



## President's Message

My favorite RAS event each year is the Annual RAS Fall Scientific Paper Session. It is exciting to see the research underway across so many disciplines at our local colleges and universities. The session is also the setting for our annual fall lecture.

Many of our members reportedly find coral reefs to be fascinating. So, I am pleased to announce that our Larry King Memorial Speaker this year on November 6th will be Dr. Howard Lasker of SUNY Buffalo.



Dr. Howard Lasker

Your RAS Board of Directors reviewed many possible candidates for this honor and determined that Dr. Lasker would be the most interesting to our membership.

Dr. Lasker studies the ecology of coral reef organisms particularly the octocorals (soft corals and gorgonians).

He and his students have conducted studies ranging from the feeding ecology of butterfly fish to the evolution and systematics of corals. Current research employs a combination of field experiments and molecular studies to examine the reproduction and recruitment of

octocorals on Caribbean reefs. You will hear about SCUBA dive observations and lab work including DNA sequencing. Please join us for this interesting talk.

For more information, you can visit the Buffalo Undersea Reef Research (BURR) at <http://burr.bio.buffalo.edu/>.



Photo: Juan Sanchez, BURR website

**Save the Date!**  
**Saturday, November 6, 2021**  
**RAS Scientific Paper Session**  
**Nazareth College**

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## RAS Eclipse Outreach

The media love to pick up special events in the sciences that regular people can enjoy. The partial eclipse visible in Rochester on June 10th was very well publicized, leading many people to arise before dawn to see this spectacle. It was particularly well visible without Rochester's usual clouded over conditions.

Our Astronomy Section partnered with the Rochester Museum and Science Center to take advantage of this as an outreach event. We had members at the RMSC locations at Martin Road Park in Henrietta and at Hamlin Beach State Park, and at the ASRAS setups at Charlotte Pier.

My wife, Mary, and I got up early and made our way to Charlotte Pier, where Bob Berch had a menagerie of homemade viewing devices, including

a pinhole projection box, a #14 glass welding filter in wooden frame on tripod, a telescope projecting onto a yogurt lid, and a 30x Sony point & shoot camera with a #12 welding filter. The Channel 8 news team in foreground of Bob's photo did a short interview with him. I met several other ASRAS people there engaging the spectators.



At Charlotte Pier, Bob Berch's menagerie of homemade viewing devices. Photo: Bob Berch.

The Section also set up at Martin Road Park in Henrietta, where Mark Minarich with other members assisting set up a telescope with the eyepiece turned sideways (as seen in photo, next page), projecting the eclipse images onto a white sheet attached to the pop-up pavilion. Key to our outreach was providing safe viewing opportunities like this for many unprepared enthusiasts.



At Martin Road Park, there were over 150 people. Many visited the ASRAS setup.

Photo: Mark Minarich

**RAS Eclipse Outreach**  
(Continued on page 2)



View of Eclipse from Charlotte Pier. Photo: Brian Oyer

It was nice to have this spectacular event closer to home than was the solar eclipse of August 21, 2017. Even better was finding so many friends and fellow RAS members on hand with whom to share it.

A high point for us during this viewing occurred when a large flock of seagulls, appearing to me to be somewhat confused, flew and circled

just offshore between us and the eclipse. This scene was captured beautifully by ASRAS member Brian Oyer with his camera.



Michael Grenier, RAS President

## Fireflies Research Study Report, Part II

By Michael Grenier

Last month we discussed how the over 2,000 species of fireflies (beetle Family Lampyridae) are organized into sub-families by taxonomists with New York's most common firefly, *Photinus*, being a member of the Lampyrinae sub-family. We also reviewed a 2017 Brigham Young University research team's DNA-based analysis that refined the previously established seven subfamilies.

In a more recent 2018 study, another international team with twenty-one members led by Duane Mckenna (Univ. of Memphis) published their analysis of 367 beetle (Coleoptera) species representing 172 of the 183 extant families.

Coleoptera is the largest insect order, comprising about 40% of all insect species. They extracted and sequenced the total genomic DNA of these species and isolated several genes totaling 9000 base pairs for comparison.

Four genera of Lampyridae were included in the analysis: *Ellychnia* (Lampyrinae, N. America), *Pyrocoelia* (Lampyrinae, Asia), *Ototretadrilus* (Ototretinae, Asia). *Pterotus* (Pterotinae N. America).



Figure 1: Clockwise from top right: *Ellychnia*, *Pyrocoelia*, *Ototretadrilus*, *Pterotus*.

