NATIONAL NEWSLETTER

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The new observatory of Cobalt-Haileybury High School in northern Ontario. Lake Timiskaming is in the background. Photo by Peter Ryback.

NATIONAL NEWSLETTER

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Deadline for August issue is June 1.

Editorial

by Ian G. McGregor

Early reports at press time about the General Assembly in Victoria are very good and I am sorry I was unable to attend this year's event. I think if I recall my past attendance this was only the fourth GA I have missed in the past 17 years. I understand about 600 people were in attendance, although many of these were from our two sister groups who were meeting with us. As I have attended several joint meetings of two or groups over the years, I know the rich experience it can be. There is the opportunity to meet people who perhaps you have only heard about or read about and you get a different perspective on your own hobby or interests. There will be a more complete report in the October Newsletter.

Wedding bells were ringing for me in June. My wife, Elfie, and I went off to Hawaii on our honeymoon immediately after the wedding service which featured a good contingent of RASC members present. Everything went very well and there are many pleasant memories. We got to the top of Haleakala volcano on the island of Maui and peered into its 34 kilometre diameter crater on a beautiful clear day. We also saw the astronomical observatory on top of the volcano, visited Hawaii's only planetarium (I know, I know, I shouldn't mix business with pleasure!), and generally had a great time. My only regret was not being able to get to Mauna Kea and see the Canada-France-Hawaii Telescope. I messed up on my planning at this point even though we reached the "Big Island" and saw the great mass of the volcano Mauna Loa.

Last time the General Assembly was in Victoria, a group of us chartered a 4-seater plane and flew down, and into, the recently erupted Mount St. Helen's volcano. Now that was also an experience! Somehow volcanoes and Victoria seem to be associated in my life.

This Cloud's For You

by Mark Zalcik
Edmonton Centre

Somewhere at high latitudes on a summer's night, a conversation like the following may take place:

"Finally pretty dark."
"Yeah, I'm surprised how dark it gets this close to the solstice."
"Really! Except for that cirrus over in the north, it's not bad."
"Funny looking clouds, aren't they? Kinda bluish."
"Mmm, but mostly white. Brilliant white. Nice against the dark sky, eh."
"Wait a minute. . what's going on here, white clouds, dark sky?"
"You're right! What is it?"

Another, smiling in the memory of his similar discovery, quietly says:

"Noctilucent clouds, that is, clouds of the twilight, NLC."

One may be inclined to lament the increasingly cloudy skies encountered as one travels from the tropics to each of the poles. In North America, areas of the southern United States enjoy skies of intrinsic clarity, whereas the poor skies north of 40 degrees latitude are plagued by numerous cloudy nights. Yet it seems that each identifiable region has the upper hand for certain fields of study. Though Canadian astronomers suffer under a scourge of tropospheric obscurity, they can also claim to have the observational advantage of observing the activity going on in the atmosphere's higher regions such as the mesopause with its mysterious summer-time tenants, the noctilucent clouds.

At a mean height of 82 kilometres above the Earth's surface, NLC, as they are informally labelled, are the loftiest of clouds. Too tenuous to be seen in daylight, they are visible only in twilight when properly situated with respect to the observer. For reasons that are not yet clear, they can be noticed only in the summer months, and only from latitudes of 45 to 75 degrees on either side of the equator.

As noctilucent clouds are composed of ice crystals, due to the very low temperature at the mesopause where they form, it is not surprising that they look like cirrus clouds. In structure, there is little to differentiate the two, except that often the NLC will have a delicate wavy appearance which looks like the mackerel sky manifestations of cirrocumuli. Like cirrus, long parallel bands and featureless sheets are prevalent in NLC, as are the contorted whirls sometimes reported. Whatever the form, its visibility is enhanced by the higher contrast brought about by the darkened background sky.

It is during the very dead of night that the contrast is most striking, though at these times the display is usually rather low in the north. The higher points of the NLC shows occur when the Sun has just past the six degree below the horizon mark and civil twilight has ended. They are not then too bright, as twilight is still quite prominent, and also for a brief time the highest cirrus clouds are still sunlit, making for a difficult designation. Beyond a solar depression of 16 degrees (almost the end of astronomical twilight), the clouds are no longer illuminated and are thus invisible. The times noted above will be earlier for the evening apparition and later for the morning one as we move further from the summer solstice.

A typical all-night display will start rather high and faint in the north-west, "move" along the northern horizon as it brightens and lowers, climbing and fading once again as it approaches the northeast. The apparent movement is only the effect of the Sun reflecting off progressively easterly masses of cloud as the earth rotates and is not indicative of actual movement within the cloud structure. Actual motions in NLC systems are difficult to follow but they tend to be westerly or southwesterly.

The average number of displays per year visible from around 54° seems to be eight to ten, with no doubt a few more occurring during nights when it is too cloudy to observe them. A pronounced peak of activity happens a few days after the June solstice, the longest day of the year in the northern hemisphere. These displays are also the brightest to ne seen. Near the limits of visibility the clouds are rather faint and hard to discern.

Last year I recorded "storms" on June 10, 12, 22, 24, and July 1, 17, 19 and 26. The brightest display

occurred on June 24, a magnificent presentation of beautiful disturbed whorls and broad bands that were cut short due to cloud. The July 1 show was faint and very low in the north, while the one on July 17 had a short "intermission" when the Sun dipped low enough to prevent an all-nighter from materializing.

