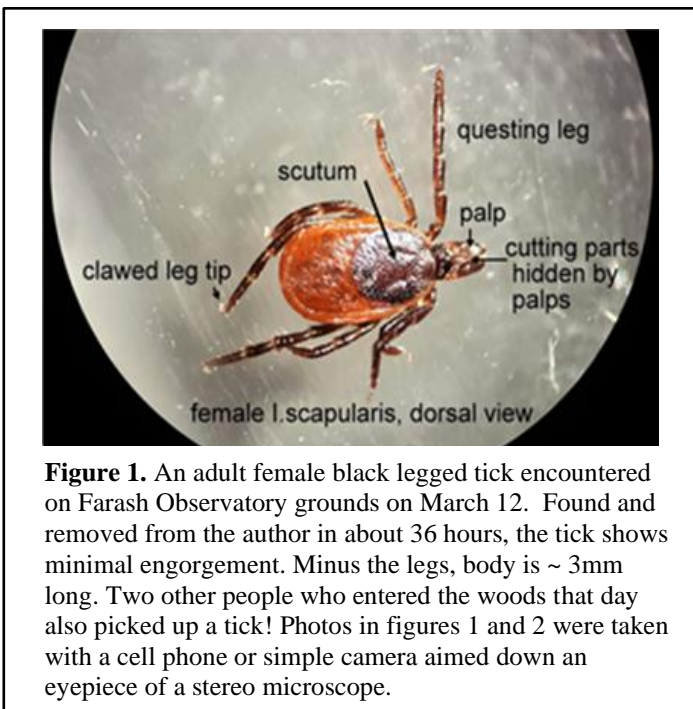
## Tick Encounters

By Jutta Siefert Dudley

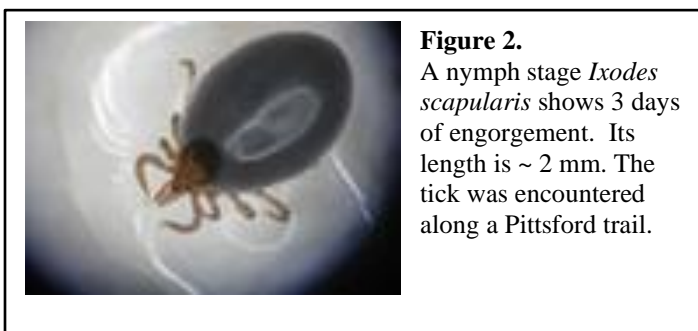
In recent years the tick population has greatly expanded, increasing the chance of being bit and even becoming ill from transmitted pathogens. With another season of outdoor activities coming up, let's review some details about ticks and their behavior, as well as some ways to reduce the risk of being bitten.

### Tick Anatomy and Life Cycle

Ticks are eight legged arachnids that feed only on blood to maintain their life cycle of four stages: egg, larva, nymph, and adult. This blood feeding livelihood is exemplified by a flat body with remarkable features. A commonly encountered tick, *Ixodes scapularis* (black legged tick, "deer" tick), serves as an example (Figure 1).



The eight legs of *Ixodes scapularis* have clawed tips and the first pair, raised up when questing for a host, have organs sensing chemicals, air currents, and heat. Once the tick has grabbed on to a host and chosen a spot to feed, its mouth parts go into action. The oral cavity of a tick features cutting tools surrounding a barbed central tube. The latter structure, plus the cement-like property of an injected substance, ensures a secure fastening.



The scutum is a shield like structure that remains the same size while the tick's body elongates during feeding. By comparing their lengths, you can approximate how long the tick has been attached. Its appearance, when contrasted to the rest of the body, is also useful in identifying species or distinguishing between males and females.

Larvae hatch from an egg cluster as dot sized ticks with only six legs. After feeding, larvae grow and molt, becoming nymphs with eight legs (~1 mm). This process repeats and they become adults (~3 mm). The entire process takes two years, and at each stage, a different host will have provided a blood meal for the black-legged tick.

### Encountering Ticks

Besides *I. scapularis*, another tick you can encounter in NYS is *Dermacentor variabilis* (American Dog tick). A third species, *Amblyomma americanum* (Lone Star tick), has advanced northward to approximately Lake Ontario's latitude, so we must be on the lookout for that one as well. These tick species are generally found within and along borders of wooded areas, among shrubs and tall grasses, and where moist leaves, ground cover, wood piles, and stone walls exist. Within these environments the ticks will find no lack of mammals or birds to serve as hosts.

The chance of encountering ticks at certain stages of their life varies due to their two-year cycle. We are most likely to serve as hosts to adult ticks from autumn to spring and nymphs from spring through the summer. Both stages survive over the winter and may bite you during thaws.

