



Penobscot Valley Star Gazers

An Astronomical Society of Central Maine

What can better please, / When your mind is well at ease,
Than a walk among the green fields in May?
-William Allingham



May 2020

<http://www.gazers.org>

Stardust in Maine

As you know, the May meeting of the PVSG will be held remotely through Zoom. Again, though you have seen it, we will repeat the announcement here for the newsletter record:

Dwight Lanpher is inviting you to a scheduled Zoom meeting.
Topic: PVSG May Zoom Meeting
Time: May 11, 2020 06:30 PM Eastern Time (US and Canada)
Join Zoom Meeting
<https://us02web.zoom.us/j/84866130871>

Hello All,

Monday May 11 at 6:30 we will be joined by another guest speaker from Southern ME, Jon Wallace, presenting "Stardust in Maine." See the program information below and the attached handout. ---Dwight

Stardust in Maine: Finding Micrometeorites on a Rooftop

Penobscot Valley
Star Gazers

Presentation: Monday May 11, 6:30 PM

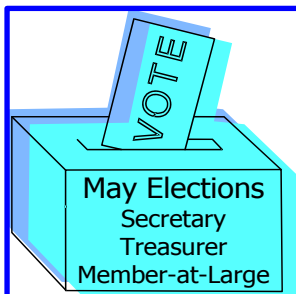
Micrometeorites are some of the oldest matter known. About 60 tons per day hit our Earth and yet, very few have been found outside of Antarctica, a few deserts and the deep ocean... until 2016, when Jon Larsen from Norway discovered the first "urban" micrometeorite. Since they are tiny (only a few times the width of a hair!), they are difficult to find, but Jon Wallace, a local scientist and educator, was intrigued and started looking in 2018. Using the protocol developed by Jon Larsen, he found his first two micrometeorites in his gutters.

Come view his images of micrometeorites found in Maine and discover what micrometeorites are, how they are found, how they can be photographed, how to identify them, and what we might learn from these most ancient visitors to our planet.





No April 13, 2020 Meeting
So, no minutes



Normally, we would have elections this month.
Our officers will decide how to handle it this year.

On the Schedule

(Items Subject to Change)

PROGRAMS

STAR PARTIES

April 17 canceled, April
24 canceled, May 15
canceled, May 22 can-
celed (co): Emera As-
tronomy Center.

? Tentative; (rs) rain or shine;
(co) clear only; (rd) rain date

Observe The Sky This Month

Some Selected Objects

May 2020

General sky comments – The May meeting will be on the 11th. I am excited because I will be able to attend just like the rest of the members. After a successful test online meeting in April the May 11th meeting will also be online. Look for full instructions if you do not already have them. This month we can be overwhelmed with the seemingly endless number of galaxies to be observed. Even where I live we have recently had nights in the 30° range.

Planets this month – Full Moon is on Thursday the 7th, last quarter is on Thursday the 14th, new Moon is on Friday the 22nd and first quarter is on Friday May 29th. The full Moon of June is on the 5th before the next meeting on June 8th. Mercury is brightening in the evening sky early in the month but is lost in the twilight until mid-month when it can be seen with difficulty. It passes within 1° of brilliant Venus on the 21st-22nd. Both planets are well north of the northern-most part of the ecliptic coming close to the star El Nath. The crescent moon joins this scene on the 23rd-24th. Venus begins the month in the evening sky 23° from the sun but rapidly appears to come closer to the Sun as it actually comes closer to the Earth. If you have never seen Venus in the daytime this is the time. Venus is one half degree [?] in size when it is in conjunction with Mercury on the 21st-22nd. Mars crosses from Capricorn into Aquarius in the morning sky early in the month and reaches first magnitude on the 31st. Jupiter is entering the late evening sky and will reach opposition next month. Saturn is in Sagittarius and visible for more than half the night. It is a good time to observe the rings. On the morning of May 12th the planets Jupiter and Saturn are joined by the Moon. All three are less than 5° apart. Get out your binocular while walking the dog. If you have a good telescope Pluto is not far away. Uranus is only visible with difficulty in the dawn sky during the second half of the month. Neptune is in the dawn morning sky in Aquarius. Pluto is in Sagittarius.

