

## The Newsletter of Westchester Amateur Astronomers

# July 2020



## Copernicus

Copernicus is probably the most popular lunar target for amateur observers and imagers. It's seen face-on, and it's optimally illuminated when the Moon is around 10 days old. At that point in its orbit our satellite is at just the right position if we take our scopes out after dinner for a look. Larry Faltz made this image in front of his house in Larchmont on May 3, 2020 at about 9:40 p.m. Orion 127-mm f/12.1 Maksutov on an iOptron tracking alt-az mount, Skyris 445 monochrome planetary camera. Best 500 of 5000 frames. Software: Autostakkaert!3 and Registax 6.1.

## **WAA September Meeting**

#### Friday, September 11 at 7:30 pm

#### Pecker Lecture Room, Wilcox Hall Pace University, Pleasantville, NY

#### Members' Night

Our first lecture of the academic year is always an opportunity for club members to talk about their activities over the past year. While astronomy trips and star parties may have been voided by the pandemic, many members have observed, imaged, read or tinkered, and your reports are always appreciated. Contact VP for Programs Pat Mahon at waaprograms@westchesterastronomers,org if you'd like to be on the program. If there are still restrictions on public gatherings and we can't do the meeting live and in person, we'll do it on line.

Pre-lecture socializing with fellow WAA members and guests begins at 7:00 pm!

WAA Members: Contribute to the Newsletter! Send articles, photos, or observations to waa-newsletter@westchesterastronomers.org

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Editor: Larry Faltz Assistant Editor: Scott Levine Almanac Editor: Bob Kelly Editor Emeritus: Tom Boustead

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WAA Hot Line: call 1-877-456-5778 (toll free) for announcements, weather cancellations, or questions. Also, don't forget to visit the <u>WAA website</u>.

### New Feature Deep Sky Object of the Month

Each issue, we'll highlight one object that will be wellplaced for evening viewing during the month. We hope all WAA members will take a look at it, a kind of "community observing" project. It will obviously have to be one of the brighter objects, since most of us have to observe from light-polluted Westchester, and smaller telescopes are more common than large ones among the membership. It won't be one of the common, familiar objects. We think it might expand your cosmic horizons just a little bit. Images will be welcome. See page 12 for this month's object.

#### Starway to Heaven

# Ward Pound Ridge Reservation, Cross River, NY

We are scheduled for July 18 (rain/cloud July 25) but only if the Park allows group events to resume. We'll send an email to members if that occurs. Masks, social distancing and eyepiece disinfection (see page 6) will be mandatory once we resume.

#### **New Members**

Jim Carroll Nastee Design Keith Fliszary Edwin Garcia Thomas Haeberle Frank Justo Allister McRae Maryellen Sinclair Jordan Solomon Jose Vega

#### **Renewing Members**

Arun Agarwal Erik & Eva Andersen Donna Cincotta Ireneo Fante Charlie Gibson Mark Hefter Mark Korsten James Nagy Kristina Newland John Paladini Deidre Raver Michael & Angela Virsinger Ernest Wieting Alan Young Yonkers Bronxville Peekskill Glendale Thornwood Port Chester Brewster Pleasantville Yonkers

Peekskill

Chappaqua Croton-on-Hudson Yonkers White Plains Scarsdale Dobbs Ferry Hastings on Hudson Waccabuc White Plains Mahopac Mahopac Seaford Cortlandt Manor Tarrytown

# ALMANAC For July 2020 Bob Kelly, WAA VP for Field Events

The advancing time of sunset, now that we are past the solstice, opens the curtain a bit wider on sights in the summer sky. The first new players are Jupiter and Saturn. The pair rise around sunset and remain low in the southern sky all summer. They look like a set of mismatched eyes staring at you as they clear the horizon about 8:30 p.m. local daylight time at the beginning of the month and 7:30 p.m. by its end. Jupiter and Saturn are brightest at opposition on the 14th (magnitude -2.8) and 20th (+0.1), respectively.

Saturn's rings show the "opposition effect," shining a bit brighter in the days around when it lines up perfectly with us and the Sun, an arrangement known as a "syzygy" (derived from a Greek word meaning "to yoke together"). This brightening, due to enhanced reflection from the ice particles that make up the rings, is also known as the Seeliger Effect, first described by the important (but now little known) German astronomer Hugo von Seeliger (1849-1924), who made studies of the rings' albedo.

Even when my eyes can't see the Cassini Division well, I can perceive that the A (outer) and B (inner) sets of rings have slightly different shadings of white and off-white. Large telescopes may afford a view of the thinner C ring, closer to the planet. Opposition is also a good time to look for Saturn's moons. How many can you spot? lapetus brightens up south of Saturn by the last week of July.

The past few months, we've tempted by comets that might have been in the range of smaller telescopes. C/2019 Y4 (ATLAS) was supposed to be a great comet, but it crumbled. What about July? The much-searched-for C/2017 T2 (PanSTARRS) will stay well placed high in the evening sky although it will be fading to 9th magnitude. Use large aperture binoculars, or a wide field telescope, and test your skill at following directions on the various comet web sites.

C/2020 F3 (NEOWISE) sounds like a character in a computer science fiction movie. It's bright now, but behind the Sun from Earth's point of view. It is readily seen in the SOHO C3 field as of this writing. Based on sky charts I've seen, it will be very low in the morning



sky, in Auriga, just after its July 3rd perihelion. Then it moves into the evening sky, bright but low in the northwest, moving higher as the month goes on. It's closest to us on the 22nd, 63 million miles away, fading as it races away from the Sun. Get a finder chart and look for NEOWISE in binoculars.

C/2019 U6 (Lemmon) moves into sight for our latitudes in mid-July. Stay tuned for updates.