In the July 1987 issue of *Astronomy* magazine, David McConnel of England provided a comprehensive overview of the observational, physical, and theoretical aspects of noctilucent clouds. The address of the British Astronomical Association's (B.A.A.) Aurora Section's Assistant Director, Dr. David Gavine, was also included for those interested in contributing observations. The response was so positive that a network encompassing North America was rightfully envisioned. I was surprised to receive a request from Dr. Gavine that I head such an endeavour, but eagerly agreed to take on the project. So now, I am happy to introduce NLC CAN-AM, the fledgling group of noctilucent cloud observers from the continent intent upon catching the wispy forms each summer. Reports from all are welcome and reports forms are available from the author. Write to: Mr. Mark Zalcik, NLC CAN-AM, #2 14225 82 Street, Edmonton, Alberta T5E 2V7, or phone (403) 473-4112.

Reprinted from Edmonton Centre's *Stardust*

(*Editor*: The Newsletter will be publishing a report on 1988 observations early next year.)

Observer's Cage 13

by David H. Levy

"Klutz" is a popular Yiddish word that identifies a person who has trouble interacting with an environment. Observing offers a special set of circumstances, including small eyepieces and filters, wires, insects, wind, dew, and darkness, and stars that need to be observed through elusive breaks in the clouds. This environment is a curse for a person who bumps and trips his way through life, and for klutzes who really appreciate the wonders of observing, life can be difficult.

I don't really consider a telescope mine until I have bumped into it, and if that is any criterion, then my 6-inch f/4 reflector named Minerva is entitled to me many times over. The first incident happened one blustery Nova Scotia night when the wind was doing everything it could to knock down the telescope. Finally, I helped by bumping into the telescope just as a gust of wind picked it up and knocked it over. Actually, there was no damage at all, except to my enthusiasm for observing.

Another time I tiptoed inside the house to avoid waking anyone after coming in from observing. I had put the telescope away, then on my second trip inside I struck the mount and was in pain for days.

Professional telescopes are not immune to the klutz effect. After two difficult but wondrous nights observing asteroids with a 36-inch reflector at Kitt Peak in Arizona, successfully avoiding all the obstacles throughout the dark nights, I was checking the dome area to make sure I had remembered to pack everything. I looked at the empty desk, thinking about the successful observing run just concluded. I stepped back from the desk two or three paces. Then the back of my head struck the mirror end of the telescope. These big telescopes don't budge when struck by a head, especially mine. No wonder we get "hardheaded" about observing.

I have collected lots of stories about people having uncomfortable accidents on observing fields. At this year's Texas Star Party, for instance, one observer went to grab some film and fell over a tent cord, giving herself some serious bruises to add to her excellent photographs. Two common threads that run through these stories are that 1. the accidents are worth the effort to get that extra observation and that 2. while the accidents seem funny after they happen, they are not funny at all at the time.

If you have had a few such experiences of your own, think of this. In a dark observing environment, when your mind is concerned with many things, do only one thing at a time. For example, getting an eyepiece and walking back to the telescope may be too much to handle. Concentrate first on getting the eyepiece. then on approaching the telescope, and finally getting back to observing. For me, observing is safer taken one step at a time.

Across the R.A.S.C.

WINDSOR: The centre celebrated its third annual Astronomy Day activity on April 23 at the main branch of the Windsor Public Library. An indoor display featured telescopes, pictures and a slide presentation. Jeff Peacock, a new member, showed the sun through a filter using his 20 cm Dobsonian reflector. Abour 200 people attended. Another new member, Al Des Rosiers, used his 20 cm Dobsonian to show Comet Liller to the members after the May members meeting.

KITCHENER-WATERLOO: To promote International Astronomy Day on April 23, the centre set up a mall display in Waterloo Town Square. The following evening, a public star night was held in Breithhaup Park. The centre is in the process of designing a crest for a club baseball cap to be produced in the near future.

HAMILTON: Astronomy Day celebrations were held on the evenings of April 23 and 24, under the guidance of Ian Stuart, Jim Winger and Bob Speck. Despite less than perfect weather, about 50 members of the public were treated to talks on astronomy and the history of the Leslie V. Powis Observatory, plus views of the Moon and Venus through the centre's telescopes. John Gauvreau, Ian Stuart and Stan Bryant have continued to run an excellent public education program at the observatory, entertaining cubs, scouts and brownies on weeknights. To date 23 groups totalling 410 children have attended these presentations. Also, 125 members of the general public have attended our Public Nights which are held twice each month.

The Centre's observatory has been the focus for much of the observing carried out by our members. Derek Baker has been assisting our members in deep-sky observing, and the team of Derek Baker, Karyn Bennett, Richard Petrone, John Gauvreau, David Hesketh and Linda McCrory has observed several dozen galaxies and many other deep sky objects with the Centre's 17.5-inch reflector. Astrophotographers Mike DeVillaer and Paul Turcotte have concentrated on objects in the "Realm of the Galaxies", and Mike DeVillaer graced our observatory's walls with several beautiful collections of his best photographs. Bert Rhebergen and Bruce Collier continue to observe the Sun and have noted increased sunspot and auroral activity. The planet Venus has been regularly monitored, and Comet Liller was observed on several occassions.

