

AURORA



Volume 41, No. 6

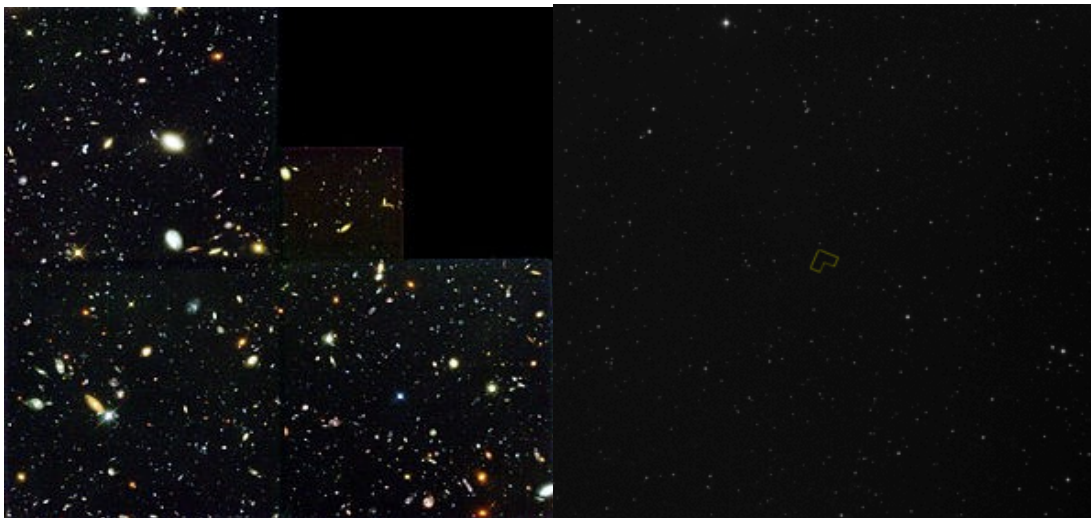
The Royal Astronomical Society of Canada - Windsor Centre

March 2016

I have questions about the universe! (Really) By Juliana Grigorescu

I. Hubble Deep Field: Back in 1995 the Director of the Hubble Telescope decided to have the telescope look at a small area in the Northern sky, in the direction of the constellation Ursa Major (2.5 arc minutes on the side). He was hoping for a good picture. And what a picture that was.... After exposing for ten days 3,000 galaxies were seen, in an area 10 times smaller than the full moon. Extrapolating over the whole sky, there should be 100 billion galaxies in the observable universe...

A similar image was obtained in 1998 for the Southern sky, called the Hubble Deep Field South.



Left: The Hubble Deep Field North

Right: The HDF North is at the centre of this image of one degree of sky. The Moon as seen from Earth would fill roughly one quarter of this image.

II. Hubble Ultra Deep Field: In 2003, a region in the Southern sky was again explored (in the direction of the constellation Fornax), 2.4 arc minutes on the side. This time, with a more sensitive camera, 10,000 galaxies were seen, during a time similar to the time for the Hubble Deep Field. Extrapolating again, there should be 200 billion galaxies in the universe ...

III. Hubble Extreme Deep Field: A last experiment was performed in 2012, basically zooming in into the region of the Hubble Ultra Deep Field, with a longer exposure. The area was only 2.3 X 2 arc minutes. This time 15,500 galaxies were seen, giving again over 200 billion galaxies in the universe ...

I was very intrigued by these images. I had a feeling that a lot of data was hiding in these pictures. As you can imagine, many papers were written based on these images, a team of astronomers are still investigating them, trying to discover something new.

So, the question is: **do we really understand what we see in these images?**

(Continued on page 5)

In This Issue

I have questions about the universe!	Cover and Page 5
Events / Housekeeping Items	Page 2
February Meeting Minutes	Page 3
At the Eyepiece	Pages 4 and 6
Astrophotos	Page 6

Calendar of Events

Our next meeting...