Comet C/2020 F3 (NEOWISE) is near the right edge at 4 o'clock on this SOHO LASCO C3 image

The International Space Station is visible in the morning sky through the 11th. We have a set of appearances all night from the 13th through the 18th. Then, the ISS will be visible in the evening for the rest of July.

If you haven't seen a train of Starlink satellites moving across the sky, watch for a set after the next launch as they move toward their final, higher orbit where they will be much dimmer. Heavensabove.com gives train arrival times.

Celebrate the Fourth of July with the Earth at aphelion, its farthest distance from the Sun, at 7:34 a.m. on Saturday morning.

The night of the 4th/5th, we'll have a very light shading on the southern half of the Moon, darkest about 12:30 a.m. local daylight time. This penumbral eclipse covers only one-third of the Moon's face. None of the darker umbral shadow we know so well will cross the Moon this time, since the Sun is only partially blocked from the Moon's point of view. Does the partially shaded Moon make it a bit easier to see Jupiter and Saturn and their Moons? Another penumbral eclipse takes place on November 30th. The entire penumbral shadow will cover the Moon, but also none of the umbra.



Finder chart for C/2020 F3 NEOWISE on July's new Moon night of Monday, July 20 at 10 pm. The comet is predicted to be magnitude +4.2 but setting in the northwest. It will a bit higher as month ends, but its brightness will drop by a magnitude or so.

The Moon pairs up with Mars on the 11th and 12th. Mars looks like it's hurtling toward Earth, getting noticeably larger each month. While it's still as tiny as a lunar crater in the telescope, it's time to check out the planet's dusky markings. The South Pole is tilted toward Earth, so it's late autumn on Mars. Start planning for the October 6th closest approach of the Red Planet.

Trailing far behind in the morning sky, Venus is brightest at magnitude -4.5 on the 8th. It's a beautiful waxing crescent in a telescope, appearing smaller each week as its distance from the Sun increases. The Moon isn't as close to Venus as it was during last month's closest approach, but they make a great pair on the 17th. Mercury is still kicking around (or being kicked around) among the legs of Gemini. The swiftest planet peeks into the morning sky the last two weeks of the month.

Lunar perigee is on the 24th/25th, with a crescent Moon visible after sunset. The Milky Way arcs highest across the summer night sky about 2 a.m. local daylight time.



Jupiter and Saturn at 1 am EDT on Thursday, July 16th, when the pair will be straddling the meridian in a dark sky. The Moon will rise at 2:06 am, but the Moon's presence is generally not a problem for planetary observation or imaging.



NGC 2420 by Steve Bellavia

NGC 2420 is a magnitude 8.3 open cluster in Gemini, diameter 10 arcminutes. Steve captured the image this past winter and presented it as an "eyepiece view". More from Steve on pages 13, 18 and 19.

#### From the Editor

#### Larry Faltz



Trials and Tribulations of Imaging

Johannes Hevelius's 1673 refractor was apparently the ultimate in astro-frustration. As you would imagine, finding an object and

then keeping it in view was nearly impossible.

For Galileo, observing was easy. Mount your telescope on a pole and look at the sky. Want to record something? Make a drawing. Then came bigger telescopes needing assistants, some absurdly bigger, like Hevelius's 150-foot monster pictured above. Then mountings with setting circles. Then polar alignment. Then clock drives. Then daguerrotypes, wet emulsions, glass plates cameras, Kodak Technical Pan 2415, hypersensitization. Then encoders, handcontrol computers, RS-232, ASCOM, wi-fi, dedicated cameras, Bahtinov masks, periodic error correction, guiding, plate solving, flats, darks, bias frames, everincreasing power requirements, stacking, processing. The toys are great and the output rewarding, scientifically and artistically, if you can master all of the pieces. Astronomy can still be totally simple, like lying back and scanning the Milky Way with your own eyes under a dark sky, or it can be an expedition, like making a beautiful deep-sky image over multiple nights.

Of course, the more complicated things are, the more errors can occur, but one's sense of accomplishment and satisfaction is greater when stubborn or intricate problems are solved. Deep sky imaging is a neverending, glorious war between man and equipment that is fought skirmish after skirmish. Every once and a while the enemy attacks from a new direction. Here's a note we received from one of our very accomplished astro-imagers that gives a flavor to the magnificent battle:

I had many issues throughout the night, and although it did finally clear around 10:00 p.m. I had arrived at 7:00 p.m. but I only got 90 minutes of usable data with over seven hours of effort. It was cold and breezy, which was not the issue. After the recent Windows update, my laptop would completely shut down or freeze when you closed the lid. So after 20 minutes I accidentally closed the lid again, which I normally do out of habit to save some power but I forgot not do it with this new issue. I lost connection and cooling to the camera, as well as the mount and guide system, and had to start over. I never fully recovered from that. My mount lost its home position, so that EQMOD's auto PEC was actually making it guide worse instead of improving it, and I did not realize that until it was too late.

I do now have the laptop working better (I think?) after downloading a host of new drivers for the display, etc. I hate Microsoft.

I am now considering a dedicated mini-computer that will have the latest of all the software I use, installed at one time, completely isolated from the internet, and then never updated again after that.

When I got this note, I felt great sympathy for him, yet a part of me chuckled. We get pleasure from Tom's inability to defeat Jerry, or the failure of every single Acme product when used in good faith by Wile E. Coyote. And of course neither Jerry, nor Wile E., nor our astronomer, gets permanently hurt, and they'll return to the fight at the next opportunity. Indeed, our correspondent was back imaging the next clear moonless night.