Constellations this month – If you want to see many galaxies or observe numerous Messier objects, this month and the next month are the times. The North and East side of Ursa Major as promised will be observed. Below Ursa Major are the constellations of Canes Venatici, the Hunting Dogs and its famous alpha star Cor Caroli. From Cor Caroli, alpha (α) Canes Venatici there are numerous observable galaxies. 4° NNW is M94 (NGC 4736) a spiral galaxy. 1¼° W of M95 is NGC 4618 (Arp 23) a barred spiral with a strange spiral arm. 1½° slightly north of W is the star beta (β) Canes Venatici. From there go ½° NW to a pair of interacting galaxies, NGC 4490 and NGC 4485 (Arp 269). Go back to Cor Caroli then 3° SE to NGC 5005 a spiral galaxy and only ¾° away SE is NGC 5033 another spiral orientated north to south. 5° NW of

Cor Caroli is M63 the Sunflower Galaxy (NGC 5055) a beautiful spiral especially in a large telescope. If you have trouble getting to the Sunflower it is located just north of a grouping of three bright stars. From M65 go 3° east and slightly south to find M94 the “Cat’s Eye nebula.” Also in Canes Venatici is M106. It is found easier from chi (χ) Ursa Major the next bright star below the bottom left corner star Phecda, gamma (γ) Ursa Major in the bowl of the asterism “The Big Dipper.” From chi go 5° slightly south of due west to M106, a spiral galaxy observed by Méchain but added to the Messier list in 1947 by Helen Sawyer Hogg. Look below in featured Messier object to find a discussion of Messier M94. Continuing in Ursa Major we will first note M109. To find M109 start at the before mentioned Phecda and go less than 1° SW to M109 a beautiful barred spiral galaxy similar to our own barred spiral the “Milky Way.” If you have never seen M40 the double star Messier placed in his catalog of objects not comets this is the time to observe it. Go to the top star of the bowl of “The Big Dipper” Megrez delta (δ) Ursa Major. From this star go 1° NW to the 5th magnitude star 70 Ursa Major then continue ¼° NW to this double star Winnecke4. There is a 12th mag galaxy to the west of M40 but this galaxy was beyond the capability of any telescope Messier had access to therefore Messier must have meant this double star to be M40. Next to observe is M101. To find it go to the stars near the end of “The Big Dipper” the double stars Mizar and Alcor plus the star at the end of the handle Alkaid. M101 is located at the tip of an equilateral triangle NW of these stars each side 5½° long. M101 is large but because it is so large it can be difficult to observe. Use low power and a wide field of view. My best view has been with a large binocular. I have also observed NGC 5473 and NGC 5474 side galaxies to M101. NGC 5473 is located ½° NNW of M101 and NGC 5474 is located ¾° SSE of M101. Coma Berenices is below Canes Venatici a constellation from ancient times known as the asterism representing the tuft on the end of the tail of Leo. It is now named for the hair of Berenices II queen of Ptolemy III Euergetes of Egypt who had sacrificed her hair to Aphrodite for the safe return of her husband from war. It was made a constellation by Tycho Brahe in 1607 and now listed as a modern constellation. To the Naked eye Coma is almost void of stars. You have to go to a dark site to see very many but what stars there are can help you find your way through “The Realm of the Galaxies.” This constellation along with Virgo contains well over 100 prominent galaxies and many more less prominent galaxies viewable with even modest telescopes (See below). The constellation of Virgo was the goddess of agriculture and most other people connected it with agriculture or fertility. Virgo contains the bright star Spica representing a head of grain held by Virgo. Finally we see the tail of Hydra and there is the constellation of Crater on it off to the west. Corvus is hovering above. We observed both of these last month. If you have a low observing sky the northern portion of Centaurus, the Centaur is just visible.

