



Event Horizon

Volume 26, Number 5
March 2019



From The Editor

This extended edition of the E.H. is largely in the spirit of the “Messier Marathon”, given that this is the time of year when all 110 deep-sky objects of the Messier catalog can be seen.

Enjoy!

Bob Christmas, Editor

editor ‘AT’
amateurastronomy.org



Chair's Report by John Gauvreau

Well this is going to sound redundant. I am sitting in front of the computer, looking out the window at a raging blizzard. Again. High winds, heavy snow and just a soft white light coming in the window from a landscape that is barely visible out there. There is an old, long running joke in amateur astronomy that new purchases of telescopes or other astronomy gear brings bad weather, so you can't use it. Just yesterday I got a phone call from a telescope store I like telling me that an item I ordered had arrived and they were shipping it to me. It should arrive here at the house by the day after tomorrow. So ok, I am willing to take part of the blame for this. But all I bought was a PoleMaster for my mount (a device which helps achieve a very accurate polar alignment) so I don't think I should take all of the blame for this weather. The way this winter has been going I expect to see HAA members armed with many new and large telescopes for spring observing. So which ones of you have got new 20" dobsonians, 6" triplet refractors or a full set of Ethos eyepieces, because I figure it has to be something that good to bring the 'new astronomy equipment curse' on us so strongly to account for this weather!

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Chair's Report (continued)

Joking aside, I really haven't taken my scope out much this winter. Instead I have used my binoculars a lot. I have several binoculars of different sizes and I enjoy them all. For a quick look on a cold night they can show so many wonderful sights in the night sky. Just this morning I was looking over a web site I really enjoy called 'Cloudy Nights' (www.cloudynights.com) which is full of articles, reviews and discussion forums. I have learned a lot there and the discussion thread I was reading this morning was encouraging people to list their favourite binocular observing targets. Despite the bad weather we have had, I realized that over the past number of months I have been able to see all the things I put on my favourites list.

- First, a lunar eclipse, which I always think looks so much better through binoculars, with the moon having a sphere like 3-D look.
- M45, the Pleiades, especially when seen rising in the fall, spied through the bare branches of a foreground tree.
- The belt and sword of Orion. Framed so nicely through binoculars, this rich field just can't all fit into a telescopic view at once.
- Melotte 20, the Alpha Persei cluster. Centered around the bright star Mirfak, this rich and pretty cluster again fits a binocular field better than a telescope.
- Sweeping the Milky Way. In the summer from the rich star fields of Sagittarius up through the great rift, catching countless clusters and star clouds and nebulae, or in the winter being surprised and just how rich the winter Milky Way is, it is always a delight to wander the sky aimlessly, without a specific target, and enjoy the varied treasures you simply stumble across.

So despite the daunting weather, I hope you have enjoyed some good observing and some good reading this winter. Now on to spring!

Scope Clinic

A big thank you to all who came out to make our winter Scope Clinic such a big success. We had lots of members, lots of equipment on display and lots of public turn out. I had a great amount of fun and I had lots of positive feedback. So many of our members did such a good job; you really made the HAA look good. Thank you everyone!

Next up is our spring workshop in April. More talks and displays and socializing. Hope to see you there!

March Meeting

Our February meeting went very well, although I expect many people shied away from attending in fear of bad weather. The weather didn't develop and those few that did attend enjoyed a great talk from Bernie Venasse.

This month we have another great speaker lined up. Many of you know Kevin Salwach and have heard him speak before. There are very few people who can deliver a talk in a more accessible and personable manner. Kevin's great amount of observing experience is evident when he talks and I am very much looking forward to his theme this time; sharing that experience in his musings on just why we pursue this hobby and what draws us to the night sky.

Look for a featured book to be showcased by our librarian, Denise White.

See you this Friday, March 8th, at the Spectator Building. It will be a good one! *(Continued on [page 3](#))*

Masthead Photo: *Venus, the Crescent Moon and Jupiter on January 31, 2019, by Bernd Mueller.*

Taken on the morning of January 31 with his Nikon D300 and a 24-120mm zoom lens, set at 120mm & f5.6, for a 1-second exposure.

Chair's Report (continued)

Public Education Events

The very next day, March 9, is our first public observing session of the year! Yay for spring! This month, weather permitting, we will be setting up our telescopes at the Niagara Gateway Tourism Centre, 424 South Service Rd, in Grimsby. This is a popular location, where we get lots of visitors, and of course there is a Tim Horton's right inside where we can warm up! We begin at 7:30 and everyone is welcome, so bring your scope to share some views, bring your family and friends, or just show up to socialize and have fun (and bring that new 20" dob; I know one of you out there got one!)

Beginners Group (Astro 101)

A popular club activity has been the Beginners Group, popularly known as 'Astro 101'. This set of meetings just for beginners happens every year or two and takes place outside of our regular meetings. With presentations by experienced members and a chance to have one-on-one time with them and other beginners, it is a great way for new members or beginning observers to get their feet wet in a relaxed and casual atmosphere. Also, if you are interested in borrowing one of the club's loaner scopes this is a great way to familiarize yourself with the equipment. It is open to all members and I have gotten to meet know some great members there in the past. If you're interested in signing up, see Dee Rowan at the next meeting or email me. Dee will have a sign-up sheet at the back of the room at the meeting on Friday March 8th.

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H.A.A.'s Loaner Scope Program

We at the HAA are proud of our Loaner Scope Program.

If you don't have a telescope of your own and want to make use of one for a month or so, you can borrow one of our fine loaner scopes.

Please contact Jim Wamsley, at:
905-627-4323
or e-mail Jim at:
secretary 'AT' amateurastronomy.org

and we'll gladly get one signed out for you.

Chair's Report (continued)

BASEF

This year, as we have for many years, the HAA is heavily involved with support for the Bay Area Science and Engineering Fair. I have a whole separate column in this newsletter on this topic and I encourage you to look it over. This is one of the most rewarding things this club does and it has gone unnoticed by many.

Council

Each month the club's council meets to conduct the club's business affairs. Members are welcome to attend any time. Everything from the club's finances to special projects to upcoming events are planned there. Each meeting is meticulously recorded on paper for future reference. This is an invaluable resource as sometimes there is so much going on that it is difficult to remember everything. Our club recorder is Matthew Mannering, who also has been our calendar editor for the past two years. Matt does a wonderful job and this showed through particularly well this last meeting. A long, complicated and often overlapping discussion was had over the idea of reviving the club's observing awards. Matthew's meeting minutes made sense of an often confusing and complex part of the meeting in a way that distilled each member's contributions into clear and concise notes. This job on council often goes unappreciated...in truth it often goes unnoticed! Matthew does a great job of reminding us just where we're going in these meetings. He definitely deserves a big thank you for that! If you'd like to attend a council meeting we'd love to see you there; just let me know through email or at a meeting.

As always, feel free to get in touch (council emails are on the last page of the newsletter) and see you out there.

HAA Helps Hamilton

To support our community, we collect non-perishable food items and cash for local food banks at our general meetings. Please bring a non-perishable food item to the meeting or a donation of cash and help us help others.

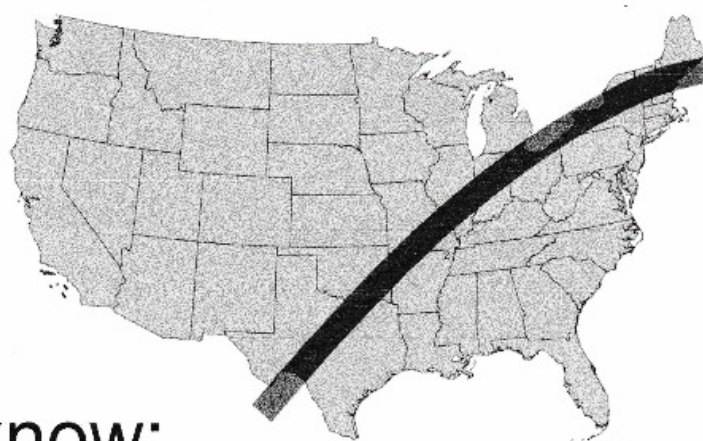
Our donations go to [Hamilton Food Share](#), which delivers them to various food banks around the Hamilton area.

If you would like to help or have any questions about this initiative, please contact the H.A.A.





What are your plans for viewing the 2024 Solar Eclipse?



Let me know:

eclipse@amateurastronomy.org





February Astrophysics Group Meeting Summary by Mike Jefferson

Our group met at Doug Black's home to hear about and discuss *exoplanets*. Seven people attended and refreshments were served.

Doug Black completed a PowerPoint presentation on much of the present knowledge or state-of-the-art of present exoplanet research. His presentation began with early efforts in 1992 to present work from Kepler, TESS, proposed SPECULOOS and GAIA missions.

To date, we have had 47 ground-based projects, 9 space-based, 5 planned space-based, 8 proposed space-based and 5 canceled space-based missions. Their results to date, especially of Kepler, are 3912 confirmed exoplanets as of February, 2019.

Closer to home, Enceladus, Titan, Venus, Mars, Ganymede, Callisto, Europa and possibly Pluto or their atmospheres, may be possible dwelling places for life within the Solar System.

Exoplanet catalogues can be located at NASA, University of Puerto Rico, NOVA archives and the Meudon Observatory.

On a theoretical note, the Kozai-Lidov Mechanism could cause the more distant moons of a 'Jovian' type system to collide with the closer 'Galilean' moons of the parent, gas giant body.

Recommended reading would be "The Planet Factor" by Elizabeth Tosher.