Tuesday April 19, 2016

7:30 p.m.

at

Ojibway Park Nature Centre

5200 Matchette Road

Main Speaker...

Dale Partin

Topic...

Extra-Terrestrial Intelligence

Activities...

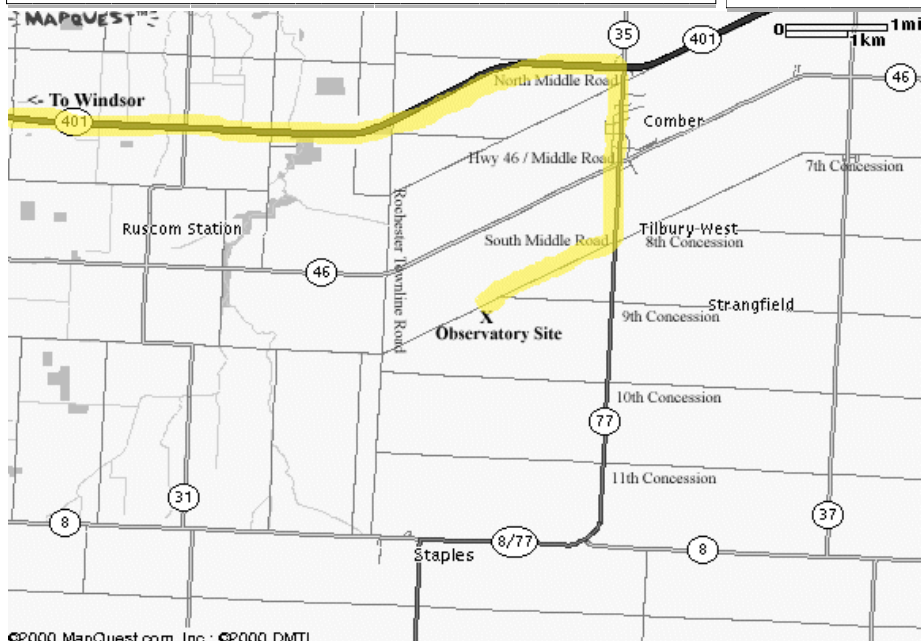
Spring Equinox: On Sunday March 20th at 12:30 a.m. EDT the Sun crosses the celestial equator heading North and marks the beginning of Spring in the Northern Hemisphere.

Jupiter Double Shadow Transits: This is the season for Jupiter's moons to cast multiple shadows on Jupiter. See the Observer's Handbook for March 22, 23 and 29 events.

Moon and Aldebaran: Just after sunset on Sunday April 10th Aldebaran will be less than a degree from the Moon. A daylight occultation occurs from 6:35 - 7:45 p.m. EDT.

Open House Night at Hallam: The next open house night at Hallam is on Saturday April 16th at 8:30 p.m..

Mercury Greatest Elongation: On Monday April 18th Mercury will be 20 degrees away from the Sun in the evening sky.



Hallam Observatory Site

Directions: The map at left shows the Comber area and it includes the major highways (401, 77, 8 and 46) that are in the area of the observatory.

The most direct route from Windsor is "highlighted" on the map which is to take Highway 401 East to Highway 77 South to South Middle Road. Turn right onto South Middle Road and go about 1 kilometer and just after the point where Concession 9 joins it (it is hard to see this intersection) you will find the observatory site on the South side (left) of the road. 3989 South Middle Road.

If you hit the Rochester Townline Road (you come to a stop sign) you have gone too far.

Submissions

Aurora is published monthly except for July, August and December. The September, October, January, March and May issues are full newsletters (usually 6 pages) with a number of member submitted articles. The November, February, April and June issues are short flyers (2 pages).

Submitted articles can be of any length from a paragraph to multiple pages. I can scan pictures and/or diagrams (both prints and film) to support your article and the originals will be returned to you.

Submission deadline is the 1st of the month.