When feeding, ticks pick up microorganisms (via host blood) and can also transmit them (via tick saliva). *Borrelia burgdorferi*, harbored by white footed field mice, is an example of a bacterium, that when transmitted to humans, can cause Lyme disease. Lyme is the most increasingly reported vector-borne disease in the U.S. Helping to cause this is a warming climate and a booming deer population. These larger animals are a favored host of adult black legged ticks.

### Protecting Yourself

Some ways to protect yourself from ticks:

- 1) tuck your pants into your socks
- 2) use repellant with DEET (diethyltoluamide) repellant on exposed skin
- 3) treat selected field clothes with Permethrin
- 4) undress and leave field clothes in the garage
- 5) place clothes in dryer under high heat; washing will not kill them
- 6) do a full body check; shower to wash off loose ticks
- 7) remove a tick with needle nosed tweezers placed against the skin and pull tick straight up
- 8) save your tick to ID it, determine how long it has been attached and decide if a prophylactic treatment is desirable; have it tested for pathogens if necessary.
- 9) Lastly, read about ticks.

## More Information

Below are a few reliable and comprehensive sources where you will find information on anatomy, life cycles, species identification, comparison photos of nymph and adult engorgement over time, protection information, how to get your tick identified or tested, and much more.

Center for Disease Control:  
<https://www.cdc.gov/ticks/>

University of Rhode Island:  
[www.tickencounter.org](http://www.tickencounter.org)

NY State Department of Health:  
<https://www.health.ny.gov/publications/2813/>

East Stroudsburg University, PA:  
<https://www.tickcheck.com/info/tick-identification>

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*Cobblestone House. Photo: John G. Sheret*

## Winterfest Outreach Program

Every year, RAS volunteers staff tables at Monroe County Park's park wide Winterfest program at Mendon Ponds Park. This year we were there on February 23rd, the make-up date (on short notice) for the usual end-of-January event, which had to be cancelled. We again secured indoors rooms in the historic (c. 1835) Cobblestone House.

The Astronomy Section table was just inside the main entrance, and was staffed by Lori Englund, Tony Golumbeck, and Neil Hornik. The displays were nicely laid out, with lots of glossy color photos of space objects.



*Astronomy Table: Neil Hornik, seated. Lori Englund, right.*

In the basement were tables with displays, including many giveaways, from the Mineral and Fossil sections.

The mineral table was staffed by Jutta and Paul Dudley, Fred Haynes, and Kathy Henrie. It included many mineral specimens, and featured Fred's collection of sands from all over the world. Both sands and small mineral samples were given to visiting children.



*Mineral Section: Fred Haynes, left front. Jutta Dudley, behind.*

The fossil table included a bin where kids could search for a fossil to take home. It featured many New York Devonian fossils which families learned not only to identify, but also where to find them, with instruction by Dan Krisher, John Handley, and Michael Grenier.



*Fossil Section Table. Dan Krisher, John Handley and visitors.*

Also seen at the event were RAS members Larry Hirsch and Stephen Busschaert.

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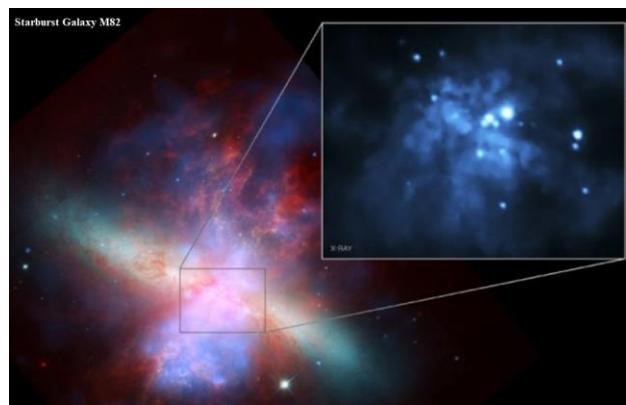
Because of National, State and County States of Emergency,  
All Public RAS Events in May are CANCELLED.

Contact your section's leaders for updates.



**James Canning (ASRAS) Images Interior Details of M82, the Starburst Galaxy**

Top Left: Color image of M82, by James Canning. Bottom Left: Image of M82, processed to show details of galactic core, by James Canning. At bottom right is a NASA image of M82 with the pullout showing bright x-ray sources from the Chandra X-Ray Observatory. M82 is known for its intermediate mass black holes possibly leading to a supermassive black hole, a type Ia supernova SN 2014J, and a very high luminosity micro-quasar detected at radio wavelengths.



**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](mailto: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 10<sup>th</sup> of the month and may be emailed to [editor@rasny.org](mailto:editor@rasny.org).

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