R E G U L U S

THE NEWSLETTER OF THE

ROYAL ASTRONOMICAL SOCIETY OF CANADA - KINGSTON CENTRE

MARCH, APRIL, 1987

SUPERNOVA DISCOVERED BY CANADIAN CALLED EVENT OF THE CENTURY

It was the brightest supernova in almost four centuries, the first naked-eye supernova since the invention of the telescope, possibly the first one ever seen before reaching its maximum brightness, and it was discovered by a Canadian just a couple of weeks ago. Supernova 1987-I, also called Supernova Shelton, has already been hailed by professional astronomers as the astronomical event of the century. It has certainly begun already to affect modern theories regarding the life-cycle of stars.

Thirty-year-old Ian Shelton, originally from Winnipeg, was working at the University of Toronto Observatory at Las Campanas in Chile, on January 23 when he spotted a bright object in the Large Magellanic Cloud. Before long he realized it was "an exploding star - the most spectacular kind of cataclysm in the universe", the phenomenon known as a supernova.

During the third night of his current observing run, Mr. Shelton noticed a strange bright object on a photographic plate. At first he did not believe his eyes. "It took," he said, "a little while to finally believe it was real. The first thing I did was look at the plates again, and it took about fifteen minutes to put the pieces together." Normally, he said, one would take a second photographic plate of the area to confirm the bright object, but in this case, it was so bright one could just look up with the naked eye and could see it.

The newly discovered object was near the Tarantula Nebula in the Large Magellanic Cloud, and since it was in the LMC, it was at a distance of about - 160000 light years. Beyond that there has been considerable disagreement - about which previously known star is involved, about which type of supernova it was (though most astronomers now favor a Type II supernova), about how much more it will brighten, and about how long it will stay a naked-eye object. Already it has presented a puzzle in the way it has varied slightly in brightness (from mag. 5 to 4) on its way to maximum. There is little doubt that it will remain a naked eye object for at least several months and will be intensely studied by all the observatories in the Southern Hemisphere; many of them have already had their research programs radically altered by this object which is the centre of attention of every available instrument.

Just when the rush of amateurs southward to see Halley's Comet had ended, there is again something to draw them to Australia and the southern lands, a cataclysmic "event" that may add more to our knowledge of the heavens than even "Halley" did in the past couple of years.

Our congratulations to fellow-Canadian, Ian Shelton, on a very significant discovery!

TELESCOPES, EYES, AND ATMOSPHERE

by Larry Manuel

[EDITOR'S NOTE: I am very pleased to have received again for this issue of our newsletter a pair of articles from Larry Manuel who has continued very active both in observing and in the production of equipment useful for the observer.]

When an object is viewed elsewhere than at the zenith, the atmosphere acts as a prism. The light of a bright planet, for example, is drawn out into a slight spectrum. In The Adjustment and Testing of Telescope Objectives, H. Dennis Taylor describes how to correct this effect in the chapter titled, "False Centering".

We can nullify this dispersion by introducing a weak prism between the eyepiece and the eye. Or, if a high power is used with a narrow exit pupil, one can allow the beam of light from the eyepiece to enter the pupil of the eye eccentrically. Because of the imperfect colour correction of the eye, red light at the periphery of the pupil is refracted less than the other colours. The result is a red fringe surrounding the object on that side.

In practice, shifting one's head toward the bluish side of an object will neutralize atmospheric dispersion with the eye's lateral chromatic aberration. Optical designers combine opposite undesirable effects to produce a more distinct image.

False centering describes the optical axes of a refractor's two (or three) elements in the objective not aligned. It is checked at high power by defocussing sightly on a bright star and examining the expanded defraction rings for eccentric colour. With false centering, one side will be bluish, the other more red. A careless observer may suspect the objective is falsely centred if his or her eye is laterally displaced. Mild false centering may be compensated for by shifting one's head just as for atmospheric dispersion.

The flint element in a doublet is pushed in the direction of the blue fringes to attain perfect centering. Traditionally, cells for objectives six inches and larger have three small screws per element to allow this.