Editor: Steve Mastellotto Email: mmastellotto@cogeco.ca

Membership

The Windsor Centre of The Royal Astronomical Society of Canada meets on the 3rd Tuesday of every month (except July and August) at the Ojibway Park Nature Centre. In addition to regular meetings the centre hosts a number of observing nights, a picnic and a December social. Members receive a copy of the Observer's Handbook, a subscription to SkyNews magazine and access to the Centre's library and telescopes. Optionally the RASC Journal is available in print form—online version free.

Annual Membership Fees: Please see the RASC website at www.rasc.ca for current rates.

Contact Greg Mockler at (519) 326-7255 or visit our website at: <http://www.rascwindsor.com> for more information.

February 2016 Meeting Minutes by Dan Perissinotti

The monthly meeting of the Royal Astronomical Society of Canada - Windsor Center was held at the Ojibway Park Nature Centre on Tuesday February 16, 2016.

Windsor Centre **President, Randy Groundwater**, chaired the meeting and called the meeting to order at 7:40 p.m. and welcomed members and guests to the Ojibway Nature Centre. Randy invited the members to review the minutes of the January 19, 2016 meeting which were printed in the February newsletter.

A **motion to accept the minutes of the January 19, 2016 membership meeting** was made by Dave Panton, seconded by Brent Hathaway. **MOTION CARRIED.**

Main Presentation

Randy gave a brief overview of the topics which were going to be discussed and introduced **Mike Mastronardi**. Mike presented the **RASC Observer's Handbook 2016** and its usefulness for the amateur and professional astronomer. The book is available on Amazon.ca as well as Chapters retail store. However the book provided to all RASC members as part of their annual membership fee. Among some of the index items listed at the rear of the book, there is a quick pictorial index to the book shown along the right hand side of the page. This is useful as a quick reference to topics and interests. The book starts off with general knowledge such as: Greek alphabet used for naming and categorizing stars, solar system geometry and conjunction definitions, measuring the sky in degrees using your hand, masses of objects relative to the Earth, and so on. As the pages turn, the topics become more involved into the physics, optics and mathematics used in order to comprehend the sciences of astronomy.

Continuing with the optics topic within the third chapter of the Observer's Handbook, explanations are given as to the history and types of optics and their uses. Examples include: binoculars, telescopes, eyepieces, filters, magnitude scales, frequency of night-time cloud cover and weather resources, and so on.

There is a fairly detailed section about our moon. This includes a list and map of craters, occultation of stars, rise and set times, phases and an analemma mapping figure.

More information about the Observer's Handbook can be found at www.rasc.ca/handbook.

Mike closed his talk by discussing a couple of other useful resource; a book called **NightWatch by Terrance Dickenson**. It is an easy to follow book with detailed, colourized charts, photographs and tables, and another RASC publication called **The Beginners Observing** guide. This book is not published every year. It is very simplistic, offering maps,

objects of interests, and general information.

Prior to the break, Randy gave a quick overview of **2016 calendar of events**.

Break and 50/50 draw: \$7.75 went to **Greg Mockler** which was donated back to the centre.

Director of Observing Report

Randy welcomed **Brian Thomas** to the floor, to present the D of O Report. Brian started off with a general questions to the group on their **observing within the last month**. Some photos from the members were shown, highlighted by Randy's **planetary parade**.

A quick rundown for the following month:

Sun is in Aquarius

Moon is full on Feb 22nd with the first quarter on March 15th

Mercury very low in the ESE morning sky

Venus low in the ESE morning sky shining at -3.8mag

Mars rising after midnight to a brightness of -0.5 be end of the month

Jupiter will track through Leo at -2.5, and will be at opposition on March 8th

Saturn resides in Ophiuchus at +0.5

As of March 1, 2016, the beautiful winter constellations are still available for viewing. Looking East, **Leo is housing Jupiter**, and to the North, **Hydra** is bordering the winter constellations. Early morning risers have the benefit of viewing the planets.