On a particularly clear weekday evening in May over a dozen WAA members took advantage of our special use permit to observe (with advance notification) at Ward Pound Ridge Reservation. At least half a dozen were imaging. For some it was *sans souci*: polar alignment went well, the scope tracked nicely, meridian flips went without incident, the cameras and computers behaved, there was ample power and all seemed right with the world. For one or two others, **SkyWAAtch** 

the gremlins were winning. At least one was unable to acquire any imaging data at all. When he announced that he was packing up for the night but would try again soon, the image of Vivian Leigh as Scarlett O'Hara histrionically declaiming the last line of *Gone With the Wind* (much in the news lately) popped into my mind. The abandoned Scarlett looks out into the distance and with steely determination through tears says, "After all, tomorrow is another day!"

But then I thought of an even more philosophical illustration of our peculiar and wonderful hobby of astro-imaging, the joke Woody Allen tells at the end of *Annie Hall*.

This guy goes to a psychiatrist and says, "Doc, uh, my brother's crazy. He thinks he's a chicken." And, the doctor says, "Well, why don't you turn him in?" And the guy says, "I would, but I need the eggs."

Send you images to SkyWAAtch whether they're hard-boiled, scrambled or sunny-side up.

#### **Cleaning Eyepieces during the Covid-19 Pandemic**

All of us want to get out under the stars and resume our star parties, and conditions seem to be improving, at least in our area. Infection rates, hospitalizations and deaths in New York have been declining, but precautions still need to be taken to prevent another wave of this highly infectious, often very severe and frequently fatal disease.

Relaxation of strict isolation rules is underway in Westchester. There is still a prohibition on "Places of public amusement, whether indoors or outdoors, including but not limited to, locations with amusement rides, carnivals, amusement parks, water parks, aquariums, zoos, arcades, fairs, children's play centers, funplexes, theme parks, bowling alleys, family and children's attractions." Outdoor restaurant dining is now permitted, with a number of requirements that should reduce the possibility of transmission: adequate separation of tables and a requirement for staff and patrons to maintain face covering (except when eating, of course). By the time you read this, things may even be less restricted, but maybe not.

It's clear that transmission of the virus is much lower in fresh air than indoors. Sporting events, with people packed together in the stands breathing all over each other and cheering (or booing), still pose significant risk, so we won't be able to go to Yankee Stadium or Citi Field (or even to the Rockland Boulders) for a baseball game for quite some time. But star parties ought to be feasible: they are more like outdoor restaurants than amusement parks. We've written the Westchester Reopening Task Force and hope they will authorize the park to allow us to resume our public events in July. Individual member viewing with notification to the park is still permitted.

The observing field in Ward Pound Ridge Reservation is large enough (45,000 square feet) that social distancing is easy, and scopes are never set up so close to each other as to pose a problem even in ordinary times. For the foreseeable future we will insist on masks and social distancing at our star parties once they resume. The risk of Covid-19 infection will be with us for a long time.

There is evidence that SARS-CoV-2, the virus that causes Covid-19 disease, can be shed through the mucous membranes of the eye. Looking through a telescope could contaminate the eyepiece, creating a transmission risk. The virus is very sensitive to alcohol concentrations over 60%. Wiping the surface of the eyepiece with 91% isopropyl alcohol is safe for the eyepiece but fatal for the virus. Bottles of 91% alcohol are again available in pharmacies. A little goes a long way. While 70% isopropyl alcohol it would still work it might have a little too much water to be totally safe for your eyepiece.

All you have to do is moisten a small bit of a microfiber cloth (the kind your optometrist gives you when you buy a new pair of glasses) with alcohol and thoroughly swab the surface of the eyepiece (and the focus knob if that was used) after each observer. There is also a variety of 70% and 91% alcohol wipes and swabs sold commercially. Once the eyepiece is thoroughly wiped, a second, dry microfiber cloth should be used to remove any residual alcohol. The amount of disinfectant needed per eyepiece is minimal, and one pint of alcohol should last a year or more.

When you observe, you need to bring all sorts of paraphernalia: your scope, tripod and eyepieces, of course, but also power supplies, wires, headlamps, bug repellant, collimating tools, etc. Add some 91% alcohol and microfiber cloths to your kit. (The Editor is a physician.) ■

## Rev. Edward Lyon Berthon and his Dynamometer

#### John Paladini



When I was young lad back in 1966 and was first getting into amateur astronomy, one of the first books I purchased was *Norton's Star Atlas*. Page 47 describes a curious device called a Berthon Dynamometer. Fast forward 54 years and I am now the owner of one of these gadgets. What may be as interesting is that I desired to have one for the same reason Berthon developed it 130 years ago.

So what is a Dynamometer and what is it used for? It is a small ruler-type device that can accurately measure small circles. A good dynamometer will measure the diameter of the Ramsden disk (which we now call the "exit pupil") of a telescope eyepiece to an accuracy of better than 0.1 mm. This can then be used to measure the magnification power of the telescope system. How that is done and how that is useful for the amateur astronomer and telescope maker?

Today we take for granted that the focal lengths of our eyepieces are correct. From that, we can calculate the magnification, which is the telescope focal length FL) divided by eyepiece focal length (EFL). Most amateur astronomers are good at doing that in their heads when someone asks them "What magnification are you using?"

What if you are handed a telescope or eyepiece of which you don't know the FL or EFL? An even more difficult problem is if this telescope has a fixed eyepiece that is part of an inverting optical train. You can try to take the telescope apart, measure the focal length of each lens, do the calculations, and then try to put everything back together properly. This method may not make sense or even be possible in every case. You might not want to dissect a rare or historic telescope, and for compound systems like catadioptric telescopes it's a very bad idea to monkey with the corrector plate. Back in the late 1890's, English vintage telescopes were becoming available to amateur astronomers. Telescopes made by Dollond, Short and Bates made in the 1700's were on the market. Many of these instruments came with a fixed eyepiece. In many cases original documentation of the telescope's specifications were long lost. The Rev. Berthon was faced with this problem and so was I, because I own several antique telescopes from the 1790-1820 period. You just cannot rip these things apart without risking damage. So how can one determine their magnifications? Berthon's Dynamometer solves this problem.