The Centre was saddened to hear of the passing of a longtime member, Mr. Gordon Craig, who had held the office of president and supported the Centre's telescope making section during the 60's and 70's.

The centre has organized field trips to the David Dunlap Observatory and the McLaughlin Planetarium, and a Garage Sale to raise funds for the Centre. Our editor, Karyn Bennett has received good support from the membership, and *Orbit* has maintained its excellent quality and content throughout the six issues published to date.

CALGARY: Last spring saw the departure of some of the center's most active members. Don Jasper has moved to Edmonton and Brian and Leone Martin have moved to Australia. Don Hiadiuk was planning public star parties throughout southern Alberta during the summer months. Don is also in charge of the centre's light pollution committee and is interested in hearing from other individuals interested in this important fight. For Astronomy Day on April 23 three events were planned: Displays and demonstrations at the Alberta Science Centre and the University of Calgary; a family picnic at Fish Creek Provincial Park; and a public observing session following the picnic.

EDMONTON: Work on rebuilding the centre's 17.5-inch telescope slowed down during the spring but it was hoped it could be completed by the summer. The May issue of the centre's fine newsletter *Stardust* totalled 40 pages! It also featured eight interesting design logos for this summer's Alberta Star Party. Since this event was taking place in Dinosaur Provincial Park guess which animal featured prominently and imaginatively in each design? Mark Zalcik is encouraging Albertans to observe noctilucent clouds this summer and is organizing a North American network to complement the work of similar groups in Europe. Observers are needed. Contact Mark at: #2-14225-82 Street, Edmonton, Alberta T5E 2V7.

VANCOUVER: The weather was unsettled for Astronomy Day in April but a successful Day was held despite reduced public attendance. The sun and Venus were observed during the daytime and despite evening clouds, the moon was at least present as a target for telescopes. A special event was an occultation of a star at about 9:30pm which caused much interest. President Greg Soderling was travelling along the east coast during April and after visiting several major planetariums felt the shows at the H.R. MacMillan planetarium in Vancouver were still the best.

OTTAWA: Many centre members participated in this year's Astronomy Day activities. Unfortunately, rain most of the day wiped out the outdoor activities but a successful indoor mall display was held at the Hazeldean Mall.

WINNIPEG: Congratulations to Myra Banman, editor of *Winnicentrics*, and Chris Rutkowski, the Centre's Librarian, who were married on April 16.

TORONTO: A speakers exchange was completed between the Toronto and Ottawa centres during the spring. Ottawa president Doug George visited Toronto and Toronto president Ralph Chou visited Ottawa. Tom Williams, a past president of the AAVSO, gave an excellent talk at an April meeting on the contributions of some famous amateurs to astronomy. The May meeting was dedicated to a full report on the extremely successful centre expedition to the Philippines to observe the March solar eclipse. The centre's Eclipse Expedition flag now has nine individual trips enbroidered on it and will be retired to a place of honour. Ralph Chou, Ian McGregor and Ivan Semeniuk acted as judges in this year's "Invent An Alien" contest at the regional finals held at the Ontario Science Centre. Members are looking forward to the annual picnic and open house at the David Dunlap Observatory in September.

HALIFAX: Two members are now actively writing astronomy columns for local newspapers. Doug Pitcairn is doing a weekly column in the *Saturday Mail-Star* and Rev. Ted McLeod has a Wednesday column in the *Daily News*. Ted's column has also been recently picked up by the *Fredericton Gleaner*. The annual banquet was held on May 27 with Randall Brooks as guest speaker. Larry Bogan did a "Messier Marathon" at the end of March and saw 103 of the 110 objects. An interesting report of his experiences with recommendations to other observers appeared in the May-June *Nova Notes*.

SASKATOON: A successful Astronomy Day program was held at the Market Mall in April with ten members manning the telescopes and displays.

VICTORIA: The June General Assembly was a sharp focus for all centre members. An late, unofficial report suggests that about 600 people were present for the joint meeting of our Society, the Astronomical Society of the Pacific and the Western Amateur Astronomers.

NIAGARA: John Dekker is organizing a Junior Astronomers Group for the centre. In the May *Niagara Whirlpool*, Bob Winder gave a review of some low cost telescopes, the cheapest of which was $400. The centre's 2nd Annual Garbage Sale was reported to be a success. The autumn meeting of the Niagara Frontier Council of Amateur Astronomy Associations (NFCAAA) will be held on November 12 in Queenston, Ontario.

LONDON: Dale Armstrong ran an interesting four-part series of articles on "Dust Storms and Windstreaks on Mars" in the winter and spring issues of *Astronomy London*.

Across the R.A.S.C. is a regular feature of the *Newsletter*. Centre editors or secretariues should send reports of their centre activities and upcoming events directly to the Editor. Deadline for the December issue is October 1.

More About Uranometria 2000.0

by Jim Lucyk
London Centre

(*Editor*: The *Uranometria 2000* is a two-volume star atlas covering the entire sky. Over 330,000 stars as faint as ninth magnitude are plotted on a total of 473 charts. As well, more than 10,000 nebulae, star clusters and galaxies are plotted. Volume One covering the northern sky was published in 1987 and volume 2 is was published this year. The *Uranometria* is practically the ultimate star atlas for the serious observer.

The following article appeared in the April 1988 issue of*Astronomy London* and the list of errata has appeared already in several centre newsletters. Jim Lucyk must be commended for his painstaking work in checking the star charts of volume 1 and providing his comments and corrections for other observers. Thanks Jim).