Upcoming events include a **solar eclipse** on March 9th, which unfortunately is not for North American observers. **Zodiacal light** is visible in the western evening sky. Favorable evening sky ecliptic angle produces the **best moon viewing**, mainly concentrated within March and April. On March 8th, **Jupiter will be at opposition**, at this time Earth will be closest to the planet. Jupiter will be at mag. -2.5, also making it the second most distant opposition in the 12 year orbital cycle.

Brian asked a **trivia question**: How fast does the lunar terminator move across the moon? **Answer**: About 15.4km/h or 8 arc seconds per hour. Some of the guesses were pretty close, however no one was on point.

REMINDER, daylight savings time "springs" ahead at 2:00 a.m. on Sunday March 13, 2016.

Randy thanked everyone for coming out to the meeting and reminded everyone that the next regular membership meeting would take place **Tuesday, March 15th, 2016 at 7:30 p.m.**

Randy **adjourned the meeting at 9:55 p.m.**

At The Eyepiece: Three Other Leo Triplets by Mike Ethier

Last March I wrote about the most famous and impressive of the Leo Triplet of galaxies, including M65 and M66. By adding on two nearby impressive galaxies, it became a quintuplet. This time, I wish to highlight three other triplets from the same constellation. Though they are far less impressive, they are worth seeking, and have provided me fine views in the 12" mirror, and some challenge.

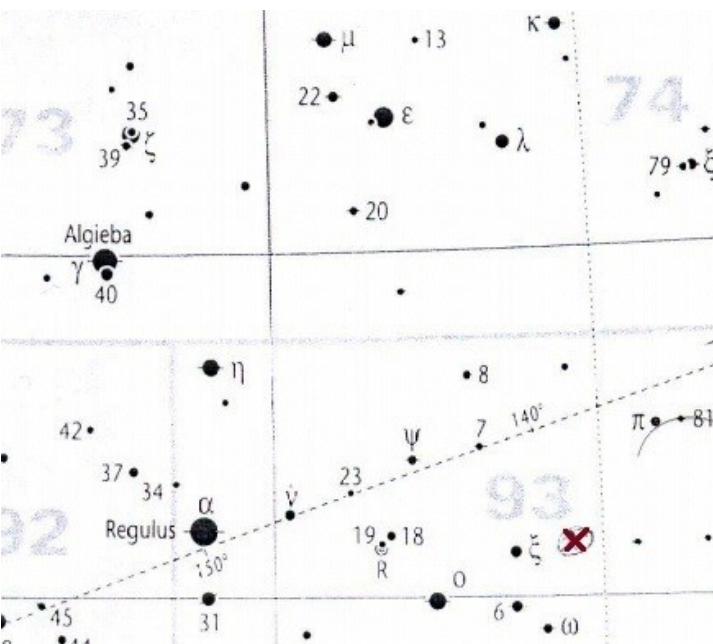
Leo is filled with galaxies grouped in pairs, threes and fours, so though I will briefly talk about three sets of three, there are many more triplets and fun multiple groupings awaiting your discovery. If you have a go-to or push-to scope, finding these objects is easy. Using *Uranometria* is also recommended. Use Chart 93 for the first group, which is a bit of a challenge for a 12" scope.

I will begin with the faintest group, following up with two more impressive triplets. NGC 2872, 2873, and 2874 precede ξ Leonis by about 6m of Right Ascension (RA). NGC 2872 and 2874 are somewhat easy to see, but at 60x they are close enough to one another to look like one object. At 150x and higher they are separated by a tiny, narrow strip of black sky. 2872 is brighter and mostly round. 2874 is very elongated, so much so that I once or twice thought that I was seeing a third galaxy to the south. 2873 poses a considerable challenge for a 12" scope, and lies a bit north of the brighter pair. I did not see it the first night I tried. It is oval, and though I was expecting a very tiny object, it appeared a bit larger than I thought it would be.