The team's phylogeny includes a molecular time tree estimating when families and subfamilies diverged.

They found that based on the "molecular clock" of DNA change rate, Coleoptera arose in the early Permian, and that only one or two lineages survived the end-Permian extinction events. Fortunately, there is

a fossil, *Coleopsis archaica*, the earliest known beetle, from the Early Permian in the Rotliegend of the Saar-Nahe Basin, Germany.



Figure 2: *Coleopsis archaica*

Lampyridae was found to have diverged from related families in the late Early Cretaceous about 110 Mya. The results from the DNA analysis are just an estimate. A datable fossil is required to verify the phylogenetic dating of the origin of fireflies.

Luckily, just this year in January 2021 a fossil firefly found in Burmese amber was published and the fossil is dated to about 100 Mya, thereby supporting the estimated origin by the Mckenna team.



Figure 3: *Cretophengodes azari* dorsal (a) and ventral (b) views, with arrowhead showing the photic organ.

You can read more about this exciting fossil in in the May RAS Fossil Section newsletter (FNL 2021-05.pdf) available at <https://rochesteracademyofscience.godaddysites.com/fossil-letter-pdfs>.

All referenced papers are available from author ([paleo@fronternet.net](mailto:paleo@fronternet.net)).

References continued on page 6

# Events for August/September 2021

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

## IN AUGUST

### NOT MEETING IN AUGUST

**Mineral Section Meeting**  
**Fossil Section Meeting**  
**Anthropology Section**  
**Life Sciences Field Trip**

### 6 Fri: Astronomy Section Meeting

7:30 p.m. Meeting held at the Farash Center. Speaker: David Bishop. Topic: David Bishop will host showing Chuck Spoelhof's talk in 2003 on the Lunar Orbiter probe. Meeting details will be shared via email. Contact: Mark Minarich at [mminaric@rochester.rr.com](mailto:mminaric@rochester.rr.com).

### 7 Sat: Astronomy Section Member Observing

Starting from dusk till last person leaves. Bathroom rules are posted. Members may bring guests, but all must sign in at [Wolk Building](#) for contact tracing. Farash Center for Observational Astronomy, 8355 County Road 14 Ionia, NY 14475. For cancellations or changes contact Mark Minarich at [mminaric@rochester.rr.com](mailto:mminaric@rochester.rr.com) or see: <http://www.rochesterastronomy.org/calendar-of-events>.

### 7 Sat: Astronomy Public Open House

12:00 p.m. - 4:00 p.m. (or later, if skies are clear). Observatory tours and work parties. Farash Center for Observational Astronomy, 8355 County Road 14 Ionia, NY 14475. For weather related cancellations or changes contact Mark Minarich: (585) 257-6042 or see: [www.rochesterastronomy.org/calendar-of-events](http://www.rochesterastronomy.org/calendar-of-events).

### 12 Thu: Astronomy Board Meeting

7:00 p.m. Meeting to be held at the Farash Center. Remote attendance via [BigBlueButton](#) as option. Meeting details will be shared via email. Contact: Mark Minarich at [mminaric@rochester.rr.com](mailto:mminaric@rochester.rr.com).

### 18 Wed: RAS Board Meeting

Virtual meeting using Zoom. For details, contact Michael Grenier at [mgrenier@frontiernet.net](mailto:mgrenier@frontiernet.net).

### 21 Sat: Fossil Section Field Trip

to Richard Hill Road Cut in Schoharie (near Albany) to collect in Lower Devonian Limestones. We meet on-site at 10:30 a.m. To sign up or for additional information contact Dan Krisher at [DLKFossil@gmail.com](mailto:DLKFossil@gmail.com)

### 27 Fri -28 Sat: RocheStarFest

Celebrating 30+ years at the Farash Center for Observational Astronomy. Featured speaker: Alex Filippenko, American astrophysicist and professor of Astronomy at UC-Berkeley. Registration due by Friday, August 20<sup>th</sup>.

**Events** Friday evening 7:00 p.m.: astro jeopardy followed by astro music trivia. Saturday 1:00 p.m.: talks, demonstrations, experiments, scavenger hunts, children's activities. 6:00 p.m.: barbeque dinner at Ionia Volunteer Firehouse. 7:15 p.m.: video on creation and construction of the Farash Center along with VIP recognition. 8:00 p.m.: virtual speaker Dr. Alex Filippenko followed by observing. For more information contact Mark Minarich at (585) 261-5666 or [mminaric@rochester.rr.com](mailto:mminaric@rochester.rr.com).