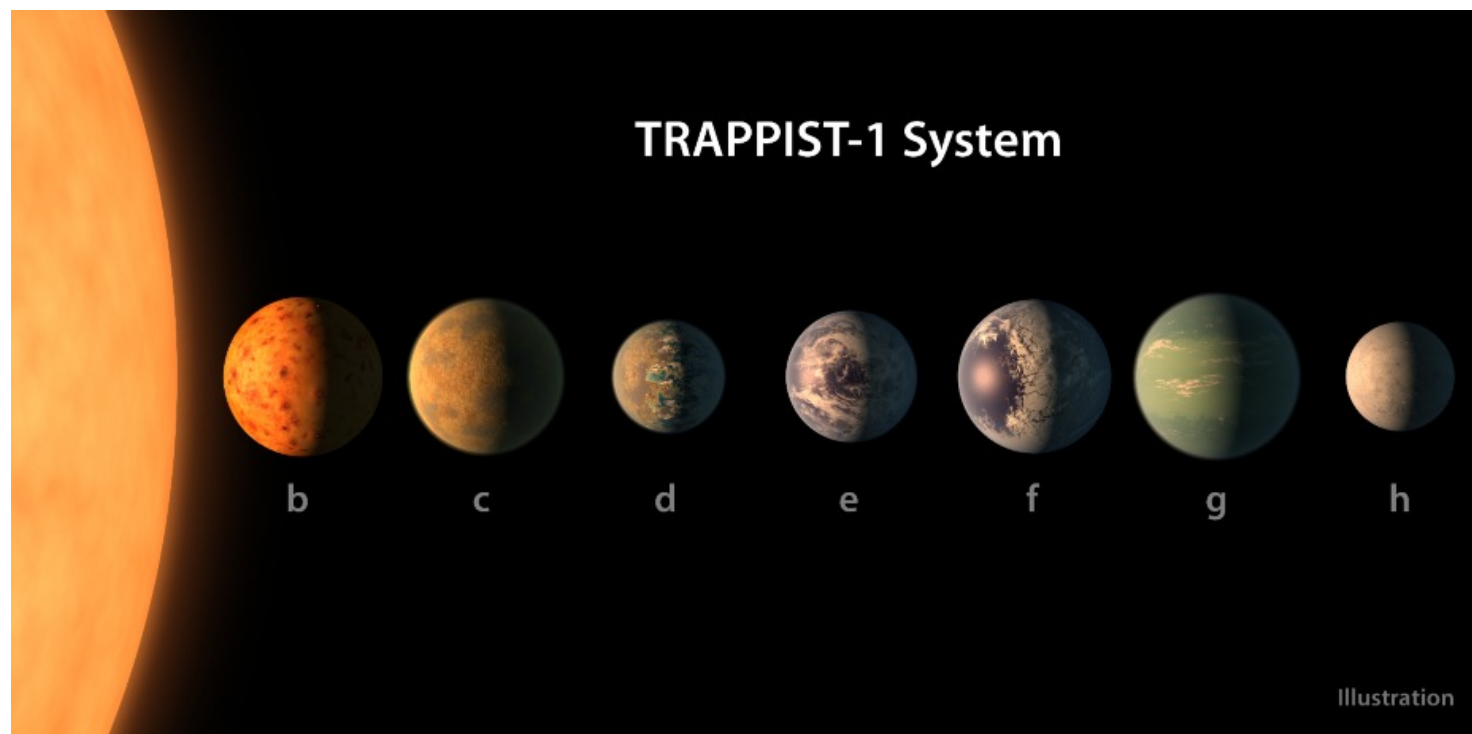
Following Doug's presentation, Aidan King did a further PowerPoint discussion about the *Trappist Project* (The Transiting Planets and Planetesimals Small Telescope). This work is being carried out by a 22" telescope on transiting exoplanets.

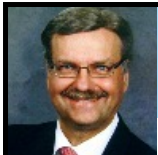
T-1, established in 2010 in La Silla, Chile, uses transit photometry to search for exoplanets, Solar System comets and trans-Neptunian objects.

To date, it has discovered the first ring-system around an asteroid, dwarf planet Makemake's (between Pluto and Eris) lack of an atmosphere and, TRAPPIST-1's close-knit 7-planetary system of #'s 1-B to 1-H, 40 LYR's from Earth.

We thank Doug B. for his kind hospitality and we meet again in March, on Friday evening, the 15th at 7:30 P.M. At 26 Markland Street, Hamilton. Please watch the HAA website for any changes or cancellations.

Image Credit:
NASA/
JPL-Caltech





The Sky This Month for March 2019 by Steve Germann

March is a special month because the Sun is in the region between 23H and 1H and that means the entire list of Messier Objects can be seen in one night, assuming ideal conditions. Although those conditions are notoriously hard to meet this far north, from lower latitudes like Arizona it is a comparative piece of cake.

We won't be trying anything so ambitious, but I can say that it is a bucket list item for many astronomers to observe the entire Messier list even if over several nights.

Our new Messier List Sweep

Each Month for the coming year, I plan to introduce a swathe of the sky's Messier Objects, with the goal of star hopping to all of them, and thus in a year, observing all of the Messier objects. This month, I introduce star hopping and deal with the Messiers in great detail, in a separate article in this issue (starting on page 16).

Each month, there will be a selection of Messier objects, sorted from south to north, allowing you to find and observe them all. They will be selected so that they cross the meridian between 10 pm and midnight, and will try to avoid the zenith if possible. The set will be designed so that if you observe the list for each month, you will see all the Messier objects in a year, at times when they are best viewed.

This Month starts with the Sun at about Right Ascension 22h 31m 20s, and proceeding during the month to about 24H.

The *Vernal Equinox*, the Start of Spring, is when the Sun is at 0H.

Accordingly, I will be selecting objects between 11H-13H Right Ascension, and featuring constellations like Virgo.

Virgo

This month's constellation is *Virgo*, and it is so important for Star Hopping that I want to ensure you can find every part of it and use it as a starting point for continued travel through the stars. Virgo features many deep sky objects but most are galaxies.

At the top of the next page is Virgo courtesy of Heavens-Above.com.

You can get a diagram of any constellation here:

<https://heavens-above.com/constellation.aspx>

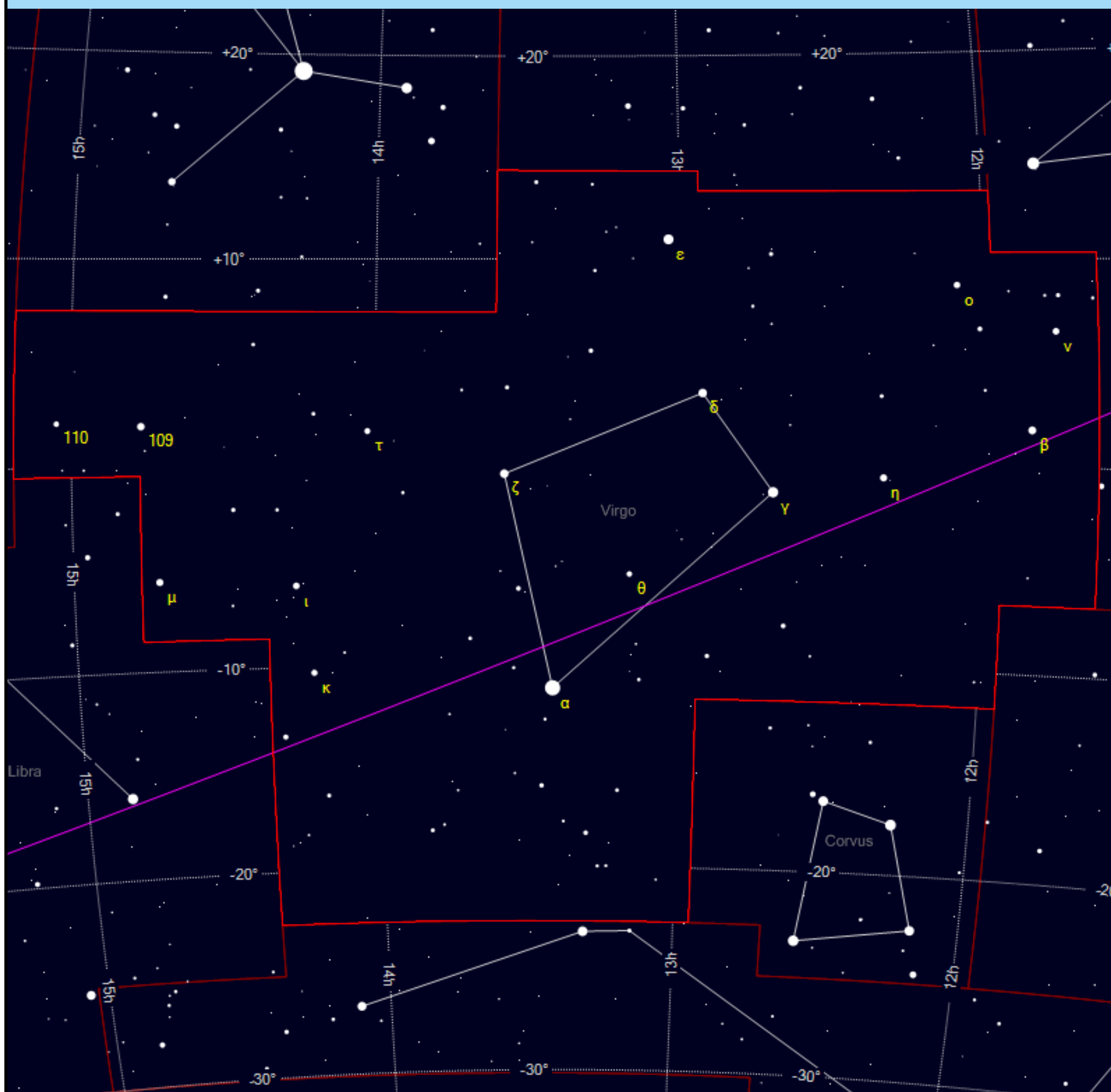
Alpha Virginis is *Spica*. The tail of Leo, nearby, makes a good endpoint for star hopping into the Virgo Cluster of galaxies.

Epsilon Virginis is closest to the line from Denebola in Leo to Arcturus on the left of the diagram. It is called *Vindemiatrix*.

This being the Messier Marathon month, technically you could see all 110 Messier objects if you had a long enough telescope (ie, one that goes right out of the atmosphere so you are not disturbed by sunrise). Otherwise, you can still set a personal best even if you retreat at 1 AM.

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The Sky This Month for March 2019 (continued)



The constellation Virgo, from the Heavens Above Website

Challenge Objects

The Messier Marathon starts in the evening, just after sunset, with some challenging targets.

These targets are easier to find in March than they are in April.

Honestly, with a clean telescope, the Moon is not a problem for the Messier Marathon, but clouds and twilight are the interfering factor.

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The Sky This Month for March 2019 (continued)

March is the last chance for a while to see these Galaxies before they are too low at evening twilight:

M74, M77, M33, M31, M110, M32.

M74 and M77 are the difficult ones. I use the top and bottom pairs of stars in Orion's shape to point west to the approximate location of M74 so I can look at the star field and try to get the first star hopping star. This has always been a big challenge for me, especially in April. In March, you have 2 extra hours to achieve it but the catch is that the morning objects of the Messier Marathon will be harder to find.

Since in March you have an extra 2 hours to find M74 and M77, you might want to try in order of ease of finding, easiest first.

That order is M31, M32, M110, M33, M77, M74.

If you can get them, then you are well on your way to a very successful Messier Marathon, and you should send out for snacks, coffee, and companions.