A BARLOW LENS'S TRUE MAGNIFICATION

by Larry Manuel

One can determine the true field of a telescope/eyepiece combination by timing a star on the celestial equator drifting through the field of view. I tried this recently with my 3" f/12 Japan Specialty Optics refractor and Celestron 22mm Plössl eyepiece. Allowing for the error in measurements (since I used my wristwatch), I found the focal length to be as stated and the apparent field to be 50 degrees - the same as the TeleVue Plössl eyepieces.

Using a Barlow lens with long focus eyepieces maintains comfortable eye relief at high power. The telescope requires the Barlow (TeleVue 2.5 X) ahead of the star diagonal in order to reach focus. The farther inside focus, the higher magnification any Barlow provides. I suspect it was providing about 3 X.

Star shift times with and without the Barlow indicated it was working at 4 X. I observed the moon with my 7mm Nagler eyepiece and "4 X" Barlow and was astonished at the lunar detail visible at a ridiculous 520 X. It is an excellent lens to give a sharp image at that power.

A KINGSTON CENTRE OBSERVING SESSION

by Mark Kaye

[**EDITOR'S NOTE:** I am equally pleased at having received an observing report from Mark Kaye, who is another one of our active observers.]

At the end of 1986 the Grass Creek Conservation Area was the site selected by our group of observers as an accessible dark-sky observing location. At the first meeting of the new year, the group decided to hold observing sessions around the time of the new moon at this site. The arrangements were informal; on a clear night one could find out what was going on simply by contacting Mark Sorensen (542-7610), Larry Manuel (544-5857), or Mark Kaye (353-2313). Although we hoped that Friday or Saturday nights would be clear for such sessions, we had to settle for a Monday-Tuesday for our first outing. Despite the -22 degree temperatures and a slight breeze, our inaugural session got under way on January 26.

I arrived first and was already observing M81 and M82 when a Skoda, apparently overloaded with telescopic gear, pulled onto the scene. Larry and Mark, bundled up to within a centimetre of not moving at all, set up their equipment and joined me. Altogether, we had a 7.6cm f/12 refractor, a 20cm f/10 Schmidt-Cassegrain, and both 15 X 80 and 7 X 50 binoculars. This was the first chance I had had to view through a refractor since I had purchased an SCT, and I was impressed by the quality of the views

that a telescope nearly one-third the aperture could give, especially under high power. Larry has built a beautiful alt-azimuth mount that would withstand a minor earthquake while providing stable images. The eyepiece is a a perfect height for unstrained viewing, and the telescope scans the sky with ease. We made comparisons: the refractor easily split doubles, a passtime I had never seen much use for in the past. However, when the image in the eyepiece is a crisp pair of star images, one immediately sees the beauty of double star observing. As a star test, Castor, with components 2 seconds apart was an easy split with the refractor, but merely a blurry oval in the SCT. Open clusters, viewed through the wider field of the refractor, were a pretty sight; however, with a wide-field adaptor, the view in the SCT was equally impressive. While viewing the nebulosity in Orion with the refractor, we could see better contrast in the images. In the galaxy department, however, the SCT's extra light-grabbing ability and longer focal length helped show these low surface-brightness objects. Using Larry's 7mm Nagler eyepiece, we detected dust lanes in M82 and some spiral structure in M81. On the whole, I would rate the refractor an easier telescope to use and cm for cm a better optical device by a long shot.

It was a cold night, as Mark will attest. His binoculars soon froze at all the joints, and the optics kept fogging over. The telescopes, however, were unaffected by the weather because of innovative heated dew caps and eyepiece heaters. I have taken apart the SCT and used snowmobile grease on all the moving parts; this has drastically reduced the mirror shift that occurs during focussing, and I hope it will prevent the burning out of the clock-drive motor. Little did I realize that before the night was through I was to pay for all the heated devices' running off the car battery. While Larry's heated finder was useful, the unheated finder on my SCT was next to useless, and in my frustration, I sometimes reverted to dialling in deep-sky objects as I gave the finder a chance to defog. I have some problems finding things in the spring sky anyway, this being the sky that I am least familiar with.

After observing with the scope for a few hours, I climbed into my sleeping bag to lie back and observe with binoculars as the winter sky changed to a spring sky. This also gave me a chance to warm up a little. The open clusters in Auriga were a pretty binocular sight, as is all of the winter Milky Way. Meanwhile, Larry was tracking down NGC objects around Cassiopeia. Every once in a while he exclaimed, "There's NGC185!", or "I think this is 1023." His perseverance at the eyepiece payed off, as he was able to spot a good number of Messier and NGC objects, ones that are difficult in the larger SCT.