Dr. Alex Filippenko, RocheStarFest

Speaker

Photo: UC-Berkeley

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## IN SEPTEMBER

### NOT MEETING IN SEPTEMBER

**Fossil Section Meeting**  
**Fossil Section Field Trips**  
**Life Science Field Trip**  
**Anthropology Section**

### 4 Sat: Astronomy Section Member Observing

Start from dusk till last person leaves. Farash Center for Observational Astronomy, 8355 County Road 14 Ionia, NY 14475. For weather related cancellations or changes contact Mark Minarich: (585) 257-6042 or see: [www.rochesterastronomy.org/calendar-of-events](http://www.rochesterastronomy.org/calendar-of-events).

### 5 Sun: Astronomy Public Open House

12:00 p.m. - 4:00 p.m. (or later, if skies are clear). Observatory tours and work parties. Farash Center for Observational Astronomy, 8355 County Road 14 Ionia, NY 14475. For weather related cancellations or changes contact Mark Minarich at [mminaric@rochester.rr.com](mailto:mminaric@rochester.rr.com) or see <http://www.rochesterastronomy.org/calendar-of-events>.

### 8 Wed: Astronomy Board Meeting

7:00 p.m. Farash center Ionia with remote option. Meeting details will be shared via email. Contact: Mark Minarich at [mminaric@rochester.rr.com](mailto:mminaric@rochester.rr.com).

### 10 Fri: Astronomy Section Meeting

7:30 p.m. Meeting held at the Farash Center. Speaker: Dr. Michael Richmond. Meeting details will be shared via email. Contact: Mark Minarich at [mminaric@rochester.rr.com](mailto:mminaric@rochester.rr.com).

### 18 Sat: Herbarium Workshop

10 a.m. - 2 p.m. basement of the Rochester Museum and Science Center (RMSC). At RMSC go to the front desk to meet other participants and sign in. You may bring a lunch. For more information, or if you plan to attend, please send RSVP or inquires to Elizabeth Pixley, herbarium curator, at (585) 334-0977 or [eypixley@gmail.com](mailto:eypixley@gmail.com).

### COVID PRECAUTIONS for ALL EVENTS at FARASH CENTER

Indoors at normal capacity for those already vaccinated. If unvaccinated then with masks and social distancing or outdoors only. Members may bring guests, but all must sign-in at Wolk building for required contact tracing. Observe posted bathroom rules.

## Featured Article

### Dragonflies: Magnificent Insects

By Timothy A. Tatakis, Ph.D.,  
Biology Dept., Monroe Community College

#### Introduction

Dragonflies are insects familiar to many people. Some people are obsessed with learning about them and purchase expensive equipment to study and photograph them, while others are afraid of them and don't want to be near them. Most people simply enjoy seeing them and perhaps learning about their life habits. This article includes some basic facts about the life history of dragonflies and includes some examples of dragonfly species found in our region.

Dragonflies are insects (Class Insecta) and classified in the Order Odonata by entomologists.

Consequently, they are often referred to as Odonates. They are not the only Odonates however. Another group of insects, the damselflies, are also considered Odonates. There are some basic differences between these two groups. Figures 1 and 2 show two common Odonates found in our region. Figure 1 is a dragonfly, the Twelve-spotted Skimmer (*Libellula pulchella*). Figure 2 is a damselfly, the Ebony Jewelwing (*Calopteryx maculata*).



Figure 1: Twelve-spotted Skimmer (*Libellula pulchella*). Along the edge of a pond, Mendon, NY.

Photo: T. Tatakis

Some basic differences between dragonflies and damselflies include: dragonflies are usually larger than damselflies and are much stronger

fliers; dragonflies tend to perch with their wings outstretched and damselflies tend to perch with their wings folded over their bodies, and in dragonflies, the hind wings have a broader base than the forewings while in damselflies the base of the hind wings and forewings is similar. The rest of this article will primarily discuss dragonflies, perhaps a future article will focus on damselflies!



Figure 2: Ebony Jewelwing (*Calopteryx maculata*). Small stream in Chautauqua County, NY.

Photo: T. Tatakis

#### Dragonfly Biology and Life Cycle

Adult dragonflies have many of the typical characteristics of insects. They have three body regions: head, thorax, and abdomen. The head includes the mouthparts, a pair of large compound eyes, and other sensory structures. Adult dragonflies have excellent vision. They are voracious feeders and predatory by nature. They often catch their prey "on the wing" (while flying). They often feed on other insects such as flies and mosquitoes.