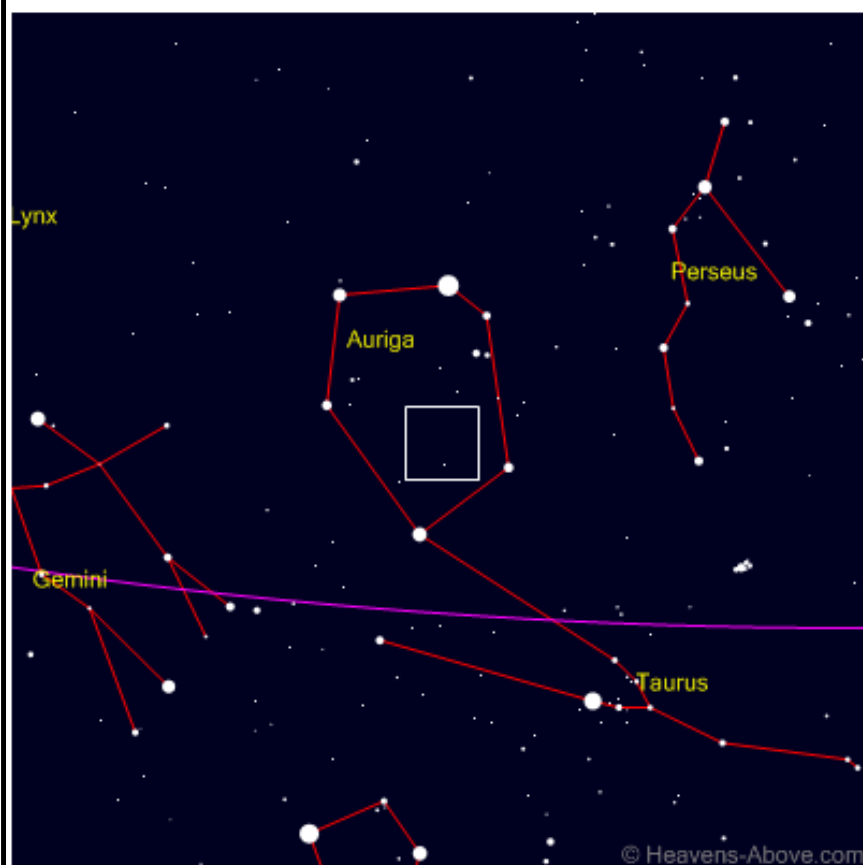
Comets

A recently discovered comet is in our skies, *C/2018 Y1 Iwamoto*.

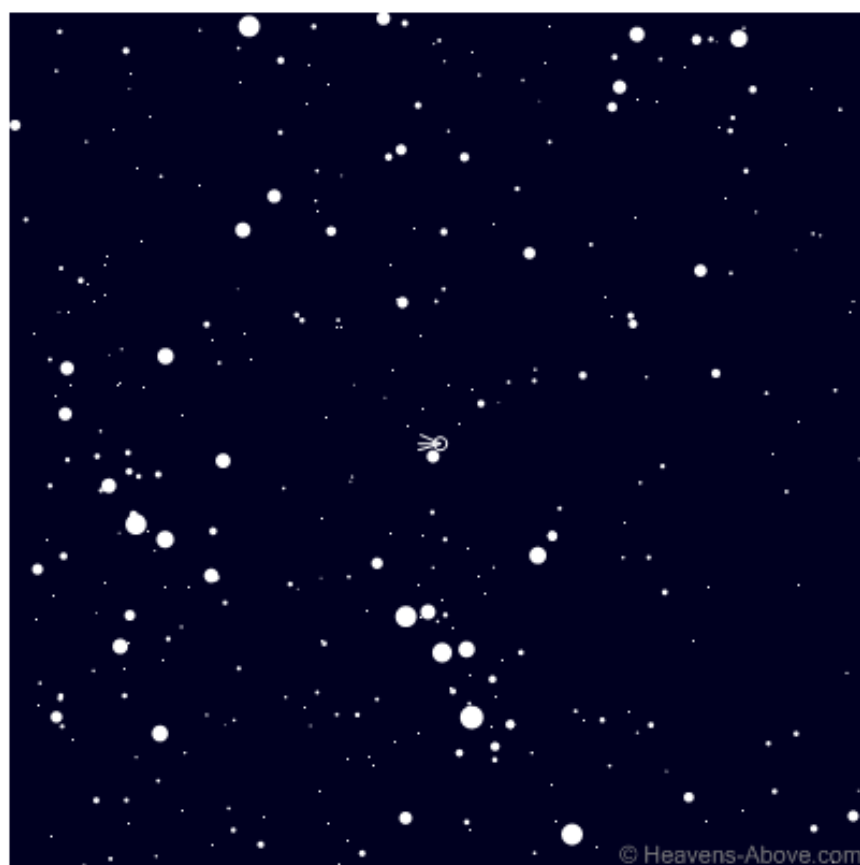
It is in Auriga now, part of the winter hexagon, and quite prominent for us to see.

Comet C/2018 Y1 Iwamoto

Year Month Day Time



Coarse finder chart
(Field of view: 60°, Max. star mag.: 5)



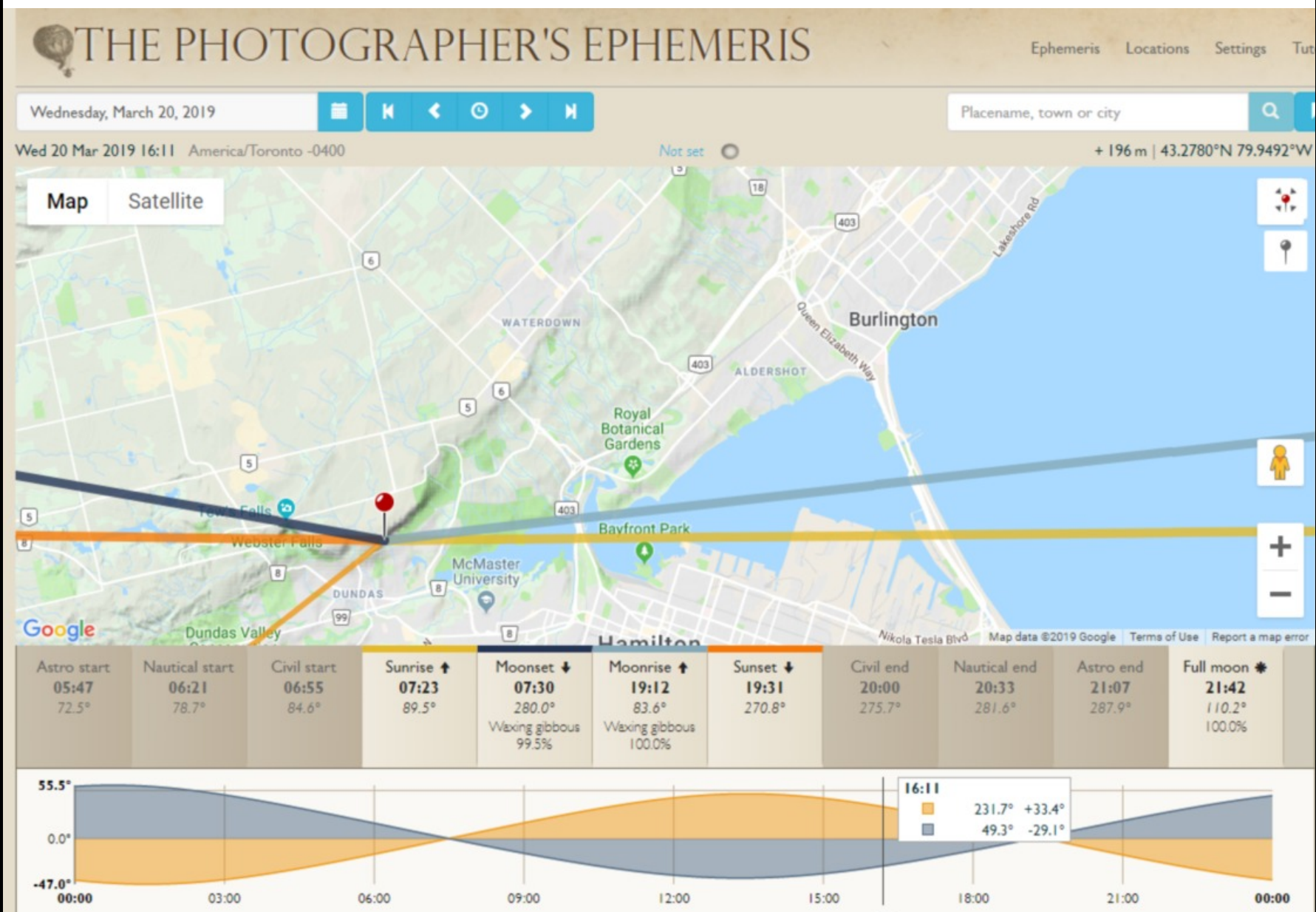
Fine finder chart
(Field of view: 5°, Max. star mag.: 10)

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The Sky This Month for March 2019 (continued)

Moonrise

The Full Moon will rise on Wednesday March 20, at 7:12 PM, and here's a map of it from the lookout on Sydenham Road in Dundas (see below). The azimuth of 83.6 degrees is getting to be more like due east each month, and is the same all around our area.



Moonrise on March 20, 2019, from the Photographers Ephemeris Website

Cartoon Corner

...will return.



Bay Area Science and Engineering Fair by John Gauvreau

The Bay Area Science and Engineering Fair (BASEF) has a long tradition as the regional science fair here, and the HAA has a long tradition of support for the fair. This year is no exception.

In the final days of March, after long months of research and work, about 500 local students will submit over 300 projects for competition, with the winners going on to the National Science Fair and the winners of that going on to Internationals.

The HAA has provided a prize to the best astronomy project each year. Named after Jim Winger, one of our clubs great supporters of the science fair, the 'Hamilton Amateur Astronomers James A Winger Award' goes each year to the student or students who have put together the best project with an astronomical subject or a related science. Originally a book prize, we now award a monetary prize to the winner. Members of our own club judge the projects and pick the winner, with 2 or 3 of our members attending each year. I have done this in the past and it is always fun and educational, and often surprising. Seeing the projects and meeting the students is one of the great rewards of our involvement.

The HAA also supports BASEF through financial support of the fair at large. It is run completely through volunteers, much like our organization, but still requires a lot of expense to operate. The HAA is happy

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Image Credit: BASEF

Bay Area Science and Engineering Fair (continued)

to make a contribution each year to this end. Encouraging and educating the students and youth of our community is exactly what this club is about.

Judging the projects takes place in two parts. During the morning of 'judgement day', the judges see the projects on their own, take the time to review them and read the accompanying reports. This is no small task and requires considerable knowledge in a variety of fields (for us not just astronomy, but physics, astrophysics, cosmology, rocketry and any number of other related fields. You never know what you're going to see there!). In the afternoon the judges return to the projects, this time to find them accompanied by the students. The judges, now familiar with the projects from the morning visit, have a chance to question the students and find out about their understanding of the field.

So where are the students in the morning while their projects are being scrutinized? In part with me! I am delighted to be part of the morning activities when not just the 500 participating students but also another 600 students and teachers from local schools are gathered to hear a variety of fascinating talks and presentations. The program varies each year but usually there are about 4 or 5 presentations on different topics. Each year though the chemistry department from McMaster University returns to show off some fun chemistry antics. And each year for 7 years now I have been invited to talk about astronomy. Standing on stage in front of 1,100 students and teachers is one of the highlights of my year and I consider it a great compliment to be invited back year after year (that's why I don't judge anymore; I'm a little busy that morning!).