Last September I received my copy of the new *Uranometria 2000.0* after what seemed a long and impatient wait. I spent the first day just pondering over the charts, wondering what it would be like to use them under the night sky. My first opportunity came a few weeks later. I decided I would try Chart 60, an area of the sky near the Andromeda galaxy. The first thing I noticed was the ease with which I could starhop. At last, the starfield in my 10 x 70 mm finder made sense. Identifying individual stars and star patterns was a cinch, and a near match to those plotted on the charts. I found *Uranometria 2000.0* much easier to starhop with than using the *AAVSO StarAtlas*. More importantly, a considerably greater number of deep sky objects were plotted on the charts.

Living in the Great Lakes area with winter soon approaching, and with it the ever present clouds and cold temperatures, I knew that I would have to wait until the following spring to give the charts a more thorough workout. With this in mind, I decided to do an indoor survey of *Uranometria 2000.0* and at the same time prepare observing lists for future use, which could be filed under their respective chart numbers. As I was only interested in the more traditional deep sky objects, I excluded from my survey objects such as quasars, radio sources and variable stars. I have now completed my task and have some comments I would like to share with you.

Because a criterion adopted for the atlas was the inclusion of all verifiable *RNGC (Revised New General Catalogue)* objects, it will soon become apparent when looking up their magnitudes that the greatest majority are between magnitudes 14.5 and 15.5. Some are even as faint as magnitudes 16 or 17, and thus beyond the reach of all but the largest amateur telescopes. This considered, owners of small to moderate apertures would do well to prepare a list of specific targets to go after prior to using the *Uranometria* charts in the field. Often on a chart showing 40 or 50 galaxies there will be perhaps only half a dozen brighter than magnitude 14 (the approximate limit of an 8-inch telescope). It will certainly save an observer valuable observing time knowing which objects are within reach of the particular instrument being used.

Another point I would like to mention is the omission of countless non-NGC galaxies brighter than the faintest NGC galaxies. The *CGCG* (*Catalogue of Galaxies and Clusters of Galaxies*) lists over 30,000 galaxies magnitude 15.7 or brighter north of the celestial equator. This is about seven to eight times the number of galaxies shown in *Uranometria 2000.0* Volume 1. As a result, *Uranometria* is not a homogeneous survey of objects accessible to today's larger amateur telescopes. Including these galaxies would have meant enlarging the scale of the charts to avoid excessive cluttering – not to mention the considerable delay or near impossibility of undertaking such a venture. Thus the omission is understandable. For the most part, the omission of these objects should pose no problem for deep sky observers whose goals are the eventual completion of a visual survey of the *RNGC*. However, there are some instances where I felt omissions might present problems. For the most part, these occurred in areas of heavy NGC concentration, where a relatively bright non-NGC galaxy might be omitted. If it happens to lie in the immediate vicinity of one or more NGC objects of equal magnitude or brighter than it would be easy to make an error in identification. Advanced observers worth their salt will never take for granted the identification of an unfamiliar object they observe, regardless of which atlas they may

use, especially if the object is faint and grouped with others of similar appearance. One should always consult the relevant catalogues or a photograph of the region on the *POSS (Palomar Observatory Sky Survey) Star Atlas*, if an observer wants to be sure. Even then there are often times when confusion exists!

In doing my survey, I found the two most useful catalogues for data on objects to be the *Uppsala General Catalogue of Galaxies* and *Sky Catalogue 2000*, Volume 2. I discovered some errors in the *Uranometria 2000.0* in the form of mislabelled objects. Errors are not common, and considering the sheer number of objects involved, I must commend Wil Tirion for the relatively few that I was able to find. I have a pretty good idea of how much work is involved and how impossible it is to avoid errors completely, for I have made several of my own. The following is a list of errata.

Labelling Errors In *Uranometna 2000 0* Volume 1

Chart #30: NGC 6424 is plotted twice. The northern designation at 17h36m +70° is correct. Change the southern "NGC 6426" (Closest east of NGC 6419) to NGC 6423. Also U 11193 should have been assigned its NGC designation of NGC 6651 although either is correct (UGC 11193 = NGC 6651).

Chart #44: Labelled as PK 158+57.1 in *Uranometria 2000.0* and listed as PK 158+37.1 in *Sky Catalogue 2000 0* Vol 2. The *Sky Catalogue* designation is the correct one

Chart #46: Change UGC 6163 to UGC 6162.

Chart #75: UGC 7774 is plotted twice. The object labelled UGC 7774 at 12h36.3m +44°00' should be deleted. No object is listed at or near this position in either the *UGC* or *CGCG*.

Chart #93: Change NGC 942 to NGC 940. Also NGC 1062 is labelled twice. The position of the northern designation agrees with UGC 2201 at 02h40.7m +32°17' (1950) magnitude l5.7z. The *UGC* and *CGCG* catalogues do not assign an NGC designation to this object. Change the southern designation of NGC 1062 to NGC 1060.

Chart #123: NGC 7264 is labelled twice. The northeastern designation is correct. Change the southwestern "7264" to NGC 7263.

Chart #147: Change NCG's 3989, 3993 and 3997 to 3789, 3793 and 3797 respectively.

Chart #148 NGC s 4089 and 4091 are plotted but not labelled.