Adult dragonflies have six legs and four wings that are attached to the thorax region. They are generally very strong fliers, but many also perch regularly. The dragonfly abdomen is the longest body region and includes ten segments. This region contains the reproductive structures.

Immature dragonflies are quite different, and here we must examine the typical dragonfly life cycle.

Figure 3 shows a male and female mating; this is often referred to as a "mating wheel" and can often be seen in nature. During the mating process, the abdomen of the female will attach to the second segment of the male

abdomen and a spermatophore (sperm packet) is transferred into the female abdomen. Fertilization of the eggs with sperm from the spermatophore occurs in the female reproductive system. The female then deposits the fertilized eggs in a body of water (e.g., a pond or stream) or perhaps in a piece of vegetation associated with a body of water.



Figure 3: "Mating wheel" of male (red abdomen) and female Meadowhawk dragonfly (*Sympetrum sp.*)

Photo: T. Tatakis

The fertilized eggs will soon develop into embryos and eventually active, feeding dragonfly "nymphs" - the term used for the aquatic, immature stage. The nymphs are fully aquatic and use gills for gas exchange with the surrounding water (Corbet, 1999). They are active feeders, and often predatory in nature, catching other small aquatic insects (including larvae) or other invertebrates for food. Dragonflies typically live approximately one year as nymphs, perhaps longer. Adults generally live for 4-6 weeks (although in some species adults can live much longer). Therefore, dragonflies typically spend most of their lives as aquatic, immature nymphs. In New York, we generally don't see dragonflies flying around in the middle of winter, but we could find the nymphal stages surviving, although relatively inactive, in the bottom sediments of a frozen pond or stream! As water temperatures warm in the spring, activity levels of the nymphs will increase (Corbet, 1999). During the later nymphal stages, wings and other adult structures will begin to

## Dragonflies

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develop and the adult will finally emerge, leaving behind the exoskeleton (outer “skin”) of the last nymphal stage. This remaining exoskeleton left being following emergence of the adult is called an exuvia, shown in Figure 4.

Collecting and identifying dragonfly exuviae (plural) is a focus of study of some odonate scientists and it can produce important data on reproductive success of dragonfly species in selected habitats.



Figure 4: Dragonfly exuvia on a structure along the shore of Upper Saranac Lake, New York.

photo by T. Tatakis

### Dragonfly Identification and Diversity in Our Region

How many different species of dragonflies live in our region? A good source of information to assist in answering this question is the report resulting from the New York State Dragonfly and Damselfly Survey that was conducted by New York State agencies in 2005-2009 (White et al., 2010). The results of that study show that there are 194 species of Odonates in New York State and 61 of those species have been recorded in Monroe County.

There are several field guides and sources of information to assist in the identification of dragonflies. Two of my favorites are “A Field Guide to the Dragonflies and Damselflies of Massachusetts” (Nikula, et al., 2003) and “Dragonflies and Damselflies of Northeast Ohio” (Rosche, et al., 2008). Dragonfly identification to species is sometimes easy but can also be quite tedious. Some species

can easily be distinguished by unique color patterns on the head, thorax and/or abdomen, along with spotting patterns on the wings. One example is the male Twelve-spotted Skimmer, named for the spot patterns on the wings (Figure 1). Another example of an easily recognizable species is the Ebony Jewelwing damselfly; it is the only Odonate in our region with wings that are entirely black (Figure 2).

An example of a dragonfly group with individuals that are a bit more difficult to identify are the different species of darners in the genus *Aeshna*. Darners are, as a group, rather large, conspicuous dragonflies that are often seen flying over meadows and wetlands as they search for food or defend territories. One group of darners is the “mosaic darners”, so named because of the blue and green color patterns on their thorax and abdomen. These “mosaic darners” are in the genus *Aeshna*, and there are several species of these darners that can be found in our region.



Figure 5: Lance-tipped Darner (*Aeshna constricta*). Mendon Ponds Park, New York. Photo: T. Tatakis

Figure 5 shows one example: the Lance-tipped Darner (*Aeshna constricta*). Other species of *Aeshna* look similar, but minor differences in the patterns of stripes on the thorax and spotting on the abdomen are used as distinguishing characteristics for each species. Refer to one of the field guides mentioned earlier if you are interested in learning more about distinguishing these species (Nikula et al., 2003; Rosche et al, 2008).

