

The Sunset Gazette

Serving the Tri-Cities since 1975

Volume 10, Issue 7

March, 2013



Meeting information

Meetings are generally in the theater in the Delta College Planetarium in Bay City. The meetings will usually be on the 2nd Friday of each month at 7:00 PM. Watch the newsletter for changes in dates and times. Membership is not required to participate in meetings and activities. See last Page for this month's meeting site.

Membership Information

Our club has switched to e-mailing our newsletters. For those wishing to receive a hard copy mailed an additional dues of \$10.00 per year is required.

New Membership Rates:

5\$ per Year

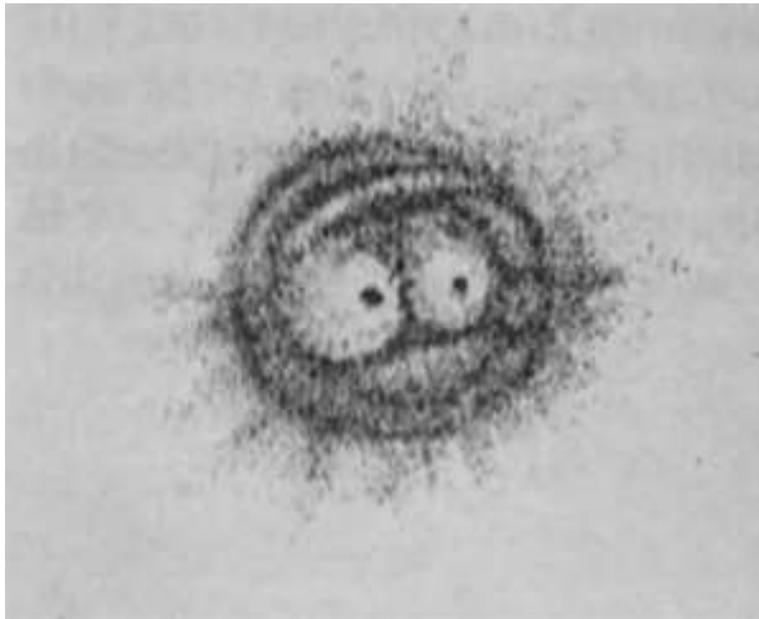
Treasurer's address for renewals and subscriptions:

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Astronomy at Birr Castle

This series tells the story about the astronomy undertaken at Birr castle in Ireland which started in 1827 and led to the construction of the largest telescope of its time, the great 72" Birr reflector who for more than 70 years was unsurpassed in its size.

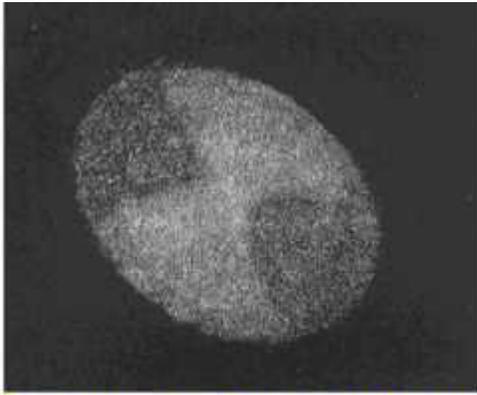
As we have seen the 72" Birr reflector was the first instrument who truly could discern the spiral nature of many galaxies but these were by no means the only deep sky objects Lord Ross and his fellow observers trained the 'Leviathan of Birr Castle' at. Another class of objects were the so called planetary nebula, a term Sir William Herschel created because at low to medium magnification they resembled often a planetary disc similar to that of the newly discovered Uranus. Unlike galaxies planetary nebula cannot be resolved into stars with the exception of the faint central star. This central star is at its end of life and has expelled its outer layers via strong stellar winds and pulsations when it entered its red giant phase. What is left is its hot luminous core which emits ultraviolet radiation which can ionize the expanding shell(s) of ejected material. It is this energized shell we can see as planetary nebula and which often comes in very intricate and beautiful shapes therefore names like Cat's Eye nebula, Hour-glass nebula, Butterfly nebula, Eskimo nebula etc. The phenomenon is relatively short lived on the galactic timescale and does last only a couple of ten thousand years.



Left: Drawing of the Owl Nebula by the Third Earl of Rosse. He makes some interesting comments about his observations of March 11, 1848: "Two stars considerably apart in the central region: dark penumbra around each spiral arrangements." (On many occasions only one star seen and spiral form doubtful.)

Another observer Thomas Romney Robinson remarked in 1848: "A most intricate group of spiral arcs disposed around two starry centers, looking like the visage of a monkey."