REV. EDWARD LYON BERTHON, M.A.

The Dynamometer is one of Berthon's many inventions (he had 25 patents, most not for astronomical equipment). It is used to determine the magnification of an optical system by measuring the Ramsden disk. Dividing the objective diameter, a trivial measurement, by the measured Ramsden disk yields the magnification. There's no need to take anything apart.

E. L Berthon MA, FRAS (1813-1899) was born in Finsbury Square, London. At the age of 5 he was adopted by his grandmother. She must have had some wealth because she sent him to private schools in London until the age of 14. After that he went to Liverpool to study to become a surgeon. However he was drawn more to mechanical engineering. In 1834 he married Margaret Preston and gave up his medical career. They went on a 6 year honeymoon (wow—try that today!) to France, Switzerland and Italy. While in Switzerland he came up with the idea of the screw propeller for naval ships. However his contacts in the Admiralty basically shot down his idea. Powered boats at that time were using paddles. Although within 20 years most boats were using screw propellers, he got very little credit for the idea. More successfully, he came up with the idea of the collapsible boat, which is still being made in England to this day.

In 1841, he entered Magdalene College to study for the clergy, graduating with a BA in 1845 and MA in 1849. Throughout his adult life, Berthon was an amateur astronomer, a member of the large group of enthusiasts in England who contributed much to science and to our hobby.<sup>1</sup> In 1865 Berthon was elected a Fellow of the Royal Astronomical Society. In his obituary in the Monthly Notices of the RAS (1900, Vol. 60, pp. 314-316), he was described as follows: "Mr. Berthon was, in short, a man of wonderful versatility. As a preacher he was eloquent, as a lecturer bright and entertaining. Moreover, he had a great charm of speech, and was master of three or four languages." As far as astronomical inventions are concerned, he is best known for the Berthon mount and the Dynamometer. He built several telescopes and constructed the "Romsey Observatory," a standardized observatory building for amateur use, somewhat equivalent in concept to a SkyShed or similar products made today.<sup>2</sup>

The name "dynamometer" is to some extent problematical. If you look up "dynamometer" in a dictionary or encyclopedia, the device described will most likely be something that measures engine power or torque. Berthon called his device a dynamometer to mean "power-measurer" of a telescope, perhaps etymologically correct, but usurped by modern usage. In more recent times it has been renamed "dynameter," but even this name can be ambiguous, as it is often used for a device that measures sound power.

I feel very lucky to have one of these original instruments. According to Australian astronomer Andrew James, "Several brass Berthon Dynamometers were made during the 1890s until about 1905, but these are now all historical relics and are wholly unobtainable." So I obtained that which is not obtainable! I managed to find one from an on-line antique dealer at a good price. When I saw it, for a few seconds I felt like Indiana Jones finding the Ark of the Covenant or the Holy Grail! Well actually a few of these originals do come up for sale every now and then. Mine came in its original box.

To make a measurement, you simply point the optical system at a bright light, even just the sky or a lamp, and move the dynamometer across it until its two blades are just touching the edges of the Ramsden circle.

It is best to get some practice on a telescope and eyepiece with known focal lengths. By repeating your measurements you will learn what your own measuring bias might be, that is, whether there are any systematic variations in how you make your measurements that would affect the results.

The size of the exit pupil can be calculated from the focal ratio of objective and the EFL of eyepiece according to the formula

Exit Pupil = 
$$\frac{\text{Eyepiece focal length}}{\text{Telescope objective f/ ratio}}$$

Recall also that the telescope focal ratio can be calculated with the equation

Telescope f/ratio =  $\frac{\text{Telescope focal length}}{\text{Objective diameter}}$ 

And since

$$Magnification = \frac{\text{Telescope focal length}}{\text{Eyepiece focal length}}$$

substituting the variables, you can obtain the magnification from the exit pupil:

 $Magnification = \frac{Objective diameter}{Exit Pupil}$ 

<sup>&</sup>lt;sup>1</sup> A fine book on amateur astronomy in Berthon's era is Allan Chapman's *The Victorian Amateur Astronomer: Independent Astronomical Research in Britain 1820 – 1920,* Leominster, UK: Gracewing, 2017

<sup>&</sup>lt;sup>2</sup> A more complete biography can be found at

http://www.oasi.org.uk/Misc/Berthon/Berthon.php and Berthon's obituary is at

http://articles.adsabs.harvard.edu/full/1900MNRAS..60..3 14.

For a given objective, a longer focal length eyepiece has a higher magnification and a smaller exit pupil. The exit pupil, by the way, is independent of the apparent field of view of the eyepiece.



Since this type of measurement is never exact, it is customary to take several measurements and then take the average (good science practice anyway!)

I chose my 80-mm diameter 400-mm focal length (f/5) Jaeger telescope with a 20-mm eyepiece, giving 20 X, as my test setup. This set up gives a large exit pupil to practice on (see photo).

The readings from the dynamometer averaged 0.168 inches. Since I was not at infinity I took tangent number to subtract error.

So 3.15/0.168 = 18.75, which isn't bad, all things considered. Keep in mind I did violate one rule: the scope should be set at infinity or the exit pupil disk will be slightly larger. At infinity you take center line measurement.

After some practice I applied what I learned to my two-inch Dollond refractor, an instrument made in 1800. The assumption was that it has power of 30 X, a common power of the time for single-eyepiece telescopes. I came up with 33 X.