The Hamilton Amateur Astronomers really should be proud of their involvement and strong support of BASEF, through our financial support, educational support and with direct contact with the students and their encouragement.

This year the fair is being held at Mohawk College and is open to the public on Saturday March 30th, from 9:00am until 12 noon. I encourage you to attend!

<http://www.basef.ca/>



Treasurer's Report by Ann Tekatch

Treasurer's Report for February 2019 (Unaudited)

| | |
|---|------------|
| Opening balance: | \$9,434.73 |
| <u>Revenue:</u> | |
| Membership Fees: | \$100.00 |
| 50/50 Draw: | \$46.00 |
| Calendar sales: | \$30.00 |
| <u>Expenses:</u> | |
| BASEF (Science Fair) Sponsorship: | \$500.00 |
| BASEF (Science Fair) James A. Winger Award: | \$200.00 |
| Closing Balance: | \$8,910.73 |



This article is distributed by NASA Night Sky Network.

The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach.

Visit nightsky.jpl.nasa.org to find local clubs, events, and more!

Springtime Planet Party

By David Prosper

March brings longer days for Northern Hemisphere observers, especially by the time of the equinox. Early risers are treated to the majority of the bright planets dancing in the morning skies, with the Moon passing between them at the beginning and end of the month.

The **vernal equinox** occurs on **March 20**, marking the official beginning of spring for the Northern Hemisphere. Our Sun shines equally on the Northern and Southern Hemispheres during the moment of equinox, which is why the March and September equinoxes are the only times of the year when the Earth's north and south poles are simultaneously lit by sunlight. Exacting astronomers will note that the length of day and night on the equinox are not *precisely* equal; the date when they are closest to equal depends on your latitude, and may occur a few days earlier or later than the equinox itself. One complicating factor is that the Sun isn't a point light source, but a disc. Its edge is refracted by our atmosphere as it rises and sets, which adds several minutes of light to every day. The Sun doesn't neatly wink on and off at sunrise and sunset like a light bulb, and so there isn't a perfect split of day and night on the equinox - but it's very close!

Ruddy **Mars** still shines in the west after sunset. Mars scoots across the early evening skies from Aries towards Taurus and meets the sparkling Pleiades star cluster by month's end.

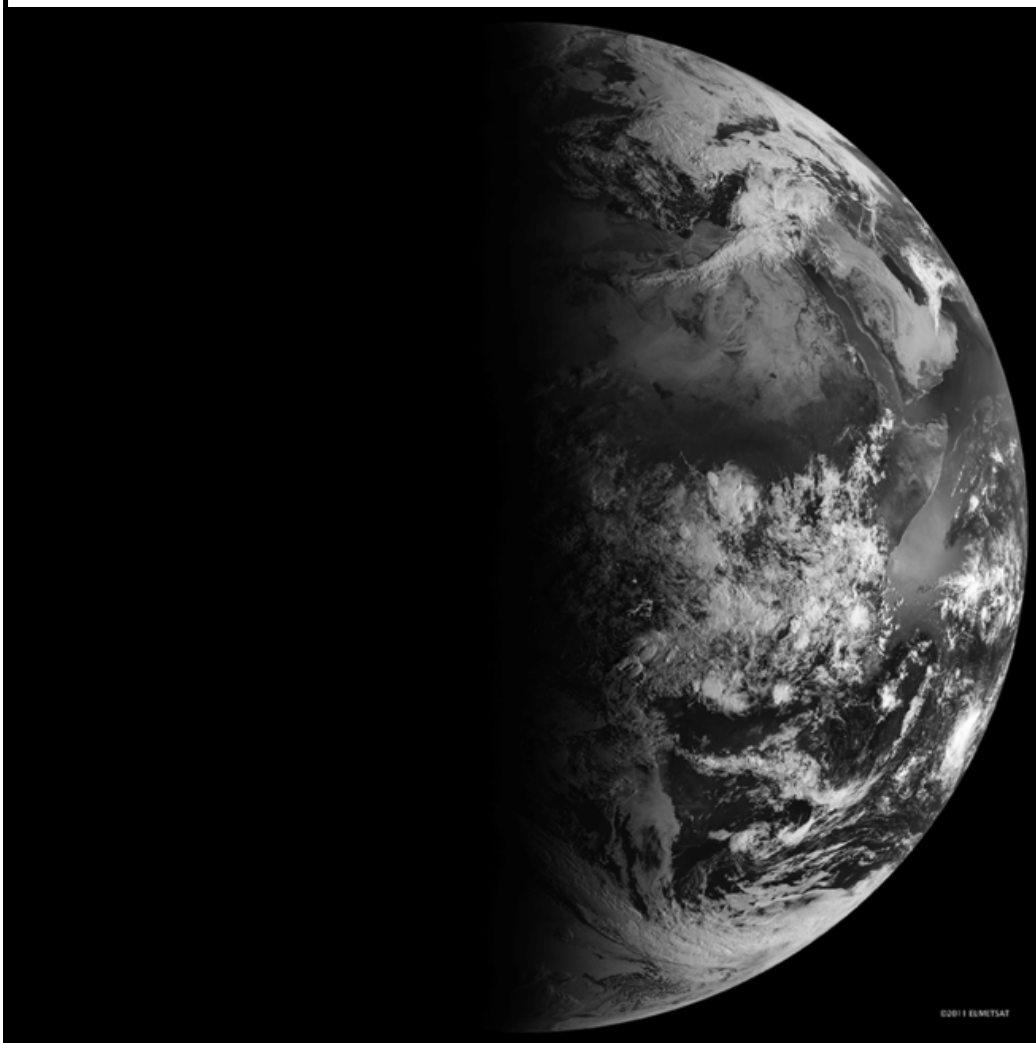
March opens with the morning planets of **Jupiter**, **Saturn**, and **Venus** spread out over the southeastern horizon before sunrise. A crescent **Moon** comes very close to Saturn on the 1st and occults the ringed planet during the daytime. Lucky observers may be able to spot **Mercury** by the end of the month. March 31 opens with a beautiful set of planets and a crescent Moon strung diagonally across the early morning sky. Start with bright Jupiter, almost due south shortly before dawn. Then slide down and east towards Saturn, prominent but not nearly as bright as Jupiter. Continue east to the Moon, and then towards the beacon that is Venus, its gleam piercing through the early morning light. End with a challenge: can you find elusive

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NASA Night Sky Notes (continued)

Mercury above the eastern horizon? Binoculars may be needed to spot the closest planet to the Sun as it will be low and obscured by dawn's encroaching glow. What a way to close out March!

Discover all of NASA's current and future missions at nasa.gov



Left:

Earth from orbit on the March equinox, as viewed by EUMETSAT. Notice how the terminator – the line between day and night - touches both the north and south poles. Additional information can be found at <http://bit.ly/earthequinox>

Image credit: NASA/Robert Simmon

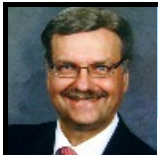
Below:

The morning planets on March 31. Image created with assistance from Stellarium.





The Super Moon in vivid detail, February 19, 2019, the year's biggest super moon, by **John Gauvreau**



Star Hopping to the Messier Objects by Steve Germann

First and foremost, this article is a crash-course on star hopping, with the specific examples selected from this month's prime Messier targets, namely all the Messier objects between 11H and 13H Right Ascension, since they will come into opposition this month. These targets will never be easier to find than they are this month.

Star hopping is in part a demonstration of sky-navigation skills, and involves several kinds of methods. When star hopping, give yourself every advantage. You can use a tracking mount, at least with an equatorial motor, so you will be able to look at a star chart and return to the star field of interest and it will still be visible.

I will also show you how to star hop without such a mount.

Step 1, Know your target.

What are you seeking? A galaxy or a star cluster? They have very different surface brightness and detectability, so you will need to choose your observing location and dark skies accordingly.

Step 2, Know and tune your equipment.

Make sure your red dot finder is aligned with your main optical tube, so that you will not have to do mental transformations each time you take a look.

Step 3, Understand your field of view.

Determine the number of degrees you can see with your scope at the power you will be using, and compare it to some stars on the charts you are using.

Make a circle on clear plastic, the size of your field of view, that you can lay over your chart.

Repeat this process for the finderscope. Use the belt of Orion to estimate the diameter of your field, if the Moon is not up (and it should not be, for good star hopping to deep sky objects).

Step 4, Ensure you have a usable chart.

Your chart needs at least 3 stars in the eyepiece diameter anywhere on the chart, that you will be able to see while hopping. The full sky is about 40 thousand times the area of the Full Moon. If you last looked at the Moon and saw all of it, then try to remember how big it was in the eyepiece. For my Dob, at 72x the Moon is a big fraction of the field of view. That means I need a catalog with at least 1 million stars, in order to have at least 3 in my field of view in most directions.

Step 5, Enhance your chart.

Make a photocopy of your chart if necessary, so that it is mirrored according to your field of view in the telescope. That way, what you see on the chart is what you will seek in the eyepiece. It might help to either reduce or increase the number of stars shown, to match your telescope's abilities, but I have not found this to help much in the past.

Step 6, Know your sky.

You will at least need to find brighter stars that are on your chart, and in the sky, not using a telescope, to get started. For instance, (see below) a way to find the brighter stars and constellations.

Step 7, Practice some 'moves'.

The Sky is big, and although there are a lot of stars, there are a lot of square degrees around each star, many finderscopes worth of square degrees. So you need to make new virtual stars in the sky, by using the line connecting 2 known stars, and selecting the midpoint, or more rarely a point 1/3 of the way from one end, to start your search at.

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Star Hopping to the Messier Objects (continued)

Other 'moves' are to imagine an equilateral triangle that uses 2 stars you can see, and then put your red dot finder in the empty space that would be the third point of the triangle. This can get you to interesting places.

Sometimes you use a line as the base of a flattened triangle or a skewed triangle. Any shape you can imagine and remember can be used to jump to a starting point on your chart.

Once you are there, you can verify using charts that you got to a known place, and start outward from there.

Step 8, Choose your next target or targets.

In this article, we will be star hopping around the *Virgo Cluster*. There's a few hundred galaxies there, that could be seen with a telescope (and probably millions that the Hubble could theoretically find in the background, but we are not star hopping to those).

Step 9, Choose a starting point.

Use your finder-scope and star charts and your view of the sky to select an appropriate starting point.

The easy starting points are accessible using stars from the recognizable constellations, then using 'moves' to make new virtual stars to start at. Often your virtual stars will be very close to your destination. This time of year, you can use Orion, Ursa Major, Lyra, Gemini, and even Auriga as starting points.

Step 10, Orient your chart.

Rotate your chart on your table, so that 'up' in the eyepiece is up on the chart. (see below for details on this)

Now that you have made all the accommodations for star hopping, you will be ready to begin.

Step 11, Double check your chart orientation.