Two other famous planetary nebulae dawn by Lord Rosse and amongst the first time targets of many amateur astronomers are the 'Dumbell Nebula' or M27 in Vulpecula and the 'Ring Nebula or M57 in Lyra. The former was drawn several times by Lord Rosse and he concluded that it was not resolvable into stars, but there was a slight inclination of resolvability possible due to some field stars which



Drawing of the Dumbbell Nebula
by Lord Rosse - 72" Reflector
ARCHIVES OF THE ARKANSAS SKY OBSERVATORY
PLATE PUBLISHED IN 1849

lied in same direction and are not connected to the actual nebula (see drawing of M27 or the Dumbbell Nebula to the right). The same was apparently true to M57 which Lord Rosse apparently drew which such details that it took many decades to confirm it with the 36" Lick refractor in 1888.

We have already talked about the fact that some contemporary comments cast doubt about the optical quality of the 72" Birr reflector and Lord Rosse indeed pointed out in a paper published in 1861 that at certain times there were problems with optical performance. The 72" Birr reflector was not placed in an observatory dome but was always in the open and the damp Irish weather quickly started to tarnish the speculum metal from which the mirrors were made. There is no doubt that such a tarnished mirror would perform subpar and that definition and resolving power would suffer badly. That was the reason why two mirrors were built so that one could stay in the tele-



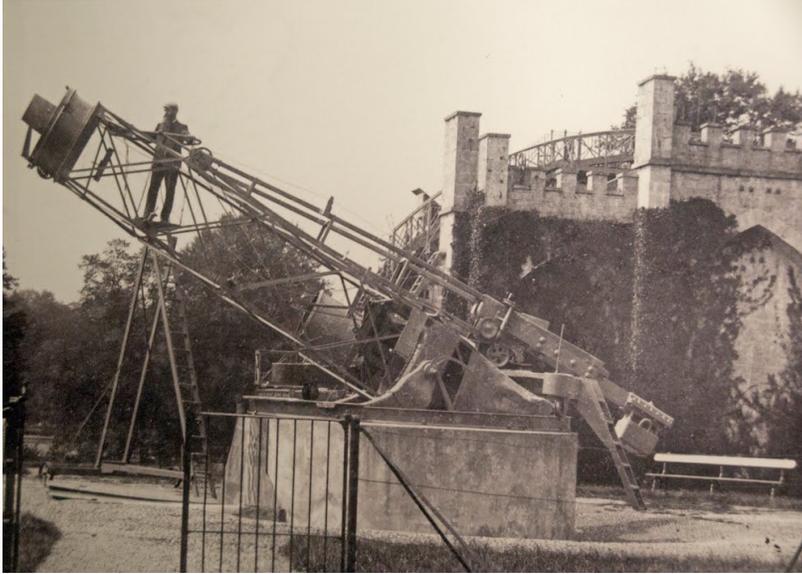
scope whereas the other could be re-polished in the laboratory. If a visitor was unfortunate enough to look through the telescope at the wrong moment he could be given a very wrong impression about the true optical performance of the telescope (see left: one of the original two speculum metal mirrors in the Science Museum, London, Source Wikipedia).

It was in the nature of Lord Rosse to open up the telescope to any serious observers who would like to use it and so it was not surprising that Birr castle became a major astronomical center in the 19th century. Apart from Lord Rosse many assistant observers took part in the work and one was William Hautenville Rambaut who stayed until 1849 after which he left for Armagh Observatory where he became assistant to the director Romney Robinson. Between 1848 and 1850 Johnstone Stoney was assistant observer and he was succeeded by his brother Bindon Stoney who stayed for two years. Other assistant observers were Mitchell (1852 to 1854), Hunter (1861 to 1864) and Robert Ball (1865 to 1866) as well as Lord Rosse's eldest son Laurence who became the fourth Earl. During this time the emphasis was on observing nebulae and the results of these skillful observers were later transferred into the famous New General Catalogue of clusters and nebulae (NGC) put together by J.L.E. Dreyer and published in 1888. John Louis Emile Dreyer was himself assistant observer between 1874 and 1878 and he used both the 36" (see next page) and the 72" mainly on nebulae. Being deeply methodical he soon realized that a comprehensive catalogue of these objects like open and globular clusters, planetary, starry and irresolvable nebulae was urgently needed. Herschel had compiled an impressive 5079 objects into his general catalogue and Dreyer added 1172 more, all of them from observations by him and fellow observers between 1848 and 1878 at Birr Castle.

The performance and the results of the 72" Birr reflector were so impressive that the Royal Society concluded that a similar sized telescope could do great things if it were set up in the southern hemisphere. And so a telescope committee created in 1852 to decide what would be the best most suitable form of the telescope. Aim was a 48" reflector but one of the main points of discussion was the form of mount. Lord Rosse strongly recommended an equatorial mount which would be much more versatile than the mount used with the 72" reflector. The objects of the whole sky would become accessible and track-able if the mount was equipped with a good clock drive. It would also make the telescope suitable for photography. But some telescope committee members did not agree and it took considerable time till the telescope, the Great Melbourne Reflector, came into being.

It was finally finished in 1870 but never lived up to expectations and its optical performance was not comparable to that of the 72" Birr reflector. Would it had performed better, reflectors would have taken over much sooner the top of the reign of large research telescopes. Only in 1945 it was given a new mirror and mount and finally it did live up to its proper role.