Chart #154 Change NGC 2928 to NGC 5928.

Chart #185: Change NGC 2516 to NGC 2526.

Chart #199: Change NGC 5989 to NGC 5983.

Chart #228 Change Bo 13 to Bo 3.

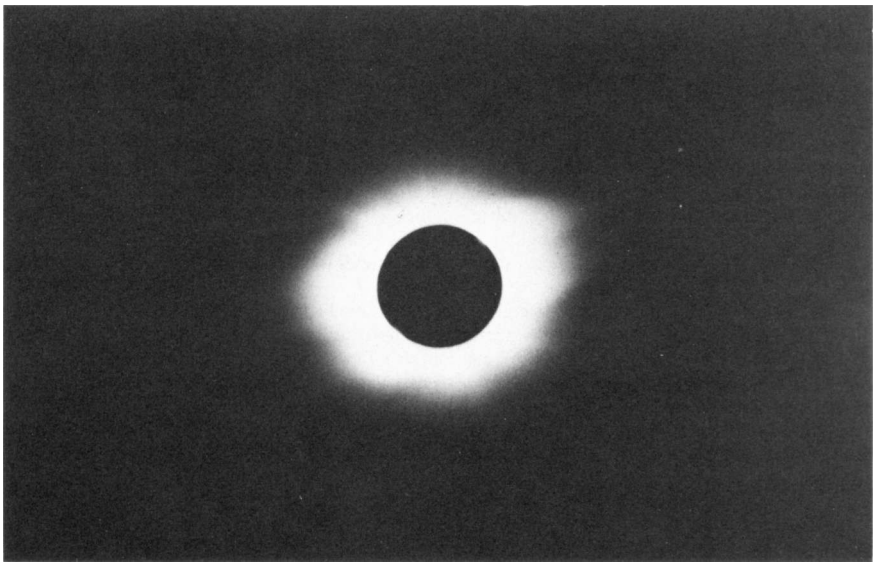
Chart #235: Change UGC 5740 to UGC 5708.

Chart #238 Change UGC 7345 to UGC 7354.

Chart #240: Change NGC's 5153 and 5154 to NGC's 5183 and 5184 respectively.

Chart #250: Change Sh 2-62 to Sh 2-64 as in *Sky Catalogue 2000.0* Vol. 2, and the *Atlas of Galactic Nebulae*, Vol. 2 by Neckel and Vehrenberg.

Reprinted from London Centre s *Astronomy London*



Total solar eclipse of March 18, 1988. RASC member Osao Shigehisa took this photograph from on board the SS Nippon Maru from a location east of the island of Iwo Jima in the Bonin Islands group southeast of Japan.

International Meteor Organization

by Peter Brown

For all those interested in meteor observing and meteor astronomy, you will be happy to learn that a new amateur non-profit organization devoted exclusively to this purpose has been established in Europe.

The International Meteor Organization (IMO) was founded at the annual International Meteor Weekend held in West Germany in October 1987. Representatives from Belgium, France, West Germany, East Germany, Czechoslovakia, Hungary, Italy, Norway, Sweden, Finland and the Netherlands all agreed there was a need for such an organization.

The organization communicates information to amateur and professional workers throughout the world in its fully English bi-monthly journal *WGN* (*werkgroepnieus*). Articles in the journal range from full scientific papers to short observing reports from such places as Australia, Brazil and the USSR.

More than fifty active meteor workers in more than 25 countries around the world have endorsed the organization and a board of governors and councilors is in the process of being elected for the 1989 organizational year. The IMO has also recently published a 200 page English observing handbook for visual meteor work covering all areas of theory and history of the major meteor streams as well as the practical aspects of meteor observing.

For those interested in obtaining the handbook, it is available for $16.00 CDN including postage and handling. If you are interested in joining the IMO and learn about the meteor work going on world-wide, a one-year membership costs $20.00 CDN. This includes a subscription to *WGN* as well as a wide variety of membership privileges. The handbooks and memberships can be obtained by writing to: Mr. Peter Brown, Co-ordinator, North American Section, International Meteor Organization, 181 Sifton Avenue, Fort McMurray, Alberta T9H 4V7.

A European Telescope for 2001

by Peter McSweeney
Hamilton Centre

For the past forty years the 5-metre Hale telescope has been the largest optical telescope in operation. The 6-metre Soviet telescope in the Caucasus is larger but problems with the mounting have affected reliability. A 5-metre mirror is roughly the largest that can be constructed by conventional means without incurring problems related to mirror deformation by gravity and temperature changes. Historically, telescope apertures have doubled every fifty years or so and computer-assisted techniques are now being used to construct a new generation of telescopes with significantly greater aperture than those currently in existence.

Last December the eight countries (Belgium, Denmark, the Federal Republic of Germany, France, Italy, the Netherlands, Sweden and Switzerland) comprising the European Southern Observatory (ESO) agreed to construct the Very Large Telescope (VLT) which will be the largest telescope in the world. Composed of an array of four telescopes, each with a single mirror with a diameter of 8 metres giving triple the light-gathering power of a 5-metre mirror, the VLT will have the resulting equivalent aperture of 16 metres and superb resolution when used as an interferometer. The telescope will be built in the Andes Mountains at a site yet to be chosen and will be the largest optical telescope in operation at the turn of the century. The VLT will establish the Europeans as clear leaders in ground-based astronomy in the southern hemisphere.