Stop your telescope tracking for about 10 seconds, and observe the direction of drift of the stars in the eyepiece. They are drifting towards the west. Make sure this agrees with your chart orientation.

Step 12, Calibrate your telescope drift.

If you do not have a tracking mount, you just need this extra skill. You need to learn to compensate for how much the field of view will drift while you are not looking at the stars, and in which direction.

This drift direction and speed is dependent on where you are looking in the sky, so this is the perfect time, now that you are near your target, to figure out how fast and in which direction the sky is moving.

Center a star and watch it drift towards the edge. Count seconds (one thousand 1, one thousand 2, etc) as it drifts, and which direction (clock face) it is moving.

If you have adjustable cross-hairs on your eyepiece, orient them so that the drift is along one of those directions.

Now when you are busy looking at the chart, you can estimate how much compensation you will need to get back to where you were, before you plan your next hop. The chart usually shows lines for declination. The field of view will move parallel to those lines.

You can use that to visit the sky along a line too.

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Star Hopping to the Messier Objects (continued)

Drift compensation is worth a few practice steps, before you are in deep water.

Do take a few minutes to let things drift and re-center them. Try by watching first, and get a feel for moving the scope a half-eyepiece worth of distance (move something at the center to the edge of the field of view) and then knowing how many seconds you looked away, you can bring it back to center with a few (or a fraction of) such eyepiece slides in the right direction.

It will help to make sure you turn your head the right way up during this operation. Choose a comfortable orientation relative to the body of the telescope, so that you are not straining each time you observe, and then orient your head and star chart accordingly each time. This will change for each direction in the sky you are looking.

With a little practice and measurement you will be able to star-hop with an un-tracked Dob, with the best of them.

In your log book, I suggest you note the time, the eyepiece length, the telescope type (if you have not noted it recently in today's log), whether the chart needed to be flipped, and which constellation you are starting from, and how long the stars take to drift from center to edge of the field of view, in approximate seconds.

Now you have all the ingredients for directed and measured star hopping. If it's out there, you will get to it.

So here we go.

This month's list is extensive. The largest month for Messier Objects. There's 28 of them here. Fully a quarter of the total, in one setting. Here is the list from 11H to 13H, sorted from South to North.

It is best to do the south ones first, as they are most likely to escape you if you take a lot of time.

| | | | | | | | | | | | |
|------|-----|------|-----|---|----|------|-----|----|------|---------|-------|
| M68 | 068 | 4590 | Hya | 2 | 12 | 39.5 | -26 | 45 | 7.8 | 12.0 | 33.3 |
| M104 | 104 | 4594 | Vir | 5 | 12 | 40.0 | -11 | 37 | 8.0 | 9x4 | 50000 |
| M61 | 061 | 4303 | Vir | 5 | 12 | 21.9 | +04 | 28 | 9.7 | 6x5.5 | 60000 |
| M49 | 049 | 4472 | Vir | 6 | 12 | 29.8 | +08 | 00 | 8.4 | 9x7.5 | 60000 |
| M60 | 060 | 4649 | Vir | 6 | 12 | 43.7 | +11 | 33 | 8.8 | 7x6 | 60000 |
| M59 | 059 | 4621 | Vir | 6 | 12 | 42.0 | +11 | 39 | 9.6 | 5x3.5 | 60000 |
| M58 | 058 | 4579 | Vir | 5 | 12 | 37.7 | +11 | 49 | 9.7 | 5.5x4.5 | 60000 |
| M87 | 087 | 4486 | Vir | 6 | 12 | 30.8 | +12 | 24 | 8.6 | 7.0 | 60000 |
| M89 | 089 | 4552 | Vir | 6 | 12 | 35.7 | +12 | 33 | 9.8 | 4.0 | 60000 |
| M84 | 084 | 4374 | Vir | 8 | 12 | 25.1 | +12 | 53 | 9.1 | 5.0 | 60000 |
| M86 | 086 | 4406 | Vir | 8 | 12 | 26.2 | +12 | 57 | 8.9 | 7.5x5.5 | 60000 |
| M66 | 066 | 3627 | Leo | 5 | 11 | 20.2 | +12 | 59 | 8.9 | 8x2.5 | 35000 |
| M65 | 065 | 3623 | Leo | 5 | 11 | 18.9 | +13 | 05 | 9.3 | 8x1.5 | 35000 |
| M90 | 090 | 4569 | Vir | 5 | 12 | 36.8 | +13 | 10 | 9.5 | 9.5x4.5 | 60000 |
| M99 | 099 | 4254 | Com | 5 | 12 | 18.8 | +14 | 25 | 9.9 | 5.4x4.8 | 60000 |
| M98 | 098 | 4192 | Com | 5 | 12 | 13.8 | +14 | 54 | 10.1 | 9.5x3.2 | 60000 |
| M88 | 088 | 4501 | Com | 5 | 12 | 32.0 | +14 | 25 | 9.6 | 7x4 | 60000 |
| M91 | 091 | 4548 | Com | 5 | 12 | 35.4 | +14 | 30 | 10.2 | 5.4x4.4 | 60000 |
| M100 | 100 | 4321 | Com | 5 | 12 | 22.9 | +15 | 49 | 9.3 | 7x6 | 60000 |
| M85 | 085 | 4382 | Com | 8 | 12 | 25.4 | +18 | 11 | 9.1 | 7.1x5.2 | 60000 |
| M64 | 064 | 4826 | Com | 5 | 12 | 56.7 | +21 | 41 | 8.5 | 9.3x5.4 | 19000 |
| M94 | 094 | 4736 | CVn | 5 | 12 | 50.9 | +41 | 07 | 8.2 | 7x3 | 14500 |

(Continued on [page 19](#))

Star Hopping to the Messier Objects (continued)

| | | | | | | | | | | | |
|-------|------|------|-----|---|----|------|-----|----|------|---------|-------|
| M106 | 106 | 4258 | CVn | 5 | 12 | 19.0 | +47 | 18 | 8.4 | 19x8 | 25000 |
| M109B | 109b | 3953 | UMa | 5 | 11 | 53.8 | +52 | 20 | 10.1 | 7x4 | 55000 |
| M109 | 109 | 3992 | UMa | 5 | 11 | 57.6 | +53 | 23 | 9.8 | 7x4 | 55000 |
| M108 | 108 | 3556 | UMa | 5 | 11 | 11.5 | +55 | 40 | 10.0 | 8x1 | 45000 |
| M97 | 097 | 3587 | UMa | 3 | 11 | 14.8 | +55 | 01 | 9.9 | 3.4x3.3 | 2.6 |
| M40 | 040 | Win4 | UMa | C | 12 | 22.4 | +58 | 05 | 8.4 | 0.8 | 0.51 |

I am using excerpts from the Printable Star Atlas here; it is freely available for your use:

<https://www.deepskywatch.com/files/deepsky-atlas/Deep-Sky-Hunter-atlas-full.pdf>



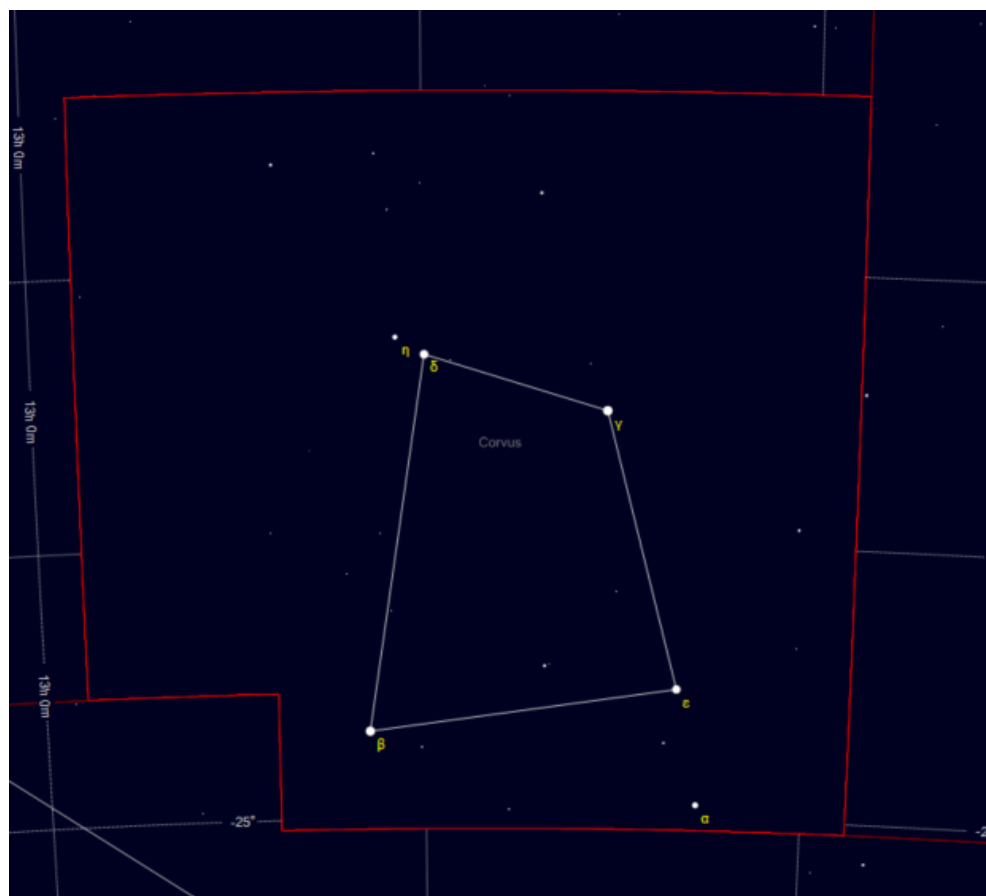
Since we are star hopping near the Virgo Cluster, we will use *Ursa Major* and 'Arc to Arcturus' following a notional circle in the sky from the handle of the Big Dipper extending the handle to *Arcturus*, which is the third brightest star in our sky, so you will easily find it. I have seen it against a blue twilight sky with some looking.

Then 'Spike to Spica' about the same angular distance in the sky, to get to *Spica*, the brightest star in Virgo.

Once you are at Spica, continue to *Corvus*. Take a 45 degree turn to the left (west) at Spica and continue about half as far as you went from Arcturus, and stop at Corvus.

Your star chart can be easily orientated using the smaller and denser constellation of Corvus.

Corvus looks like this, and its top 2 stars point back to Spica:



Those two close stars at the Upper left of Corvus (northeast) will help you orient your chart.

Our list starts with the globular cluster *M68*, aka "Steve's Bane".

Use your circle of eyepiece size, to orient the star field around Delta Corvi, and to rotate your chart for this part of the sky. Note that for an Alt-Az mount such as a Dobsonian mount (preferred for star hopping because it gathers a lot of light and will show you a lot of stars), up is different in different parts of the sky, so you need to locally rotate your sky chart to match what you see. It's really worth it to do this step, because the sky can be very confusing if you don't know which way is up, literally.