The modern dynameter is a descendant of Berthon's idea. It is basically a low power eyepiece with a reticle filter. As you may have guessed I also have one of

those. Mine was made by Bausch & Lomb. It has a 10 mm ruler with 0 at center and 5 mm on each side, and minor tick marks in 0.1 mm increments.<sup>3</sup>

This dynameter is used by placing on top of another eyepiece while that eyepiece is in the telescope scope set at infinity. It works well with modern eyepieces that are 1.25 inches in



diameter. It does not work as well for eyepieces of larger or smaller diameters. Berthon's ruler is more adaptable and easier to use for those situations. Fortunately, the focal lengths and optical diameters reported for modern instruments are very accurate, and you won't need to measure the exit pupils yourself unless you collect some vintage glass. ■

<sup>&</sup>lt;sup>3</sup> Instructions for making a dynameter can be found at <u>http://www.southastrodel.com/Page209.htm</u>.

#### Member Profile: Mike Cefola

Family: Myself, my wife Ann, and our rescue dog Daisy.

**How did you get interested in astronomy?** My dad was a scientist and bought me a telescope when I was around 14---a classic white 60-mm long tube refractor. I still have it. The optics are quite good.



Do you recall the first time you looked through a telescope? What did you see? It was through that telescope: the Moon, Jupiter and Saturn. My first deep sky object was the Orion Nebula. I actually still have the log book I made of those observations.

What's your favorite object(s) to view? Anything deep sky but since I obtained a high-end refractor, I am loving the planets and Moon again. Another singular area of viewing is that I love to hunt down rare star asterisms: The Stickman, The Golf Club, etc.

What kind of equipment do you have? Besides that early refractor, I have a TeleVue Pronto and TV 101. My go-to scope for years, and the first serious one I owned, is a Celestron C8+ which I got soon after joining WAA. In our second home in Vermont the garage has a roll-off roof with a Celestron C11 on a Losmandy G11 Mount and a Nightsky 18" Dob which I roll out of the garage to observe. Apart from the scopes, I am a binocular freak and have a number of them from birding to 30x100 tripod-mounted astronomy binos.

What kind of equipment would you like to get that you don't have? I actually don't have a computerized go-to mount. I find things by sight or setting circles. I am thinking about getting a Celestron AVX Mount.

Have you taken any trips or vacations dedicated to astronomy? Tell us about them. Some years back Ann and I went to New Mexico Skies Astronomy Retreat with friends from WAA. Along with the giant Dobs we looked through, one of my favorite observing nights was using a Celestron C11 on a go-to mount. It is really fantastic what one can see in a scope of that aperture in dark skies. We pulled in Stephan's Quintet along with other truly amazing sights.



Are there areas of current astronomical research that particularly interest you? Actually I am fascinated by rocketry and propulsion and still long for a major breakthrough that gets us away from solid fuel to gravitational or solar power. I watched too may Star Trek and sci-fi movies as a kid.

**Do you have any favorite personal astronomical experiences?** My one total solar eclipse in 1970, numerous aurora sightings, and perhaps my favorite--while observing in the front yard of Ann's uncle's home near Squam Lake, New Hampshire, a bolide crossed right over the top of the house. I was binocular observing and managed to get the object in view. Flaming chunks of the meteor were actually coming off it as it streaked across the sky. Incredible. I'm still waiting to see a major meteor storm.

What do you do (or did you do, if retired) in "real life"? I was a manager with what is now known as Verizon but started when it was good old NY Telephone. a.k.a. "Ma Bell."



Have you read any books about astronomy that you'd like to recommend? I love to read star charts the way others read books. My new favorite is the *Interstellarum Deep Sky Atlas* which goes into incredible detail, yet is user friendly unlike many others out there. I pride myself on knowing the night sky rather well without use of go-to or charts to locate objects.

**How did you get involved in WAA?** My wife bought me a copy of *Sky & Telescope* and reading it brought back all my childhood love of astronomy. I had heard about the club and decided to attend a meeting. This was around 1989. Ann and I joined and have been proud members ever since.

What WAA activities do you participate in? The lectures have always been wonderful and I used to attend the star parties regularly. I also enjoyed impromptu observing nights at WPR and am glad to see a new contingent of avid observers who meet up there for similar sessions.

If you have or have had a position in WAA, what is it, what are/were your responsibilities and what do you want the club to accomplish? I was the president of the club for two terms. The accomplishment I am most proud of while holding that position was moving the newsletter from paper send-out by mail to its electronic format. Not everyone was happy at the time but, seeing the incredible images posted by our members each month, I know it was the way to go and it keeps getting better every year.

**Besides your interest in astronomy, what other avocations do you have?** I love music and have played guitar in bands since I was a teenager and continue to do so to this day. My current band (when we can get back to live playing) focuses on British Blues and British Pop. The Beatles and Rolling Stones on Ed Sullivan set the flame and I have never stopped playing.



I have ridden motorcycles for over 40 years and have a love for Harley-Davidsons. Having owned a number of them through the years, I still have my 1989 FXR Super Glide--a true "street bike."

Provide any other information you think would be interesting to your fellow club members, and don't be bashful! As a teenager I had the incredible good fortune to meet Jesse Greenstein, a close friend of my father, who visited us at our home in Scarsdale. Dr. Greenstein founded the Caltech Astronomy Department in 1948 and did milestone research on stellar composition, working with the Hale Telescope at Mt. Palomar. I sat in wonder as he told me about the universe and will never forget him saying "we come from the stars" years before Carl Sagan's *Cosmos*. My awe of the night sky has never ceased from that moment.