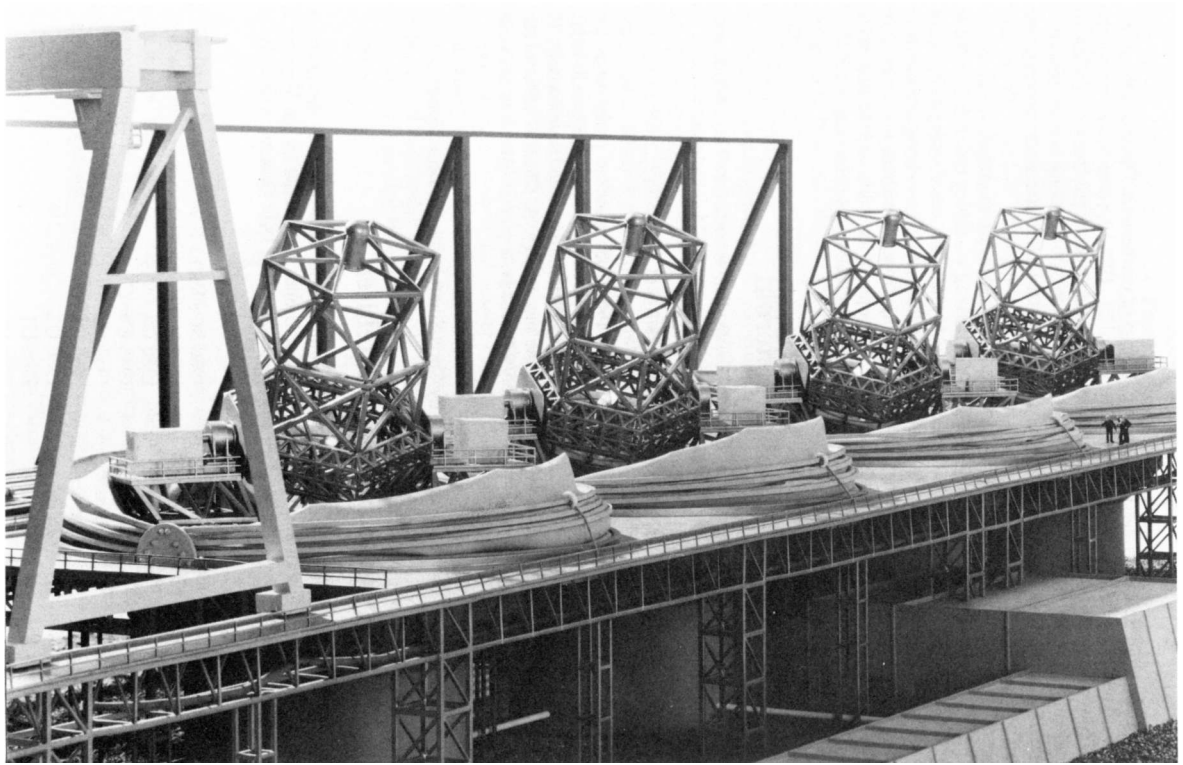
The mirror in the VLT will be manufactured by the spin-casting technique developed by astronomer Roger Angel of Arizona. In this technique, molten glass is poured into a hot furnace mold shaped in a paraboloid and spinning at a fixed rate. Centrifugal forces compel the glass to assume the shape of the mold and the glass is cooled slowly to a solid while spinning. Polishing is done with a computer-controlled polisher that adapts its curvature to that of the surface being polished. The result is an 8-metre f/1.8 glass paraboloid about 20 cm thick with honey-comb-like backing ribs. The goal of new generation telescope makers is an f-ratio near one since short focal length implies a short telescope which is smaller and easier to mount.

The four telescopes will be positioned in a row 112 metres long, each mirror having its own computerized drive. The telescopes can be used individually, in pairs, or all together depending on the application. The telescope can be used as an interferometer to simulate the resolution of a 112-metre mirror. The interferometry mode will be applied primarily at infrared wavelengths. The VLT will have a resolution of 0.001 seconds which is quite adequate to resolve the disks of stars such as Betelgeuse and other nearby giant stars.

The VLT will feature state-of-the-art technology to compensate for image distortion caused by atmospheric blurring and mirror deformation. To correct for atmospheric blurring, a system called adaptive optics will adjust the shape of the mirror up to 1000 times per second. In practice, a small adaptive mirror placed in the reflected light beam will actually be adjusted. A beam analyzer will read atmospheric blurring effects and adjust the shape of the adaptive mirror by means of the piezoelectric effect. Adaptive optics is at the frontier of research on optics technology and further development is required before it can be implemented in the VLT.

Mirror deformation caused by gravity and temperature changes will be corrected by the technique of active optics. In active optics, a beam analyzer will generate information required to control the movement of 200 actuators supporting the mirror. Movement of the actuators will preserve the paraboloid shape.

The VLT will be so advanced that it is going to be a set-back for the adventurous astronomer. Astronomers cherish their trips to telescope sites but VLT astronomers will remain at home. The VLT will be operated by remote control from Europe via satellite link-up.



The ESO 16 m Very Large Telescope (VLT). The ESO VLT (here a model) consists of four connected telescopes, each with an 8 metre main mirror. They will operate in the open air and can be protected by inflatable shelters. A crane (left) moves on a supporting platform about 120 metres in length to service the telescopes. Photo courtesy of the European Southern Observatory.