In 1865 Lord Rosse had to give up practical observing because his health began to fail and he died two years later. But the story of astronomy at Birr castle did by no means end here. He was succeeded by his oldest son Laurence, the fourth Earl of Rosse, who continued his work as observer and engineer. Apart from the great 72" and its 36" predecessor a 18" reflector was added to the range and it was in use during the late 1850's and through 1860. The telescope was used for micrometrical measurements of star positions in selected fields and drawings of the 72" were then superimposed on them. The mount of the 18" was quite interesting



because the driving force was neither electricity nor a clockwork but water! It was designed by the later fourth Earl of Rosse who then started to equip the 72" reflector with a drive system. Of course it was not as good as a modern drive but it was still better than no drive. He then moved to the 36" and Lord Rosse decided to remount the telescope onto a fork with the axis pointing to the celestial pole - very similar to a modern fork mounted telescopes. The tube itself was a square lattice and the eyepiece could be turned into a position most comfortable to the observer, who would stand on an independent platform moving on circular rails (see left photo: quite modern even for today's standards).

At the end of the story about Astronomy at Birr castle we will cover one more important discovery which does not concern some remote spiral galaxies but an object much closer to home: The Moon. A long standing question in science was the actual temperature of the Moon. At day the Moon's surface was strongly heated by the Sun but the Moon has no atmosphere and the amount of heat received by Earth is quite low, so an ordinary thermometer would not been suitable. The heat of the Moon had therefore be collected as radiation and measured with a more sensitive device like a thermocouple. The collector was the 36" which now had a clock drive and was more manageable than the 72" reflector. Focusing the collected radiation onto some self designed thermocouples Lord Rosse measured a value of 197 °F later corrected to 212 °F. He later repeated the measurement using a modified 24" searchlight to collect the radiation but came to similar results. For a long time the scientific world did not follow his results but rather those of S. P. Langley who in 1885 stated that the temperature of the Moon never rose above freezing water. Yet over time it became clear that Lord Rosse early measurements were correct and today's value is 224 °F at the equator during a Moon day. With this we come to an end of the of the main story about Astronomy at Birr castle. The great 72" reflector was not longer consistently used for observing nebulae after 1878 and so astronomical activity at Birr slowly faded away - also due to the fact that now more and larger reflectors were planned and build especially in America. In 1908 the fourth Earl of Rosse died and the 72" was apparently never used again and the telescope was dismantled and the main mirror sent to the Science Museum in London. In 1925 the staircase and the wooden structure was in such poor state that it was taken down for safety reason and 1927 nothing remained than the two stone walls. In 1994 Michael Tubridy was tasked with research redesigning the great reflector - quite a difficult task given that no original plans were available. In 1996 to 1997 the telescope was partly restored with the help of photographs taken by the third Lady Rosse and in 1999 a new mirror was installed not from speculum but from aluminum metal to maintain a compromise between historical authenticity and modern astronomical observation needs. Visitors to Birr castle can now see the telescope like guest observers may have seen it during its hey days in the 19th century when it was the largest telescope on Earth and one of great centers of astronomy.

This series about "Astronomy at Birr castle" has been loosely based on the wonderful book by Patrick Moore published in 1971.

SUNSET ASTRONOMICAL SOCIETY
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This issue can be accessed in color on the website of the SAS!!!

<http://www.sunsetastronomicalsociety.com>

SAS Meeting

Start: 7:00 PM

Friday, March 8th, 2013

Delta Planetarium

Welcome members and guests

New and old business

Club Business

Treasure report

Refreshments Break

Presentation:

TBD

If clear we will observe on the observation deck. Perhaps a good opportunity to watch Comet PanSTARS from the upper deck.

What's up in the Sky

Feb 27 to March 12 *Early Evening*:

Now is an excellent opportunity to observe the zodiacal light from a dark location. In the early evening look to the west ca 80 min after sunset for a huge, tall, left-sloping pyramid of light reaching toward Jupiter.

March 1-2 *Night to Dawn*: Saturn pairs up with the Moon ca 5 deg to the left or the lower left.

March 7-10 *Dusk*: Comet PanSTARS should now become visible to binoculars and even the unaided eye. To find it look very low in the west shortly after sunset.

March 4: *Last Quarter Moon*

March 10: *Daylight saving time starts at 2 a.m. for most of the US and Canada.*

March 11: *New Moon*

March 12-18 *Dusk*: This is the week of comet PanSTARS who should be most prominent. It can be found immediate to the left of a very thin crescent Moon on the 12th and well below a substantial more crescent Moon on the 13th.

March 19: *First Quarter Moon*

March 17 *Evening and Night*: Watch out for an incredibly close Jupiter to a waxing crescent Moon amid Aldebaran, the Hyades and the Pleiades.

March 20: *Spring begins*

March 27: *Full Moon*

March 28, 29 *Night*: Watch out for the Moon who rises upper right to Saturn on the 28th and below Saturn on the 29th.

UPCOMING EVENTS