Gradually new constellations rose from the horizon. Even though it was spring in the sky, it was still winter on the ground. This was my first chance, since moving from the light pollution of Toronto, to view the faint objects in the spring sky. In Virgo there are places where one cannot help but find a galaxy or two in the eyepiece. Some of these objects stand well to higher power, like M104, the Sombrero, whose dust lanes are easily visible, or M51, the Whirlpool, with its spiral structure and its companion, or M97, the Owl Nebula, which has structure as well, or M108, which is only a push away.

All good things must come to an end, however, and the cold was beginning to get through even to Larry's tough skin. After jump-starting the dead battery of the car, Mark retreated to the warmth, while Larry and I looked at our last object of the night, M13. We had started the night with M31 and M33 and ended three seasons later with the Hercules Cluster. My SCT resolves this beauty with ease; in the refractor, it is smaller, but no less spectacular. One of my favorite deep-sky objects, this cluster is often either first light or last light; tonight it ended a very successful observing session.

I hope I have stirred some interest in further meetings of the observing group of our Centre. Judging from the success of the first outing, I know that at least Larry and I will be out again soon.

JOTTINGS ON THE CONSTRUCTION OF A REFLECTING TELESCOPE

by John Turgoose

Encouraged by Larry Manuel, I would like to give you an insight into some aspects of telescope construction.

Some years ago, I decided to build a 6" reflector using the Edmund Scientific pamphlets on construction and a grinding kit from Optics of Canada in Hamilton. I successfully ground and polished the mirror and tested it with a home-built foucault

tester, but never finished it, and while I had a spherical shape, I had only started on parabolizing.

Twenty years later with children around, I felt a telescope would be good for them; so we got a cheap Jason 60mm for Christmas. This quickly led to thoughts about my unfinished mirror which I still had. Terry Dickinson can attest to my "quickness"; it was on Boxing Day that I called him and he referred me to Larry who kindly agreed to check out my mirror. Larry told me that a telescope was possible; in fact, my mirror was more than good enough to use. While not perfect, it would take a neophyte observer, such as I am, more than two years to notice the imperfections.

The chase was on. I purchased a Meade focusser, a diagonal, and a 32mm Televue Plössl eyepiece all for a good price from Scope City in Toronto. A friend helped me get a piece of 8" diameter white sewer pipe which was very rigid and, as I believed, ideal for this project. Another friend, Doug Angle, suggested that I use foam-filled door skins for the Dobson mount - available locally from Cashway

Now to the most important port, the aluminizing. Some fiends have access to a vacuum evaporator and were kind enough to watch and help in the aluminizing. The procedure is quite involved. The mirror is first made perfectly clean by immersing it in various solutions which are brought to a boil; three were used including acetone and finally de-ionized water. While this was being done, the evaporator was prepared. A bell jar (about 20" in diameter) covered with steel mesh was being cleaned. A filament of tungsten attached to the power bars and strips of aluminum wire hung on the filament. An aluminum foil covering was put over all the other items in the jar to guard against their being coated with aluminum. Finally, the mirror was attached to three suppport pieces with a metal clamp ring and the suspended mirror was placed face down about 10" above the filament. The bell jar was lowered by an electric hoist and the vacuum process began. A mechanical pump sucked out most of the air and when the vacuum was low enough an oil dispersion pump was put into action. This works like a coffee percolator; the oil collects the remaining air and when it percolates over, the mechanical pump gets rid of the air. This is a fairly critical operation since failure to do it properly can mean a damaged unit. After about 15 minutes, the vacuum was low enough, and a current of 100 to 150 amperes was passed through the filament. I stood on a chair and looked down through the mirror at the filament to try to gauge the level of aluminum being evaporated on the mirror. This was very difficult (I had read that it should just reach the point of opacity), but at the same time the mirror was beginning to reflect back at me with the filament image as well. The end result was that the current was turned off and turned on as a check. The aluminum had all evaporated by now; so we decided it was enough.