Observatory Opens At Cobalt-Haileybury High School

by Peter Ryback

Cobalt-Haileybury High School in the Timiskaming District of northeastern Ontario is the proud owner of a new domed observatory. Officially opened on April 21, 1988, the observatory houses the school's Celestron 8-inch telescope. The project began a year earlier when the Ontario Ministry of Northern Development and Mines provided a $30,000 grant. A 4-metre Ash dome was purchased to cover the rotunda portion while adjacent to it is a darkroom in which students can process their astrophotographs.

The astronomy program at the school has seen a significant expansion as a direct result of the availability of the observatory. Enrollment projections for the grade 12 astronomy course for the fall of 1988 are very encouraging. This course is now entering its sixth year in existence. A night course for adults is now in its second year. In addition, a special program has just begun to bring astronomy to grade 7 and 8 students of area public schools. It is very gratifying to see the enthusiasm generated in these youngsters when they visit the dome! Judging from the response of the public and the students to date, we feel that the astronomy program in Timiskaming will continue to enjoy success.

New Canadian Asteroid

Minor planet 3670 has received a name that honours a Canadian astronomer. The asteroid was recently named in the April 2, 1988 issue of Minor Planet Circular #12974 as follows:

(3670) NORTHCOTT = 1983 BN

Named for the Canadian Ruth Josephine Northcott (1913-1969), an associate professor at the University of Toronto and a staff member of the David Dunlap Observatory from its inception in 1935. A specialist in stellar radial velocities, Northcott served on IAU Commissions 26 (double stars), 30 (radial velocities), and 41 (history of astronomy). In 1956, she succeeded C.A. Chant as editor of the *Observer's Handbook* of the Royal Astronomical Society of Canada, a position she held until her untimely death

The name was suggested and the citation provided by Chris Spratt of the Victoria Centre.

Names For New Satellites

The International Astronomical Union's Executive Committee has approved new designations and names for one satellite of Saturn and the ten satellites of Uranus discovered by the Voyager 2 spacecraft in 1985 and 1986. They will be formally adopted by the IAU General Assembly in August.

Saturn XII	Helene	=	1980 S6 ('Dione B')
Uranus VI	Cordelia	=	1986 U7
Uranus VII	Ophelia	=	1986 U8
Uranus VIII	Bianca	=	1986 U9
Uranus IX	Cressida	=	1986 U3
Uranus X	Desdemona	=	1986 U6
Uranus XI	Juliet	=	1986 U2
Uranus XII	Portia	=	1986 Ul
Uranus XIII	Rosalind	=	1986 U4
Uranus XIV	Belinda	=	1986 US
UranusXV	Puck	=	l985 Ul

The satellites of Uranus are numbered in order of increasing distance from the planet itself.

Writing For A Newsletter

by Tom Torrance
Past President, Niagara Branch
Canadian Authors Association

(*Editor*: I spotted this interesting article in a recent issue of Niagara Centre's *Niagara Whirlpool*. Mr. Torrance was newsletter editor for the Niagara Branch of the CAA before becoming president. As my mother was a member of the CAA and editor for several newsletters, I feel quite comfortable with sharing Mr. Torrance's thoughts with our readers).

Take pen in hand and apply thoughts to paper. By this method, you are indeed a writer. Do this with the knowledge that people are going to read it and you will be a successful writer. Do it for a specific group of people who are going to read it in a newsletter, and you are a newsletter writer.

It sounds simple enough, but what thoughts do apply to paper? This is a question most would-be newsletter writers are really asking. If you are one of them, you may find the answer by asking these other questions.

What would I like to see in the newsletter that already isn't there? What would the other members like to see in it? Why isn't it there? Why don't I write and get it into the next newsletter?

Now comes the big excuse. "I don't know enough to write for the newsletter." While you may not know as much as some of the other members of the group, this should not stand in the way of your writing for that newsletter. I'll let you in on a secret. There are a great many writers who will write about things that they don't yet know too much about.

Ask questions of those who are more knowledgeable and let them know that the information may be used for the story or report in the newsletter. They may be flattered that you asked. Read the latest reports in other publications that may interest your group and write your own report based on this information. Many of your fellow members do not have time to read the other publications. Some might not have access to them. Your report will keep them up-to-date and save them the trouble of going through all the publications.

What about a newsletter story that doesn't give out new information? It gives a short summary of something everyone knows, just one or two sentences, and then asks a question. It gets the reader thinking and, in turn, may lead to another story.

How about a question and answer column? What about quizzes and puzzles? These don't write themselves! If there is enough space in your group's newsletter, why not write profiles of the other members, or people outside the group who in some way influence your group? If there isn't enough space for all this, your newsletter may be ready to grow a little.

Now you have what is necessary to be a newsletter writer. Take pen in hand and apply thoughts to paper.