NGC 2872: 2'.1 x 1'.9: Mag 11.9; Surface Brightness (SB) 13.4

NGC 2873: 0'.7 x 0'.3: Mag 15.4; SB 13.6

NGC 2874: 2'.5 x 0'.9: Mag 12.6; SB 12.9



X marks the location of NGC 2872-4, preceding ξ Leonis. Uranometria Chart 93

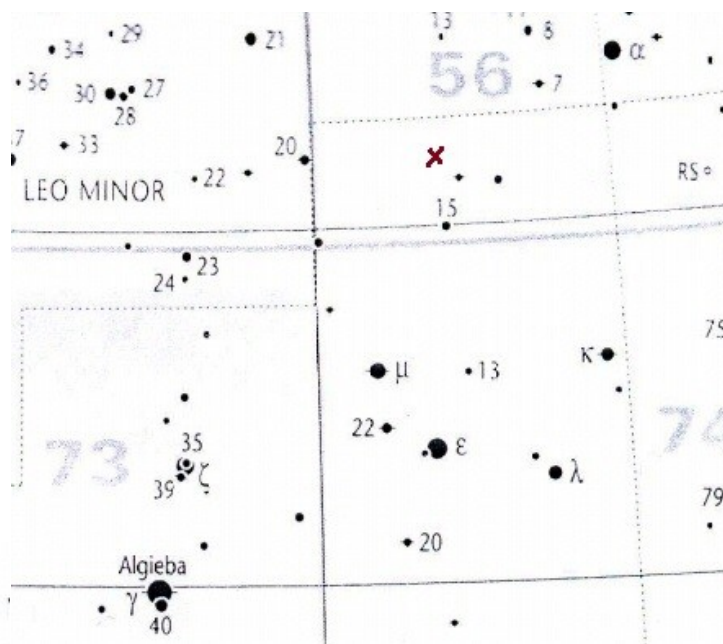
A brighter and easier trio of galaxies is NGC 2964, 68, and 70. This fine Leo triplet contains two large and fairly bright galaxies, and a smaller, fainter one. NGC 2964 and 2968 both show up together at 60x, while 100x shows all three! 2964 is the largest

and brightest, and isn't a bad little showpiece in a 12" mirror. It is quite large and very elongated, has a bright middle and also fainter extensions that are easy to see. I used up to 200x on this one and could have gone higher. 2968 is also pretty bright, though less so than 2964. It is oval, has a small, bright center, and is more uniform in brightness. Tiny 2970 is round with a stellar center, easy to see but better at higher power (200x is good). This is a wonderful little group, and often overlooked. It can be found on Chart 56 in *Uranometria*, 2 degrees north of Star 15 in northern Leo, near the border with Leo Minor. There are some wonderful photos of the group in Google Images.

NGC 2964: 3' x 1'.7: Mag 11.3; SB 12.8

NGC 2968: 2'.2 x 1'.5: Mag 11.7; SB 13

NGC 2970: 0'.6 x 0'.5: Mag 13.6; SB 12.3



NGC 2964, 2968 and 2970 near the X, north of Star 15. Uranometria Chart 56

Our final set of triplets for this year are NGC 3605, 07, and 08. These galaxies form the largest and brightest of the three sets in this article, and are easily seen in a 12" mirror. In fact, I managed to spot them without difficulty from my light-polluted back deck in suburban Amherstburg, near Pointe West. From a dark sky location they positively shimmer! NGC 3607 is brightest and largest, with a blazing core. It is also the roundest one of the three. Along with 3608, it is suitable for 6" scopes, and quite nice in an 8". 3608 was oval, and though smaller than 3607 it was nearly as bright, with both objects sharing similar surface brightness numbers. The core of 3608 was also very bright, though smaller than in 3607. 3605 is the icing on the cake. Seen at 60x with averted vision, higher powers easily reveal it. This group can be seen on Chart 73 in *Uranometria*, a little more than 2 degrees south of Delta.