(Continued on [page 20](#))

Star Hopping to the Messier Objects (continued)

All we need to do is start hopping. Basically, you need to use the finder-scope to get to the star of the constellation that you can see, which is closest to your target.

Then use the star charts to spot the various stars and move in your direction. If you cannot see all the main stars of the constellation without a telescope, be advised that star hopping is going to be difficult. But usually we can, and near opposition, we definitely can see them all. (Light pollution domes excepted) For southern targets, make sure you are not north of a city. South of a city is better. Binbrook is almost ideal. There's not much bright to the south for a long long way.

Our list starts with M68, in Hydra at declination -26.45. Personally this was the hardest constellation for me to observe, as I started seeking it in late June and it was many months before it became available to me again. After M68 I was rapidly able to observe the rest of the Messiers (in sequence) in just a few more days.

Here's how to find M68. Once at Spica you are in the middle of Virgo. Many star hopping sessions can start from Spica. In this case, to get to Corvus, when you arrive at Spica, turn left 45 degrees and continue until you come to 2 3rd-magnitude stars in a row, which are on the line from Spica. These are the top 2 stars of Corvus. Use the left 2 (east 2) stars of Corvus, and continue down half again as far as their distance. That will put you at a 5th magnitude star which is an easy binocular target. M68 is about 45' NE (up and to the left) of that star.

Here is a close-up map near M68:

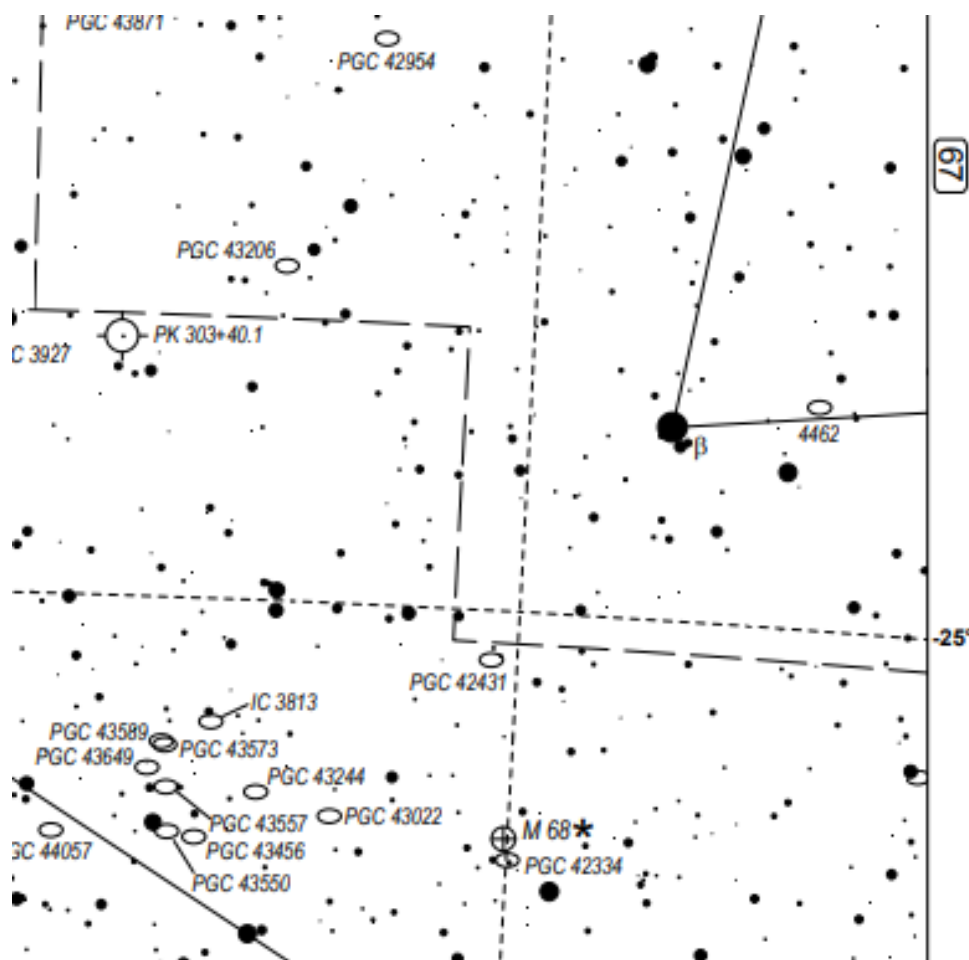
You can see just how busy the binocular sky is, near M68. For reference, a binocular field of view is probably a 1/25th of the total area of this image, or about 1/5 of the edge dimensions. So once you follow down to that star, you will also have M68 in view. M68 brings back memories of frustration and clouds. When I sought M68, I was battling twilight, and had to star hop with a high power telescope, as no stars were visible in the finder-scope, south of Beta Corvi. At the time of year (early July), I failed to get there. You have the advantage of time and darkness. You can do this. I hope you will check off M68 on your list, and while you are observing it, note the equipment you used, especially the aperture and telescope type, date and time, magnification, and make a sketch of the star field near M68. Who knows, you might just sketch an asteroid in the frame as well.

The rest of the Messier objects on this month's list are easier. And most of them fit on one chart.

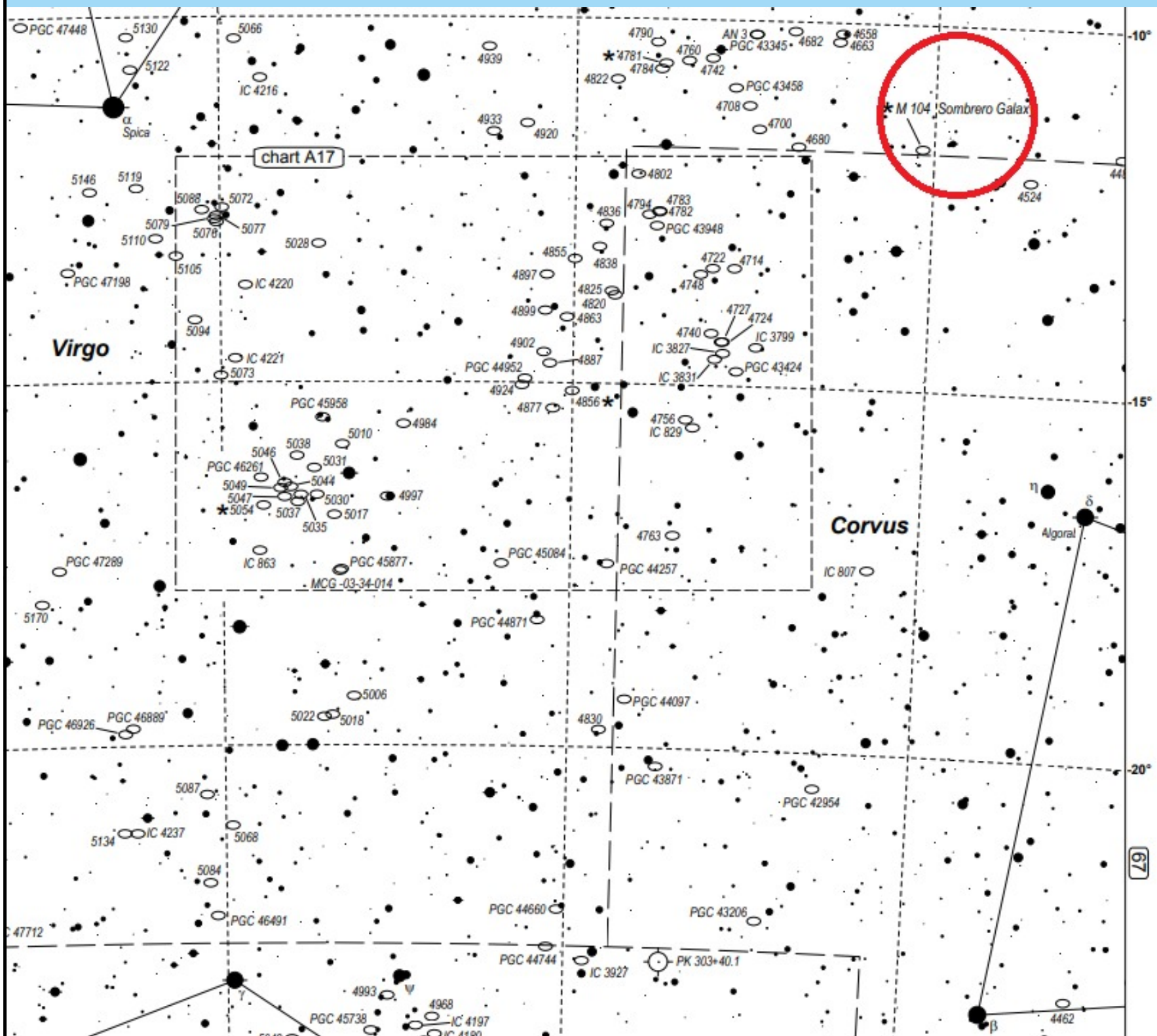
There is one more Messier on the way to the Virgo Cluster. It is M104, the *Sombrero Galaxy*. A treat in large telescopes and for astro-photographers.

For us, trying to find it for the first time, it is more important to note whether you can see it as elongated, and in which direction in comparison to the stars you see near it.

(Continued on [page 21](#))



Star Hopping to the Messier Objects (continued)



Here's a map of the region, with M104 circled. It shows how busy this part of the sky is.

Here's some interesting facts (from Wikipedia) about M104. It is bright... The absolute magnitude (in the blue) of the Sombrero Galaxy is estimated to be -21.9 at 30.6 Mly (9,400 kpc) (-21.8 at the average distance of above), that as stated above makes it the brightest galaxy within a radius of 32.6 Mly (10,000 kpc) around the Milky Way.

The Sombrero Galaxy is located 11.5° west of Spica and 5.5° northeast of Eta Corvi. Although the galaxy is visible with 7x35 binoculars or a 4-inch (100 mm) amateur telescope, an 8-inch (200 mm) telescope is needed to distinguish the bulge from the disk, and a 10-or-12-inch (250 or 300 mm) telescope is needed to see the dark dust lane. M104 is almost due north of M68. You will have to go straight north until the altitude of Spica. In terms of star hopping, it is much harder than M68.

You can also take a bit of a hop along from the upper left corner of Corvus among some fairly bright stars.