Featured star – Cor Caroli, Alpha (α) Canum Ve-

naticorum is located a little over 14 degrees SW of the star at the end of the handle of the big dipper, Alkaid eta (η) Ursa Major. I will not cover who or why this star received its popular name Cor Caroli (Charles' Heart) here. You can look up the two popular theories for yourself. Cor Caroli is a double star. The two are not the same color but it is difficult to tell the difference. Most consider them white and slightly yellow. It does not take a very powerful telescope to separate this pair. The dimmer of the pair is designated as Alpha (α) 1 at mag 5.6 and the brighter Alpha (α) 2 at mag 2.8. Alpha 2 is a star with two characteristics of interest. It is both a star with a very strong magnetic field and a star with a strong abundance of rare-earth elements. Stars with strong magnetic fields show The Zeeman Effect a splitting of spectral absorption lines. The Zeeman Effect was noticed in the europium lines at maximum magnetic intensity and when the polarity was reversed the chromium lines were at maximum intensity. The magnetic field seems to concentrate the rare-earth elements in the star but the origin of the magnetic field or the origin of the rare-earth elements is not known for certain. The current thinking is merging of neutron stars form rare-earth elements. Did this star result from a merging of neutron stars and somehow the strong magnetic field was a result? Just wondering. Did I mention both Cor Caroli Alpha 1 and Alpha 2 are also spectroscopic binaries? This is one mysterious star!

Featured constellations – Coma and Virgo and all the galaxies they contain are quite a challenge but if taken in small sections they do not have to be overwhelming. I have found if you start with Vindemiatrix, epsilon (ϵ) Virgo a third magnitude star (and a good star chart) go approximately 1.5° slightly north of west you come upon a pair of galaxies NGC 4762 and NGC 4754 one an elliptical and one a spiral. These two types of galaxies are what you will see all through this area although each galaxy will have variations. Once you have found this pair you are on your way into the Realm of the Galaxies. Continue 1.5° on the same line to the Messier galaxy M60, NGC 4649 an elliptical galaxy. This galaxy is slightly interacting with its neighbor NGC 4647 to form what the astronomer Halton Arp numbered as Arp 116. Continue on less distance this time to M59, NGC 4621 another elliptical galaxy. Continue on a little farther to M58, NGC 4579 one of the barred spiral galaxies in the Messier catalog. This galaxy is located next to an 8th mag. star. From M58 we now go NW the same distance we just traveled to find M89, NGC 4552 another elliptical. A little less distance this time NNE to M90, NGC 4569 a tipped spiral galaxy. Are you lost or confused yet? I know people with a go to telescope are saying "What is the big deal?" but isn't this more challenging? From here go SW to M87, NGC 4486 another elliptical galaxy characterized by its

supersize and jet although it takes a very large telescope to see the jet. Pause here and get a cup of coffee because it is going to get interesting. From M87 proceed about 1° almost NW to a pair of Messier objects M86, NGC 4406 and M 84, NGC 4374 both elliptical. M84 is the smaller of the two. From this point we will follow a chain of galaxies starting at M84 called Markarian's chain named after Benjamin Markarian who discovered these galaxies all have a common motion. After M84 they are M86, NGC 4438 and NGC 4435 known as the eyes then 4461, 4473, 4477, and NGC 4459. During this time we have crossed into the constellation Coma. From NGC 4459 go less than a degree NE to M88, NGC 4501, an open face spiral, then east to M91, NGC 4548 another of the Messier barred spirals. Back track to M88. From here the galaxies are farther apart. Almost 3° west is M99, NGC 4254 a grand design galaxy I imagine our Milky Way might resemble. To get our bearings near here is the 5th magnitude star 6 Como. Less than 1° west of 6 is M98, NGC 4292 a more edge on spiral. Follow a string of 5th magnitude stars NE to M100, another grand design galaxy. Don't miss this one. Above it and slightly east almost 2° is M85 an elliptical galaxy. There are two additional Messier galaxies in Virgo and then we will stop this time. 5° south of the Markarian chain of stars is a grouping of 6 magnitude stars. Between the two most prominent western stars is found M49, NGC 4472 an elliptical galaxy. Finally there is M61, NGC 4303 the third Messier barred spiral in this area. If you have found M49, M61 is almost 5° SSW. It is almost 5° north of eta (η) Virgo a 4th magnitude star.