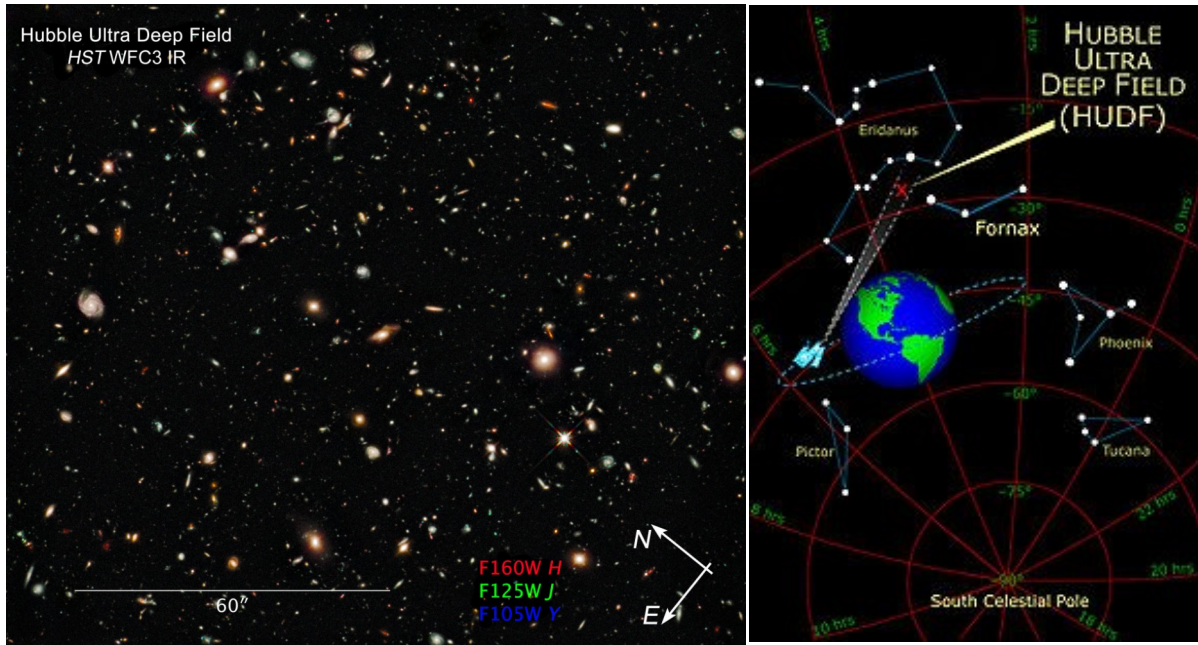
NGC 3605: 1'.4 x 0'.9: Mag 12.1; SB 12.4

NGC 3607: 4'.6 x 4': Mag 9.9; SB 13.1

NGC 3608: 3'.2 x 2'.6: Mag 10.7; SB 13.1

(Continued on page 6)

I have questions about the universe! (Really) (continued)



Left: Hubble Ultra-Deep Field (HUDF) image (full range of ultraviolet to near-infrared light) includes some of the most distant galaxies to have been imaged by an optical telescope, existing shortly after the Big Bang (June 2014)

Right: Location of the HUD Field

We have based our whole theory of the universe on the Big Bang theory. **No new matter appears out of “nothing”, matter is only transformed.**

So in these images, the background small galaxies must be very far away and very old. They are small because they are far away and because they are physically small. The fate of these small galaxies, I believe, is to grow bigger, by collisions. Almost all of the medium galaxies must be the result of these collisions. The best proof that that really happens is small galaxies interacting, that scientist call “tadpole galaxies¹”. They come into view as the universe evolves, but the original galaxies that form these medium galaxies are **out of sight**.