#### Deep Sky Object of the Month for July 2020: Kemble 2

Kem	ble	2
		_

Object type	Asterism
NGC	N/A
Right Ascension (J2000)	18° 35′ 00″
Declination (J2000)	+72° 23′ 00″
Magnitude	7
Size	20'

Inspired by Mike Cefola's interest in asterisms, we picked one for our first "DSO of the Month." Kemble 2 has been called "Mini-Cassiopeia" for its resemblance to the "W" of Cassiopeia's chair, part of the WAA logo.

Lucian Kemble (1922-1999) was a Franciscan friar and amateur astronomer who lived in Alberta. His name is known for the more familiar asterism "Kemble's Cascade" in Camelopardalis. That assemblage of stars was communicated to Walter Scott Houston, then editor of *Sky & Telescope*, who coined the name in a "Deep Sky Wonders" column in 1980. Kemble described Kemble 2 in an unpublished article. Sue French, in *Deep Sky Wonders*, says that Kemble's Norwegian friend Arild Moland brought it to the attention of other observers and gave it its nickname. It was first plotted as Kemble 2 in the *Uranometria 2000.0* star atlas.



Image by John Mirtle <a href="http://www.astrofoto.ca/john/">http://www.astrofoto.ca/john/</a>

Visibility in July from Westchester at 10:00 pm EDT

Date	Altitude	Azimuth
7/1/2020	52° 58′ 52.8″	19° 30′ 38″
7/15/2020	56° 03′ 21.7″	14° 40′ 25″
7/31/2020	58° 18′ 40.8″	06° 56′ 42″

Kemble 2 is  $1.1^{\circ}$  east-southeast of the class F star Chi ( $\chi$ ) Draconis, magnitude 3.6. It's only 18° from Polaris and thus is circumpolar for our latitude.



#### Steve Bellavia Images Kuiper Belt Objects with a Six-Inch Telescope

We're continually amazed by the fantastic images coming from portable small aperture telescopes. Leandro Bento's amazing images of the Rosette Nebula in the <u>May 2020 SkyWAAtch</u> and IC1318 on page 20 of this issue were obtained with just 51 mm of aperture. Fine mounts, guiding and sensitive cameras produce multiple subs that can be stacked for hours' worth of data.

Club member Steve Bellavia often images from eastern Long Island with a Celestron 6-inch SCT outfitted with a Starizona HyperStar, functioning at f/2. The camera shown is a ZWO ASI183MM cooled monochrome camera, 20 megapixels, sensor size 13.2 x 8.8 mm. The SkyWatcher EQ6-R Pro equatorial mount is guided with an old T-mount Tele-Lentar 300-mm f/5.5 lens using a ZWO ASI224MC 1.2-megapixel camera. An Astronomik L2 UV-IR cut filter was in the optical train for these images. Note the clever support on the front of the tele-

scope that holds the wires, reducing unwanted diffraction and preventing contact with the optics.

Steve imaged two Kuiper Belt objects in April, integrating for 40 minutes on each object plus 30 dark, 30 flat and 30 flat-dark frames. He used APT, Nebulosity, PHD2, and EQMOD to drive the mount and to acquire the images and PixInsight to process them.

Haumea (minor-planet designation 136108 Haumea) is a dwarf planet located beyond Neptune's orbit. It was discovered in 2004 by a team headed by Mike Brown of Caltech with a 1.3-meter telescope at the Palomar Observatory in the United States. It was named after Haumea, the Hawaiian goddess of childbirth. It has a mean radius of 780 km with an apparent magnitude of 17.3.

Makemake is a dwarf planet and perhaps the second largest Kuiper belt object in the classical population, with a diameter approximately two-thirds that of Pluto. It was discovered on March 31, 2005 by Mike Brown's team. Initially, it was called 2005  $FY_9$  and later given the minor-planet number 136472. In July



2008 it was named after Makemake, the creator god of the Rapa Nui people of Easter Island. It has a mean radius of 739 km and an apparent magnitude of 17.0. Makemake has one known satellite, S/2015 (136472).

Steve notes "Using my little 6-inch telescope, I was able to see Makemake and Haumea on my screen in single 1-minute exposures, and by aligning the single image on the second night with a single image from the first night, I could easily see the object move while I was sitting there, without any calibration, stacking, etc. To me, this was very exciting!

"This makes me wonder why it took until 2004 and 2005 for these to be discovered. Yes, of course it was easy for me, as I knew where to look, but what about all the comet hunters, and survey telescopes, like Lincoln and Sloan? This is about the magnitude where comets are discovered. In some ways, these are easier than comets, since they don't move much in a single night, so you can do many and/or long exposures. It makes me wonder what else the big observatories are missing that amateurs could capture."



#### How Lucky (Imaging) Can You Get?





Making images of the Moon and brighter planets is easy, even with a small telescope, using the technique sometimes called "lucky imaging." There are quite a few very capable CMOS cameras currently being marketed in the \$250-300 price range. Many of them are color imagers. Getting these cameras up and running is not difficult, although there are a few subtleties in the software, imaging parameters, focusing and processing that you have to learn. There's a lot of useful information on the Internet. You don't even need an equatorial mount. As long as you are well-aligned and have tracking, an alt-az mount will be sufficient, since alignment and field rotation corrections are made by the processing software. You can even make planetary images during a full Moon.

The cameras record a video file (usually avi), and then software (free!) evaluates the frames, picks out the best ones and stacks the images. The resulting uncompressed tiff mage file can be tweaked to get a pleasing final image. I stack with Autostakkaert!3, bring out details with the wavelet function of Registax 6.1 (Registax can also do stacking) and finish color balance, contrast and brightness with Photoshop Elements. Unlike deep sky imaging, planetary imaging doesn't require hours of exposures and complex, time-consuming computer manipulation.