(Continued on [page 22](#))

Star Hopping to the Messier Objects (continued)

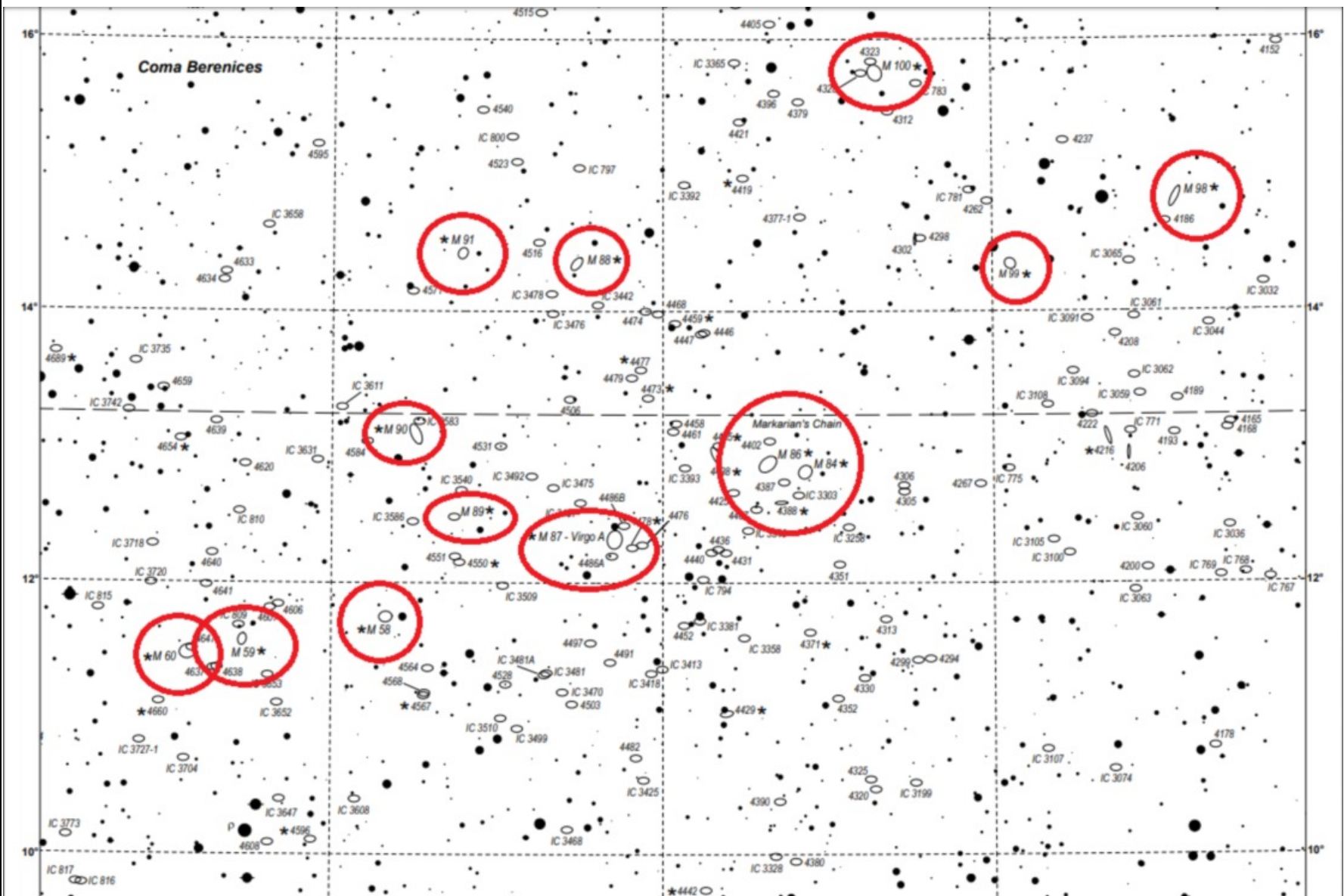
The key detail is, star hopping is a skill that needs to be practiced, and doing it to find a new object is the best kind of practice, because you will demonstrate your new skill in a real way.

I recommend printing the chart on page 21, then stand a bit away from it, and squint to the point where you just see the brighter stars. Then when you have an idea of what's going to be visible, draw with a pencil the path you intend to follow.

The Sombrero Galaxy is a favourite target of astro-photographers in our club.

On to Virgo.

The next batch of Messier Objects is in *Virgo*. Everything starts from the 'face' of *M84* and *M86*, and you need to be able to look at the sky and point your finder at it.



Basically, you will need to practice looking at the sky, finding Spica, then following along the big Y of Virgo up the eastern branch, to get to *Vindemiatrix* which sounds like a Harry Potter story villain name. By splitting the distance from the Vindemiatrix in Virgo and the tail star of Leo (Denebola), you will find the bright end of *Markarian's Chain*: M84 and M86 and 2 smaller galaxies which make a recognizable 'face' in the sky with eyes, nose and mouth. The mouth is noticeably elongated.

So, once you have gotten to the big end of Markarian's Chain, you have automatically found M84 and M86. You can then star hop to M87 which is very bright. These galaxies are so close together, if you have a 2 degree field of view, you will almost always have a galaxy in sight as you star-hop. More like galaxy hopping.

(Continued on page 2)

(Continued on [page 23](#))

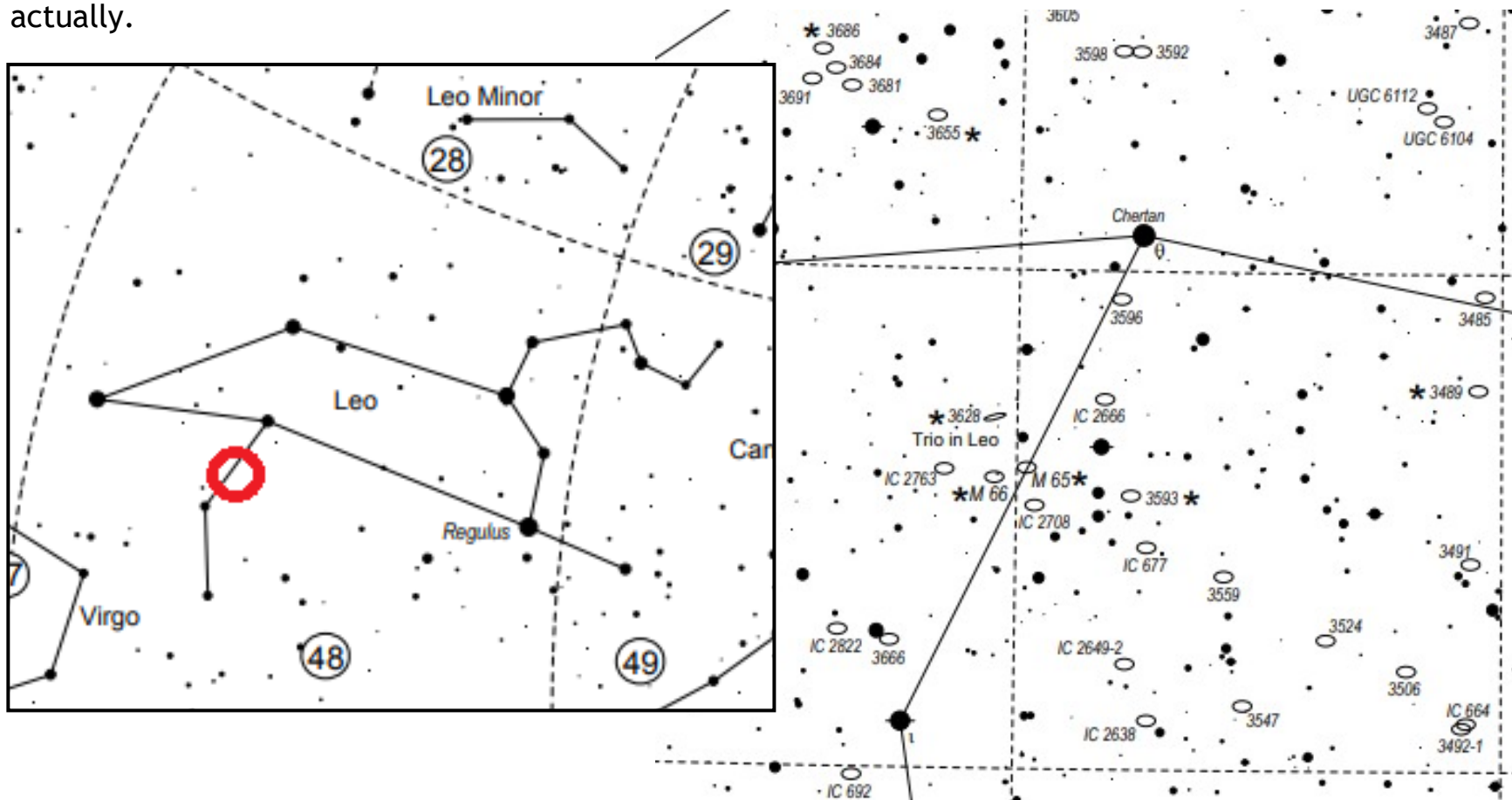
Star Hopping to the Messier Objects (continued)

Using the eyepiece distance from M84/86 to M87 you can then pace yourself across the diagram and find the other brighter galaxies. If your telescope is under 12 inches, you won't have too much distraction from the other hundred or so non-Messier galaxies in the area.

I have circled all of the Messier Galaxies which are on the page, and you need to basically star hop to Markarian's Chain and then out from there. You can expect each of these to take a few tries and about 5 minutes to be sure. Each time, return to your home base at M84/M86 and set out in a new direction. While you are at it, you can admire Markarian's Chain itself, which is a lovely set of several galaxy pairs in a curving arc.

In your log book, you can note the time when you are sure, and some distinguishing feature of the star field, to prove to yourself that you were in the right place. By the time you find the last of these, you will have improved in star hopping so well that going through the entire list again will be simple for you.

Our list for this month has 2 galaxies not on the page-22 chart, M65 and M66. They are in *Leo*. The bright star *Regulus* in *Leo* and the reversed question mark of stars marking his Mane make *Leo* recognizable in the sky. The first time I star hopped in *Leo*, I was impressed at just how BIG *Leo* is in the sky actually.



M65 and M66 are part of the '*Leo Trio*' which is comparatively easily found below *Leo*, halfway along the thigh line. M66 is slightly to the east (trailing) and south of M65. Let the stars drift to the west a little so you know which is which.