The typical flight season of darners, especially the mosaic darners, is mid-summer into the autumn months. Other species of dragonflies have flight

seasons later in the year, while certain species fly only early in the year, and won't be found later in the season. Whether you are interested in looking for darners or perhaps other groups of Odonates, there is still plenty of time this year to search and learn about them in various habitats in New York State. Remember, partly because the immature stages of dragonflies are aquatic, adult dragonflies can often be found near ponds, lakes, streams, rivers, and wetland habitats. However, the adults can fly long distances from a body of water, often for food or dispersal. Therefore, they can also be found flying over fields and meadows, perching on vegetation and structures, or cruising in suburban and urban habitats. Whenever you are outdoors in upstate New York, you may encounter these very conspicuous and interesting insects - keep an eye out for them!

### References

- Corbet, P. S. 1999. Dragonflies - Behavior and Ecology of Odonata. Comstock Publishing Assoc., Cornell University. 829 pp.
- Nikula, B., J.L. Loose, and M. R. Burne. 2003. A Field Guide to the Dragonflies and Damselflies of Massachusetts. Massachusetts Div. of Fisheries & Wildlife, Natural Heritage & Endangered Species Program, publ. 197 pp.
- Rosche, L. O., J. M. Semroc, and L. K. Gilbert. 2008. Dragonflies and Damselflies of Northeast Ohio, 2nd ed. Cleveland Museum of Natural History, publ. 300 pp.
- White, E. L., J.D. Corser, and M. D. Schlesinger. 2010. The New York Dragonfly and Damselfly Survey 2005-2009: Distribution and Status of the Odonates of New York. New York Natural Heritage Program, Albany, New York. (can be accessed at: [https://www.nynhp.org/documents/104/dds\\_report.pdf](https://www.nynhp.org/documents/104/dds_report.pdf))

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## Fireflies, Part II

(Continued from page 2)

### References

Martin, G.J., et al. **Total evidence phylogeny and the evolution of adult bioluminescence in fireflies**

(Coleoptera: Lampyridae). *Molecular phylogenetics and evolution* 107 (2017) 564-575.

Mckenna, Duane D., et al. **The beetle tree of life reveals that Coleoptera survived end-Permian mass extinction to diversify during the Cretaceous terrestrial revolution.** *Systematic Entomology* 40.4 (2015): 835-880.

Yan-Da Li, et al. **Cretophengodidae, a new Cretaceous beetle family, sheds light on the evolution of bioluminescence.** *Proceedings of the Royal Society B: Biological Sciences* (2021) 288.

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## Rochester Research in Review

[July 28, 2021, Cornell, Hemp goes 'hot' due to genetics, not environmental stress.](#)

[July 27, 2021, UR, Under pressure, 'squishy' compound reacts in remarkable ways.](#)

[July 27, 2021, SUNY-Binghamton, Early signs: Perceptual distortions in late-teens predict psychotic symptoms in mid-life.](#)

[July 27, 2021, Cornell, Cell-analysis technique could combat tuberculosis.](#)

[July 21, 2021, Cornell, Study finds calcium precisely directs blood flow in the brain.](#)

[July 21, 2021, Cornell, Nanostructures enable record high-harmonic generation.](#)

[July 21, 2021, Cornell, Reaping the benefits: Training in rice growing system ups yields and well-being.](#)

[July 14, 2021, SU, Have you ever wondered how many species have inhabited Earth?](#)

[July 7, 2021, SUNY-ESF, Energycane produces more biodiesel than soybean at a lower cost.](#)

[June 29, 2021, Cornell Lab of Ornithology, Air pollution from wildfires impacts ability to observe birds.](#)

[June 24, 2021, URM, Parents of children with complex medical conditions more likely to have mental health issues.](#)

[June 23, 2021, Cornell, Exoplanets in 2,034 star-systems get cosmic front-row seat to see Earth.](#)

[June 17, 2021, UR, Novel chirped pulses defy 'conventional wisdom.'](#)

[June 14, 2021, SUNY-ESF, Biodiversity 'hotspots' imperiled along California's streams.](#)

[May 20, 2021, SUNY-Buffalo, Airborne radar reveals groundwater beneath glacier.](#)

View of Eclipse from Ionia, NY.



Photo: Doug Kostyk, taken from his hill 1000ft. above sea level, just NE of Farash Center.

### 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 10th of the month and may be emailed to [editor@rasny.org](mailto:editor@rasny.org).

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

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