There are many factors that impact the final image, and you won't match the really high-quality work being done by amateurs with large, optimally sited, equatorially mounted and meticulously aligned telescopes using sensitive monochrome cameras and color filters, who image on nights with the best seeing. Nevertheless, there's tremendous satisfaction in making your own images. This image was made on August 10, 2019 at the Crossways ballfield in Scarsdale. Saturn was only at 24° altitude. Seeing and transparency were poor. Individual frames of the avi file were ghastly (a typical frame is on the left) as the image contorted due to the many thermals in the atmosphere. I used a Celestron CPC800 (alt-az mount) with an older Celestron Neximage 5 color camera (still being sold for around \$150). After focusing as best I could on Saturn's moons I dropped the gain and exposure settings in the iCap 2.4 software to give a reasonable range of brightness in its histogram display, I recorded 2446 640x480 frames over a couple of minutes. The best 20% of the frames were automatically selected, aligned and stacked. The resulting tiff file was resized and processed as I mentioned above. The final image won't make it into Sky & Telescope or APOD, would never get respect on CloudyNights, and doesn't rival what some other WAA members have produced on clearer nights with better equipment and greater skill, but it happily surprised me and amazed my friends.

Jupiter and Saturn will be quite close together in Sagittarius this summer but again very low in the southern sky, since they are near the nadir of the ecliptic. Nevertheless, you should be able to make decent images on a clear night. Mars will be quite large and well placed in the fall, making its closest approach to Earth on October 6th when it will be 22.6" in diameter and above 50° elevation. It takes patience to observe the Martian surface features at the eyepiece (an orange filter helps). Lucky imaging will bring out details if you're patient and lucky. Plan now, and send your images to SkyWAAtch!■

#### Images





**Tony Bonaviso** sent in images of two of everyone's favorite deep sky objects. They were taken at Ward Pound with a DSLR Nikon D500 at ISO 1600, Astro-Tec AT92 APO triplet on a Skwatcher mount.

Top: M42, auto-guided with PHD2. 150x20 sec. processed in Pixinsight.

Left: M27, unguided, 50 x 1 min., processed in Photoshop.



After gracing the evening sky for months as Hesperus, the evening star, Venus passed inferior conjunction on June 3rd and is now Lucifer, the morning star. In Latin, Lucifer means "bringer of light." The star does not represent Christianity's bad guy. John Paladini captured this view of the planet a few minutes after sunset on May 20th, when it was just 6.7% illuminated, 20 degrees from the Sun and 15 degrees above the horizon. Even though so little of the sunlit side is visible, the planet still shined at magnitude -4.3, with a disk diameter of 52.9 arc-seconds. John obtained this image with an 8" Schmidt-Cassegrain, using a filter that passes just infrared wavelengths centered on 1000 nm, with a bandwidth of only 10 nanometers. John notes "unless you're Predator (from the movie) or a pit viper, 1000 nm is totally black to humans."



New astrophotographer **Greg Borrelly's** image of open cluster Messier 35 is a one hour exposure with a Canon T6i on a 102-mm refractor.



Gary Miller imaged NGC 2903, a magnitude 9.75 spiral galaxy in Leo just off the lion's "sickle."



Supernova 2020jfo erupted in early May in Messier 61, a 10.18-magnitude spiral galaxy in the Virgo cluster. Many amateurs captured the event. **Steve Bellavia** (left) had a pre-event image of the galaxy to pair with his capture of the supernova. **Robin Stuart** (right) sent us a labeled image. M61 has hosted eight supernovas since 1926, one of the most fecund galaxies for this type of object. Steve images under dark skies in eastern Long Island, while Robin's Televue 127 is set up in light-polluted Valhalla.



M66 is one of the "Leo Triplet" galaxies. This is **Steve** Bellavia's first light image with a new camera, the ZWO ASI533MC. It has 9 megapixels in a 1-inch square CMOS sensor. He used the telescope/mount setup described on page 13 in this issue, with a Celestron focal reducer, to achieve f/6.9 and 1030-mm focal length. He also used an Astronomik L2 UV-IR cut-filter. Image capture: 30 x 180 seconds, using APT for platesolving (with Plane Wave PS2), capture, and dithering. Calibration: 30 flat and 30 dark-flat frames at 0.5 seconds each, and 30 dark frames at 180 seconds each.

Scott Nammacher captured starburst galaxy NGC 4490 in Canes Venatici, sometimes called the "Cocoon-Galaxy." The magnitude 9.8 barred spiral is interacting with smaller NGC 4485, magnitude 11.9. The pair is catalogued as Arp 269. PlaneWave 12.5-inch scope, SBIG 10XME camera, guided by a SBIG S-1 off-axis camera, shot over several nights using MaximDL, stacked and calibrated there and processed in Photoshop. There were 65 minutes of luminance frames, 76 min of green, 97 of red and 131 minutes of blue. The images were converted from FITS to TIFF using FITS Liberator by ESA. Once Scott obtained the LRGB, he applied a second high-pass filter sharpening step.





#### IC 1318 in Cygnus by Leandro Bento

Leandro made this dazzling image on May 31st at Ward Pound Ridge Reservation. Cygnus was low in the sky (IC 1318 was only at 28° elevation at 11 p.m.) and the Moon was 73% illuminated. He used a WO Redcat 51 refractor, ZWO ASI533MC Pro cooled color camera, iOptron Skyguider Pro tracker, Optplong L-enhance dual band filter. Fifty 3-minute subs at -10° C sensor temperature. Darks, flats and bias taken. Processed in Pixinsight. A spectacular result once again from a small telescope and simple mount.

IC 1318 is an emission nebula close to γ (Gamma) Cygni (Sadr), the heart of the swan. Part of the whole Gamma Cygni Nebula complex, IC 1318 was discovered by E.E. Barnard on a photographic plate around 1893 and included in the Index Catalogue of 1895. The open cluster above γ Cygni is NGC 6910.