The vacuum was slowly released, and a fragile aluminized mirror was the result. It should be stressed that everything in the bell jar had to be very clean, since even fingerprints cause trouble in achieving a proper vacuum. Therefore, plastic gloves are worn and a little vacuum cleaner is used to pick up stray dirt. This whole operation took about two and a half hours. Considering that the evaporator is worth at least $50000., one is amazed that some companies in the United States can perform this operation for less than $20. and provide an overcoat as well. I did not put an overcoat on my mirror, but in commercial operations the process is done right after the aluminizing.

I hope to complete this report when the telescope has its "first light." In the meanwhile, anyone who wishes to have further information may contact me at 376-3862 between 6 and 10 p.m..

I would like to thank sincerely the people who were kind enough to coat my mirror. (Commercial aluminizing is a true bargain.) Larry was also kind enough to look over the finished mirror and pronounce it "well done".

REPORT OF THE JANUARY 1987 NATIONAL COUNCIL MEETING

The National Council of our Society held its first meeting of 1987 at the National Office in Toronto on Saturday, January 31. The National President, Mrs. Mary Grey, presided and twelve Centres of the Society were represented. The agenda items of the meeting included reports from all the officers and standing committees of the Society, and a number of other important decisions.

Approval was given to a proposal for allocating $1750 from the Ruth Northcott Memorial Fund toward three projects: (1) assistance in the Quebec Centre's production of

the Almanach Graphique, (2) the Northcott Lecture at the General Assembly, and (3) the Helen Hogg Public Lecture which is co-sponsored with the Canadian Astronomical Society.

The Treasurer, Dr. Chou, on behalf of the Budget Committee, presented a financial statement for 1986, noting that the income from membership fees and sales of the Observer's Handbook were considerably above what had been expected. On the other hand, major expenses included those associated with the installation of the National Office's new computer, an item that was already proving quite beneficial to the operation of the office. Over all, there was a healthy surplus of over $5000. for the year, and the accumulated debt of the Society had been eliminated. A proposed budget for 1987 was also presented and approved.

A report from the Librarian, Mr. Brian Beattie, mentioned steps that had been taken in the converting of the Library into an historical archive. Several hundred unwanted books had been selected and Council approved a procedure for disposing of them in a way that would eventually put them in the possession of Centres and members of the Society. Major awards of the Society to be presented at the General Assembly were approved in recognition of outstanding achievement and service by three members: M. Damien Lemay, winner of the Chant Medal, and Mr. Peter Broughton and Mr. Cyril Clark, winners of the Service Award. Messier Certificates were also approved for Mr. Mel Rankin of the Edmonton Centre and Mr. Gordon Lorimer of the Montreal Centre. The Honorary Members Committee proposed the selection of Professor Hanbury Brown, a pioneer in radio astronomy, as the latest Honorary Member of the Society, and the proposal was approved by Council. Also approved was a motion that would allow winners of the Society's major awards to receive some financial assistance to travel to the General Assembly at which their award would be presented.

Information was presented to Council about two events taking place in May. Mr. Enright presented information about International Astronomy Day to be celebrated on Saturday, May 9, and Mr. Attwood, the Chairman of the G.A. Organizing Committee, presented the proposed schedule of events for the Toronto General Assembly to be held May 15 to May 18.

Approval was given to 64 requests for Unattached Membership and 11 transfers to Life Membership. The problem of late quarterly and annual reports from Centre Secretaries and Treasurers was also discussed and a number proposals for dealing with the matter were suggested.

Complete details of the items discussed at the meeting may be found in the Minutes of the meeting which have been received by our Centre President and National Council Representative, both of whom would be quite willing to share this information.

FOR YOUR COMPENDIUM OF ESOTERIC FACTS

We are all familiar with the fact that in the current year the moon moves far north and south of the celestial equator each month. This means that each month, if we try, we can find some strange or unusual fact about the moon's position in the sky or the amount of time it is above or below the horizon during certain days.

Did know, for example, that during this month, even though it is near mid-March, and near the time of the equinox, there is one day when the moon at our latitude rises before sunset and sets after sunrise. It is true; my calculations show that for the latitude of Kingston, the moon, on the night of March 14-15, the moon rises 47 minutes before sunset and sets about 10 minutes after sunrise. On that morning of the 15th, the moon is still waxing (it is still 103 minutes before the moment of full moon); yet the moon sets AFTER the sun rises. How often have you heard of a WAXING MOON setting just AFTER sunrise?