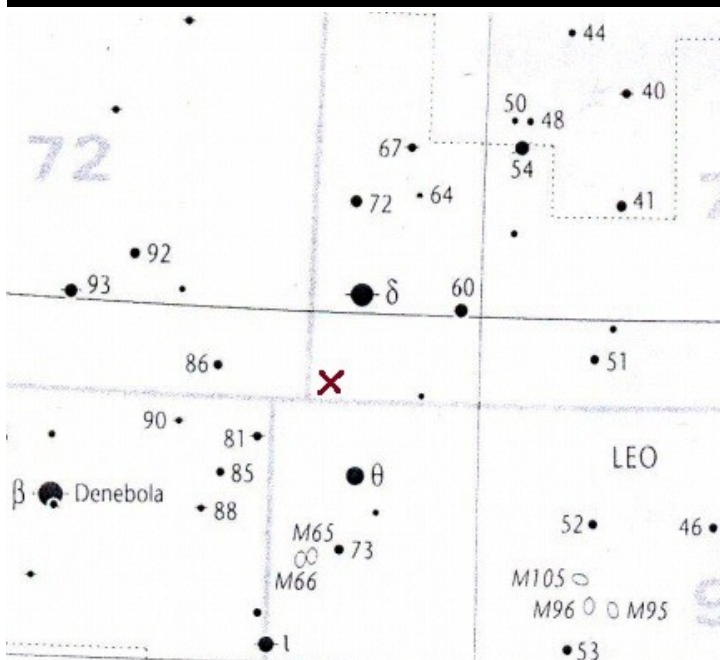
The big galaxies that we see in these images are, in my opinion, even more complex, they are the result of medium/small galaxies colliding with each other. They come into view as the universe evolves, but the original galaxies that form these big galaxies are, again, **out of sight**. So when we estimate the number of galaxies in the universe we are counting more galaxies that they really are. That means that there is less matter in the universe than predicted, which will make the accelerated expansion of the universe very plausible, with or **without dark energy**.

It is just an opinion, but it would explain what the universe is doing now, according to the latest discoveries about the accelerated expansion of the universe². And who knows, maybe it could eliminate the mysterious problem of dark energy, which has been with us, faithfully, for almost 100 years.

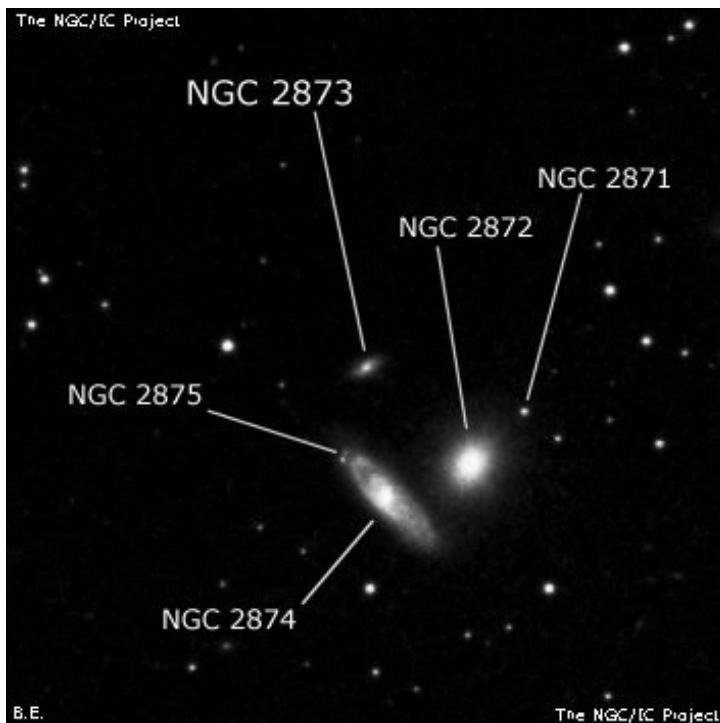
1. See on the Internet: “A gallery of Tadpole Galaxies”, Credit NASA, A. Straughn, S. Cohen, and R. Windhorst (Arizona State University), and the HUDF team (Space Telescope Science Institute).
2. In 1998, published observations of Type Ia supernovae (“one-A”) by the High-Z Supernova Search Team, followed in 1999 by the Supernova Cosmology Project suggested that the expansion of the universe is accelerating. The 2011 Nobel Prize in Physics was awarded to Saul Perlmutter, Brian P. Schmidt and Adam G. Riess for their leadership in the discovery (Wikipedia).