#### Active Region 12765 by Mauri Rosenthal

After a long stretch during the solar minimum with almost zero sunspot activity, sunspot AR 2765 (upper left) put on a great show during the second week in June, with an extended filament visible to H-alpha viewers. On June 7th the spot began its journey across the face as the Sun rotates (from left to right in this image). Based on its magnetic orientation, the spot is associated with new solar cycle 25 and hopefully solar activity will pick up in the coming months.

This image was captured with a 3.5" Questar outfitted for H-alpha with a DayStar Quark and Energy Rejection Filter. A few minutes of 5-millisecond exposures from a QHY 5-III monochrome camera were processed using AutoStackaert!3, Pixinsight, IMPPG, and ADCSee to form this false color image.

There is an enormous amount of information about solar activity at NOAA's Space Weather Prediction

Center, <u>https://www.swpc.noaa.gov/</u>. The graph below comes from the Sunspot Index and Long-term Solar Observations division of the Royal Observatory of Belgium, <u>http://www.sidc.be/silso/</u>. Solar images are available at <u>https://sohowww.nascom.nasa.gov/</u>.



#### **Research Highlight of the Month**

#### A census of baryons in the Universe from localized fast radio bursts

J.P. Macquart et. al., Nature 2020; 581:391-395

Evidence from CMB and Big Bang nucleosynthesis suggests that normal baryonic matter only represents about 5% of the mass-energy content of the universe. Astronomers have accounted for only about half of it from the mass of galaxies and galaxy clusters and the density of intergalactic hydrogen and helium in early cosmic eras using spectroscopy. Recently, fast radio bursts have been localized to distant galaxies. Intervening matter along the entire path of the burst causes dispersion of the radio waves proportional to the matter density, with most of the contribution coming from warm  $(10^5 \cdot 10^7 \text{ K})$  intergalactic ionized baryons (rather than from baryons in gas in the Milky Way), mostly protons and some helium nuclei.





Dispersion retards the pulse arrival time proportional to the wave-length.

Data was collected on six FRBs originating in galaxies with redshifts between 0.118 and 0.522 using the thirty-six 12-meter dishes of the Australian Square Kilometer Array Pathfinder, a prototype for the full Square Kilometer Array currently scheduled to begin construction in Australia and South Africa in 2021. When completed, the SKA will be the largest scientific instrument ever built.

Based on the measurements of the dispersion of the FRB signals at each object's redshift and assuming a Hubble constant of 70 km s<sup>-1</sup> Mpc<sup>-1</sup>, the cosmic baryon density is found to be

$$\Omega_b = 0.051^{+0.021}_{-0.025} H_{70}^{-1}$$

The authors conclude "This independent measurement is consistent with values derived from the cosmic microwave background and from Big Bang nucleosynthesis."

It may be possible to utilize this technique to map out the cosmic web, if enough FRBs can be localized once the full Square Kilometer Array comes on line. ■

# Member & Club Equipment for Sale

Item	Description	Asking price	Name/Email	
Meade 395 90 mm achromatic refractor	Long-tube refractor, f/11 (focal length 1000 mm). Straight-through finder. Rings but no dovetail. 1.25" rack-and-pinion focuser. No eyepiece. Excellent condi- tion. A "planet killer." Donated to WAA.	\$100	WAA ads@westchesterastronomers.org	
Meade LX-70 Equatorial Mount	Dual Axis Drive and Polar Scope - Brand New. Bought during the closeout sale of these mounts. Owner thought he might like to have a light GEM, but decided to stick with alt-az mounts. Set up once in the garage to be sure it all works, and it does, but never saw first light in the field. Price paid: \$365.	\$195	Eugene Lewis genelew1@gmail.com	
Sky-Watcher 10" f/5 reflector OTA	Brand new in box. Newtonian optical tube, 2" focuser, tube rings. No eyepieces, finder or dovetail. Would make a great Dobsonian or use on a decent sized GEM. These listed at over \$500 when new. Donated to WAA.	\$225	WAA ads@westchesterastronomers.org	
Celestron 6-inch f/5 reflector OTA	Same tube as the Orion 6" StarBlast. 1¼" rack-and- pinion focuser, Celestron 25 mm EP, tube rings, dove- tail plate. 5x30 straight through finder. Dark canvas carrying case with compartments, room for accesso- ries. Excellent condition, unblemished optics. This size OTA is hard to find without a mount. A similar Orion StarBlast 6 with 1¼" focuser and table-top Dobsonian mount lists for \$379. Meade's 6" f/5 OTA, admittedly with a 2" Crayford focuser but no case, lists for \$339. Donated to WAA.	\$175	WAA ads@westchesterastronomers.org	
Celestron Orange Tube C8	A gem from the 1970's! WAA has had this scope in storage for a long time. Serial #25778-6, labeled "Celestron Pacific," so it was made before Celestron's founder Tom Johnson changed the company's name to "Celestron International" in 1978. Perfect condition, unblemished optics, comes with 110 volt power cable, finder and wedge, lacks only the tripod. Includes sev- eral eyepieces and other paraphernalia. You could also de-fork it and use the optical tube on a go-to GEM, which actually makes the most sense, although you might feel bad about getting rid of the iconic Celestron fork mount. Current Celestron 8" SCT optical tubes list for \$679-\$800.	\$300	WAA ads@westchesterastronomers.org	
Want to list something for sale in the next issue of the WAA newsletter? Send the description and asking price to ads@westchesterastronomers.org. Member submissions only. Please submit only serious and useful astronomy equipment. WAA reserves the right not to list items we think are not of value to members.				
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