Look at the tables and do some calculations for lunar phenomena for your latitude and try to find some other unusual events during 1987.

FREE TELESCOPE MIRROR (NOT ALUMINIZED)

Suspected Origin: swap tables at Stellafane via a box of junk from Queen's University.

Diameter: 6" (151mm) Material: Pyrex
Focal Length: 48.4" +/- .75" (1230mm +/- 20mm)
Chips: (1) 3 X 6mm 30mm from edge
(1) 2.5 X 3mm 10mm from edge

Pits: some left over from grinding
Figure: from Ronchi test: spherical with mild turned down edge approx. 5-8mm wide.
Notes: It would make an acceptable mirror for a first telescope. It will not give high performance, but that will not be evident to someone with minimal observing experience. It could also be used for practice figuring (parabolizing and testing), or you could regrind and polish it.
Contact: Larry Manuel, 21 Balaclava Street, Kingston, Ont. K7K 1J4 (Phone: 544-5857)

Reports and Other Items

1. After a long series of days and weeks of bad weather, the week of February 23 to March 1 proved a very welcome exception. Your editor was able to enjoy a number of nights in February when the Zodiacal Light was exceptionally bright, sometimes as bright as and twice brighter than, the Milky Way. Comet Tarasako (1987d) at mag. 10 was seen with the 8-inch telescope on the night of Feb. 18-19; it was northwest of the star Tau Ceti. It was quite diffuse and no tail was evident. Mira, the famous long-period variable, has been stunningly bright over the past couple of months, reaching third magnitude or brighter.

   In thirteen solar observations during the first 24 days of February, no sunspots were detected; however, one spot was seen on the 26th and 27th. So far in March, the number of spots has been very small.

2. Members of our Centre were very pleased to have our member, Warren Morrison, as our guest speaker at the meeting of February 13. Attendance was the best in a very long time and his talk on Observing Variable Stars was most interesting and very well received. We hope to have him at many more of our meetings.

3. The Humorous Quotation Department: The March issue of the Montreal Centre newsletter quoted our Regulus article on the discovery of Comet Levy 1987a.
   Our article correctly stated that "on January 5, while observing with "Jupiter", his 16-inch reflector, David noticed a faint object of eleventh magnitude not far from the star Alpha Ophiuchi."

   As quoted the sentence read: On "January 5, while observing Jupiter, with his 16-inch reflector, David noticed a faint object of eleventh magnitude not far from the star Alpha Ophiuchi.

   Quite a change!!!!!!!!!

4. It is now time to begin serious planning for the General Assembly in Toronto from May 15 to 18. A schedule of events is available.

5. Please plan to attend and assist with our Astronomy Day activities at the Frontenac Mall and our Star Party that evening (weather permitting). More details will be given at our meeting on April 10.

6. Here are some objects worthy of our attention or observation over the next few weeks: (1) on March 26, Mercury reaches greatest western elongation, and though most texts suggest it is an unfavourable elongation and difficult to observe, I should point out that Warren Morrison, who has an incredible record for observing Mercury had already observed it on this elongation on March 13. Maybe more of us will be able to see it by the 26th. (2) There will be a penumbral eclipse of the moon on the night of April 13-14. Try to detect some darkening of part of the lunar disk. Check the Observer's Handbook (pages 83 and 87) for more details. (3) A very old moon occults Venus on the morning of April 25. Use binoculars and try to observe it. (4) Observers with larger instruments should plan to observe the more distant over the next few months. Pluto reaches opposition in April and Uranus and Neptune do the same in June. This means we are approaching the time when the three of them are largest in our telescopes and in this year's most favourable location for our observations.

7. The dates for our upcoming meetings are:
   April 10: Members' Night
   May 8 Special Guest Speaker Dr. Gunter Wessel
   June 12: Still open
   Our meetings begin at 8:00 p.m. and are held in Room D-206 in MacIntosh-Cory Hall

at Queen's University.

8. Contributions to this publications are welcome. Our address is:
R.A.S.C. - Kingston Centre,
Box 1793,
KINGSTON, Ont.
K7L 5J6

Clear skies!
Good observing!

Les Enright