Featured Messier object – M94 (NGC 4736) is found by locating Cor Corelli and proceeding 3° NNE. Known as the Cats Eye Galaxy M94 was discovered in 1781 by Pierre Méchain and observed by Messier two days later. The name comes from the contrast between the inner bright ring containing the starburst ring and the darker outer disk containing the spiral arms. Some astronomers think the inner and outer rings are the result of the merger with a smaller galaxy. Others think they were formed out of material in the galaxy and the galaxy is still evolving. A group of astronomers in 2008 announced M94 contains little or no dark matter and could have formed under gravitational influence while others have a contrasting view. M94 is the brightest member of the Canis Venatici group of about 40 galaxies. It appears M94 has very few or no dwarf companions which is unusual. Get out and observe this galaxy. It is face on and offers a great view. The larger your telescope the better. If you are unable to observe M94 at least locate the Hubble observation and view it.

Bill Shackelford

Stardust in Maine: Finding Micrometeorites on a Rooftop – Summary

Take your telescope to the sky

A **micrometeorite** (MM) is a microscopic object from space that falls to Earth and survives the trip through the atmosphere.

About **60 tons per day** of micrometeorites hit our Earth, much more than all other meteorites and space debris put together. Despite that, very few have been found outside of Antarctica, a few deserts and the deep ocean... until **2016**, when Jon Larsen from Norway discovered the first “**urban**” micrometeorite.

Since they are **tiny** (only a few times the width of a hair!), they are difficult to find.

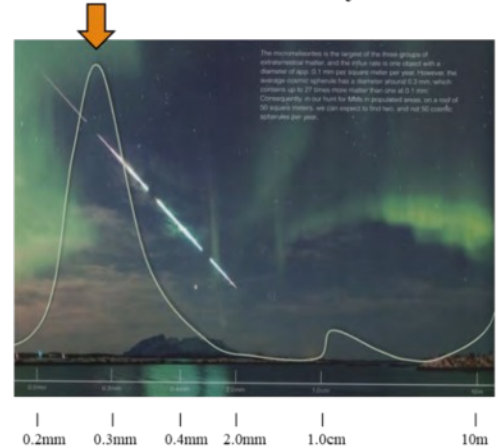


Micrometeorites enter the atmosphere at **25,000 to 150,000 mph** or more and usually heat up due to **Friction** and **Ram Pressure** (compression) and become spheroidal (not usually spheres but close).

The textures seen are formed from the heating they receive from passing through the atmosphere.

Depending on how micrometeorites ‘hit’ the atmosphere, they can produce heat from **about 400-2800°C (~750-5000 °F)**.

Micrometeorites – 60 tons/day



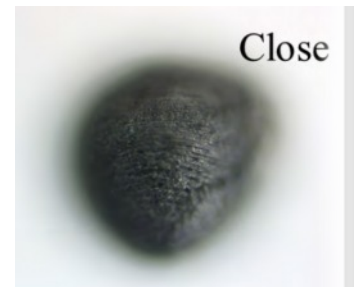
www.facebook.com/micrometeorites

In order to identify your micrometeorite, you must take an image since microscopes at **high power** only show ‘slices’ of objects in focus. By taking 100’s of images and **Focus Stacking** (using a program to take ‘in-focus’ parts of images and put them all together into one totally in-focus image) you can get an image to use for identification.

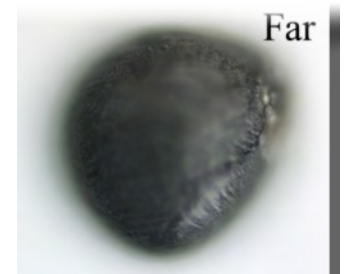
Hunting for Micrometeorites

- Find a flat roof or gutters
- Use a strong magnet to search for magnetic particles
- Double bag the magnet to prevent particles from sticking to it
- Collect material - wash thoroughly with laundry soap and ‘latex’ gloves
- Let water settle and pour off/repeat until water is clear
- Dry material
- Sieve or screen material (window screen would work in a pinch)
- Collect smaller material and examine it under 20-40x microscope/lens
- Examine any spheroids found under 100-400x microscope
- Take Focus-Stacked images of any possible micrometeorites
- Remember that **MANY** objects look like micrometeorites but are human-made!

If you have questions, comments, have material you are willing to donate to my research, or know of a roof I can search, please contact me at: wallacefj@comcast.net.



Close



Far



Final