Three Other Leo Triplets (continued)

Astrophotos



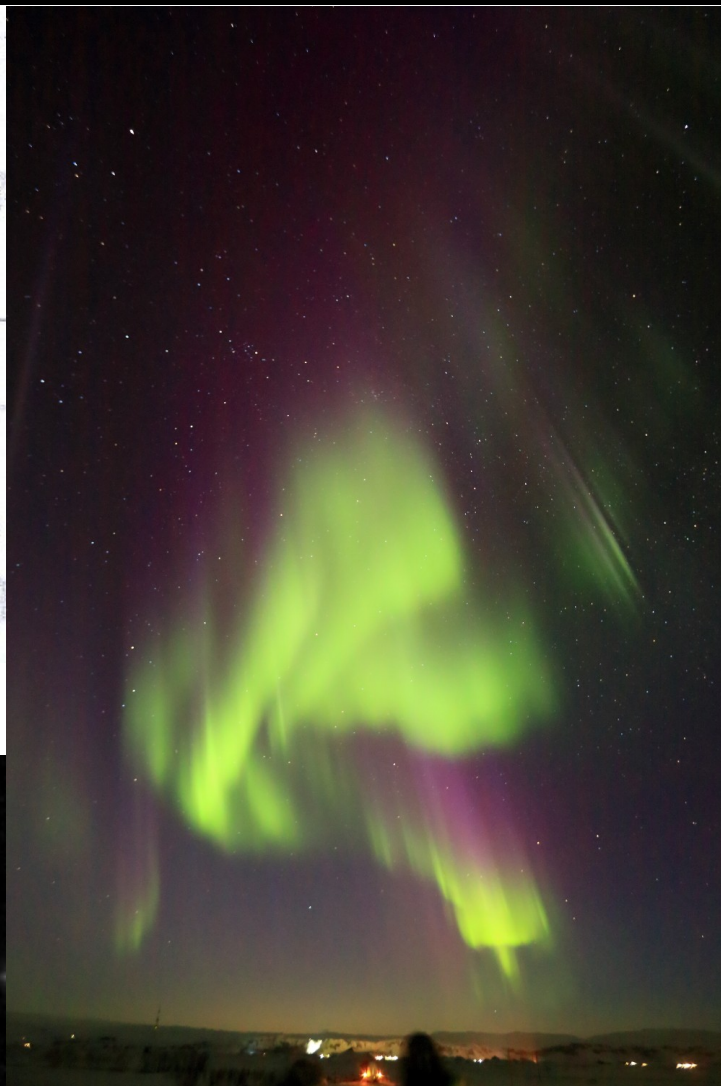
NGC 3605, 3607, and 3608 can be found at the X above.
Uranometria Chart 73



If you have a very large telescope you might make this group into a quintuplet! I only saw 3 of them. NGC 2871 and 2875 are stellar and extremely faint.

And don't forget to go back and view the original Leo Triplet (M65, M66 and NGC 3628) - it will look even more spectacular if you view this month's smaller ones first. The original Triplet is nearly due south of our final group of galaxies (see chart, above).

Happy hunting and clear skies!



Top: Windsorite and astronomy enthusiast Gerry Kaiser was lucky enough to be near Vik, Iceland when a solar flare and the resulting geomagnetic storm triggered a large auroral display on Sunday March 6th. **Bottom:** Mike Pataky recently had this image of Jupiter selected as the *Photo of the Week* on the SkyNews web page - Congratulations Mike!