Well, we have completed 2/3 of the list. 8 to go:

| | | | | | | | | | | | |
|-------|------|------|-----|---|----|------|-----|----|------|---------|-------|
| M64 | 064 | 4826 | Com | 5 | 12 | 56.7 | +21 | 41 | 8.5 | 9.3x5.4 | 19000 |
| M94 | 094 | 4736 | CVn | 5 | 12 | 50.9 | +41 | 07 | 8.2 | 7x3 | 14500 |
| M106 | 106 | 4258 | CVn | 5 | 12 | 19.0 | +47 | 18 | 8.4 | 19x8 | 25000 |
| M109B | 109b | 3953 | UMa | 5 | 11 | 53.8 | +52 | 20 | 10.1 | 7x4 | 55000 |
| M109 | 109 | 3992 | UMa | 5 | 11 | 57.6 | +53 | 23 | 9.8 | 7x4 | 55000 |
| M108 | 108 | 3556 | UMa | 5 | 11 | 11.5 | +55 | 40 | 10.0 | 8x1 | 45000 |
| M97 | 097 | 3587 | UMa | 3 | 11 | 14.8 | +55 | 01 | 9.9 | 3.4x3.3 | 2.6 |
| M40 | 040 | Win4 | UMa | C | 12 | 22.4 | +58 | 05 | 8.4 | 0.8 | 0.51 |

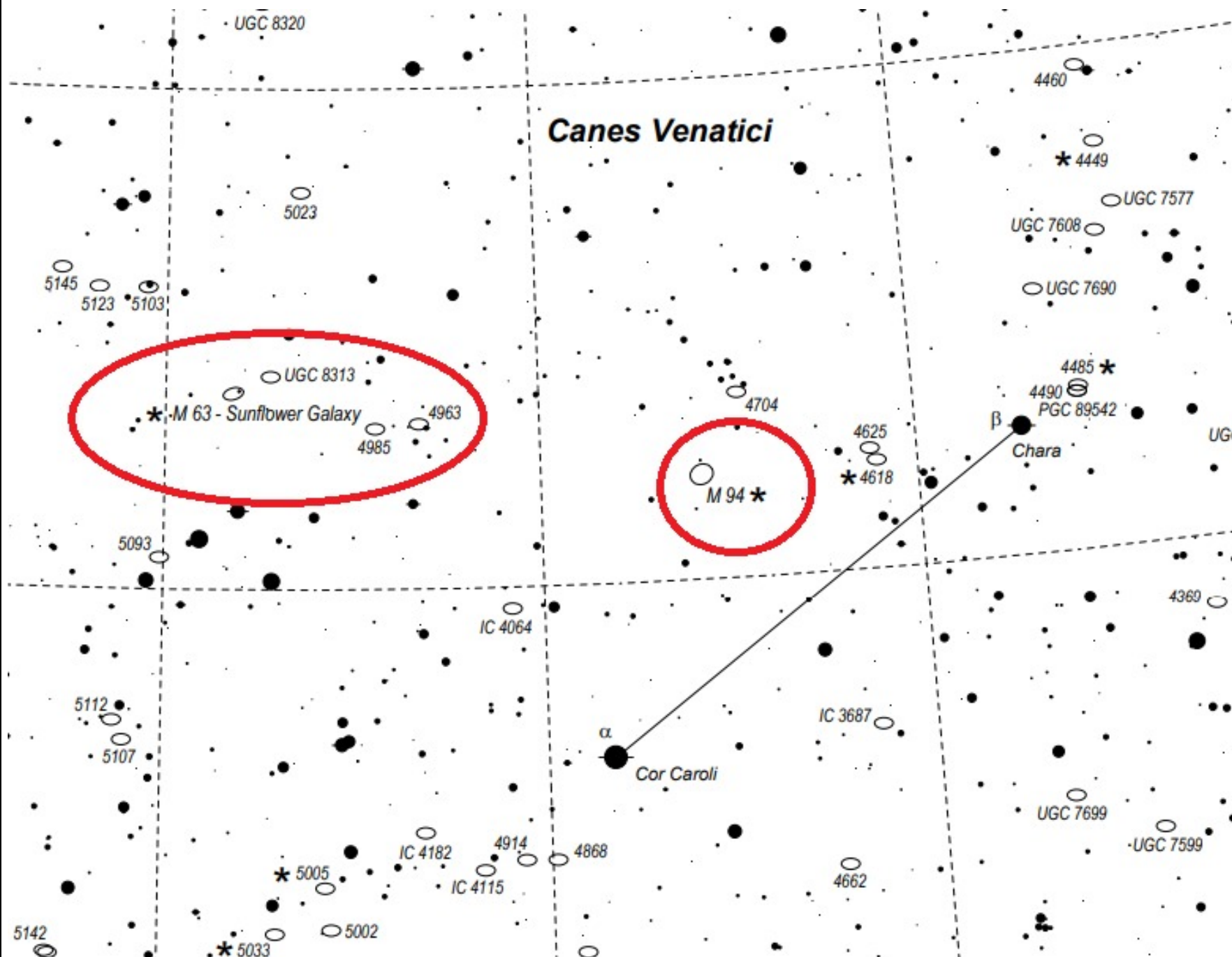
(Continued on [page 24](#))

Star Hopping to the Messier Objects (continued)

Of these, *M64* is probably the hardest one, due to the distraction of other objects. Use the stars of *Coma Berenices* to estimate the locations of *M64* which is just a touch north of the diagonal line connecting alpha and gamma.

Take a quick detour to the globular cluster *M53* which is not on our list, because it's going to be right there near Alpha Comae Berenices.

From *M64* we head north 20 degrees to *M94*, with some attraction to *M63*, and *M3* which are just off our list to the east.



It's the home stretch, and the Messiers which remain are circumpolar. So you will have as long as you need to find the next 5.

M106 is the hardest of the remaining targets. It's in the middle of nowhere.

You will have to create a virtual star to get near it, then study the star field.

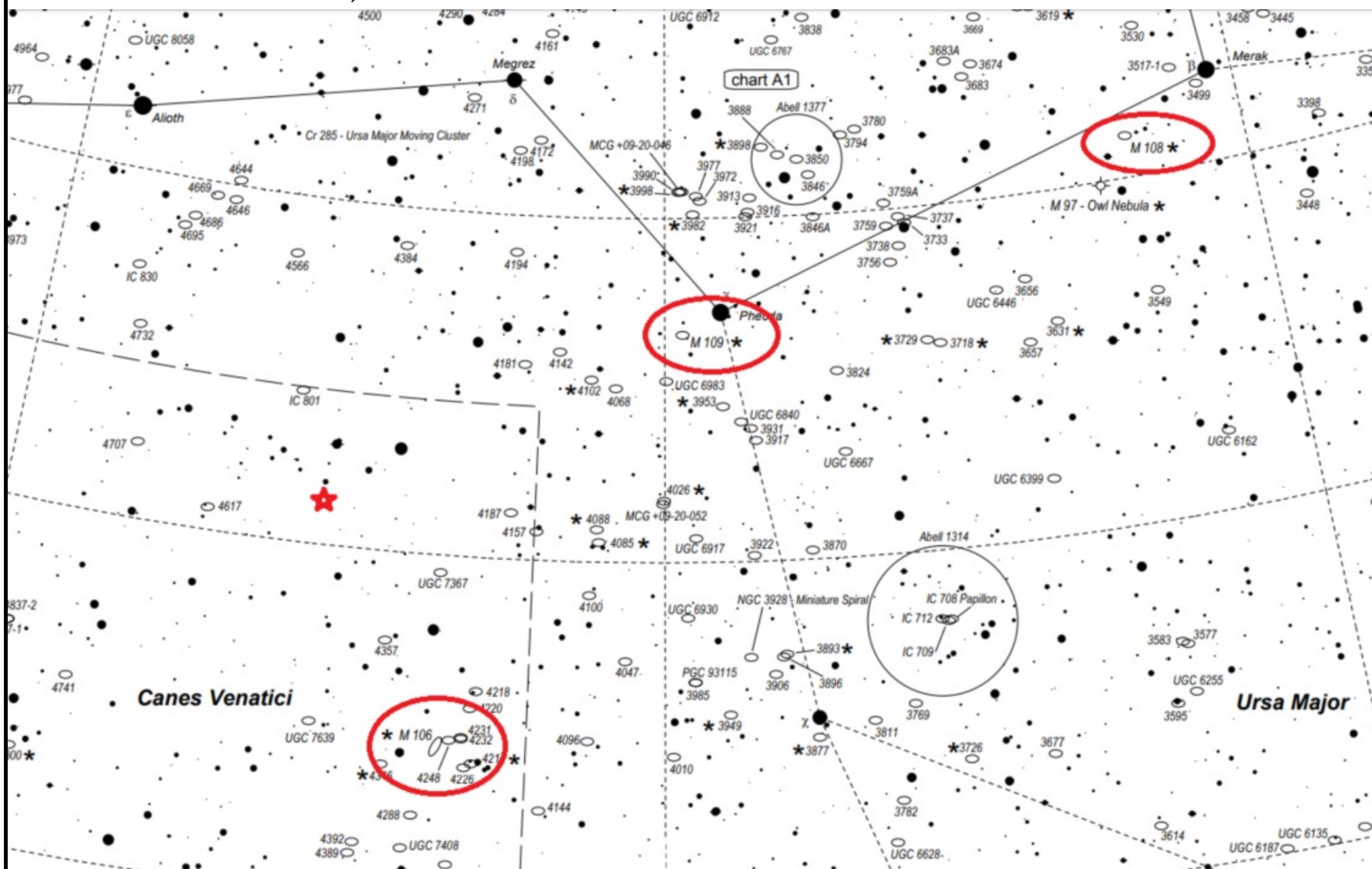
Start at *Merak* and draw the line to *Phecda*, the bottom of the Dipper bowl, towards the handle, and stop when you are directly below *Alioth*, the first handle star from the bowl.

(Continued on [page 25](#))

Star Hopping to the Messier Objects (continued)

Continue the line from Alioth to where you stopped, past the Merak-Phecda line by almost the same distance, and you will get to M106.

This chart shows the area, with a red dot for the virtual star.



M109 is an easy extension of the Merak Phecda line. Make a left turn southwards, and go about twice as far as you came from Phecda, to M109B.

M108 is just below the line, about 20 percent of the way from Merak.

M97 is a planetary nebula, the *Owl Nebula* and is about 25 percent along the line from Merak and a bit more south than M108.

Finally, M40. This one was considered a hoax. The most generous thing we can call it is a 'star cluster' but it is more like a double star. Messier claimed to see nebulosity there. On our map, it is the combination of NGC4358 and NGC4335 near the connector to the handle of the dipper. If you can see that, check off M40.

This completes our tour (more like a slog) of the sky from south to north, visiting all Messier objects between 11H and 13H. We started with a globular cluster, saw many galaxies, and a planetary nebula, and had a glimpse into Messier's averted imagination. In the process we not only learned to Star-hop, but we got a ton of practice too, using some virtual stars and other moves. Star hopping is a skill that you can refine with more moves, and eventually memorize the way to easier targets.

If you want to do the whole Messier Marathon, then it will be good to have some practice before the big night.



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 - **Mar 20: Dammit Jim, I'm an Astronomer!**
 - **Mar 27: The Golden Dance of Death**
- For more details, visit
www.physics.mcmaster.ca/planetarium

UPCOMING EVENTS

March 8, 2019 - 7:30 pm – *HAA Meeting* at the Hamilton Spectator Auditorium. Our featured speaker will be **Kevin Salwach**. His talk is entitled “*A Step Back, and a Look Up*”.

March 9, 2019 - 7:30 pm - 11:00 pm – *Public Stargazing Night* at the Niagara Gateway Tourism Centre, Grimsby, ON.

April 12, 2019 - 7:30 pm – *HAA Meeting* at the Hamilton Spectator Auditorium.

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