Reprinted from Niagara Centre s *Niagara Whirpool*

Telescope Operator Wanted

The David Dunlap Observatory in Richmond Hill, Ontario is planning to hire an additional telescope operator in September 1988. The operator will observe with the 1.9 metre telescope and other telescopes and provide support services to the scientific community using the instruments. Requirements are a B.Sc. in physical sciences or mathematics, some computer experience, manual dexterity, and good health. Some course work in astronomy and/or experience operating a telescope in a research environment are desirable. Applications should be sent to:

Julia Finerty
Human Resources
Sidney Smith Hall
University of Toronto
Toronto, Ontario
M55 1A1

Space University

Eight Canadian graduate students have been awarded fellowships to attend the inaugural session of the International Space University this summer at the Massachusetts Institute of Technology (MIT) in Boston. They were selected from among 26 Canadian finalists and will join some 50 other students from around the world, including 12 from the Soviet Union, 10 from the United States and six from the People's Republic of China. In total, there were more than 350 applications from 37 different countries received.

The space university was founded in April 1987 at a meeting at MIT. Its aim is to attract new talent to space-related fields by providing a wide range of studies and showing how they relate to space in an international and non-military environment. Courses include ones on space policy and law, arts, microgravity science and satellite applications. It will meet for nine weeks every summer in different countries. Annual enrollment will eventually number about 100 students.

In November 1987 Canada became the first country to sign up for the International Space University. Initially scholarships were going to be available for only six Canadians but federal agencies and business raised enough money to send two more.

One of the Canadians chosen is Daniel Blanchard, a PhD astronomy student at the University of Toronto who was quoted in *The Varsity* as saying:

"There are going to be students from China and the Soviet Union, people who you would normally never meet, and I'm going to have a chance to work with them for nine weeks. It's just a great opportunity."

Another member of the Canadian delegation is Kristina Valter, a master's degree student in biomedical engineering.

"I've been interested in space research for a number of years, and I've also been interested in life sciences. Basically, what I'm looking to do is combining the two fields ... to look at how man fits in space and what the effects of space will be on the physiology of man."

Future host countries have not yet been decided but Canada is a possibility in 1990.

Testing the "CAT"

by Jack Newton
victoria Centre

Ever since seeing a demonstration of the "CAT" (Computer Assisted Telescope) at the Riverside Telescope Makers Conference in California, I had looked forward with great enthusiasm to an opportunity to actually put such a computer to the test here at home, under familiar conditions, and using my own equipment. Suffice it to say that the CAT has lived up to and exceeded my wildest expectations!

My main concern had been the degree of difficulty I might face in attempting to mount the CAT, not on a Celestron 8-inch telescope for which it was designed but on my home-built German equatorial 50 cm reflector. I found that I need not have worried – the process was not difficult. I decided to mount the encoders on the south end of the right ascension shaft. This required that I machine a plate to attach to the right ascension pulley and then to bolt it to the bottom of the right ascension shaft. I then attached the declination pulley in a similar fashion. The machining was relatively simple for me, since I have the necessary metal lathe and other equipment in my home workbench. I suspect that a little arm-twisting might be required for anyone planning to have similar modifications done who was not in possession of his own workshop.

When the CAT was first delivered, I had eagerly opened the large shipping carton to find an extremely well-presented and professionally embellished kit. The manuals were easy to use and

obviously painstakingly researched. As suggested by the manufacturer, I spent some time reading through the user's manual and familiarizing myself with the features of the CAT.

I own a Celestron 8-inch telescope in addition to the home-built 50-cm reflector, so I thought it might be worthwhile to initially test the CAT on the smaller scope first. I attached the optical encoder to the right ascension shaft and then to the declination shaft, using the brackets and pulleys provided with the computer, a process which took about 45 minutes. Soon afterwards I was able to try out the various features of the computer, and was fascinated with the LED read-outs. These provide not only object numbers and descriptions, but also give the magnitude and even a "rating" of how "good" an object is to observe.

Once I felt entirely comfortable with the CAT's illuminated cross which is used to pin-point the location of the various objects, I disassembled the optical encoders from the C-8 and put the CAT through its paces on the 50 cm telescope. I plugged the start-up information into the CAT and chose the bright globular cluster M13 as my first subject. I moved the telescope until the cross on the computer indicated that M13 was centred in the field, but found that while it was okay in declination, the right ascension was out. All I had to do to make the necessary adjustment was to press the "synch" button, and presto, the computer locked in on the object. I have never used setting circles on my telescope and was absolutely fascinated with the amount of time I was able to save by not having to sort through star maps and find guide stars before starting to take pictures. I just could not believe how easy that had become! I have spent anywhere from half to three-quarters of an hour attempting to get to the point where I could start photographing, and here I was accomplishing the same thing in about 30 seconds. To say that I am impressed is an understatement! What can I say except that in one day, the CAT moved my telescope into the 21st century!

Telescope Care

by Ray Khan
Toronto Centre

Most telescope owners have an intrinsic awareness of the special care and handling that a fine precision instrument, such as a telescope, requires. However, as a telescope owner and as a retailer of fine telescopes, I have become acutely aware of the lack of knowledge on the part of many amateurs in the proper handling and cleaning techniques that should be used for the optical surfaces of a telescope that are exposed to dust and other contaminants.

I can think of nothing more unsightly than a primary minor with fine hairline scratches staring at you when you look down the tube... or to see circular scratches in a high-quality minor star diagonal that should be a pride and joy to own. A plea of ignorance is of little help, once the damage has been done.

Unfortunately, the manufacturers of telescopes generally do not supply an abundance of information on telescope cleaning. It may be that they are concerned lest they encourage the overzealous owner into rubbing off the dust with a dry cloth (I have seen it happen!).

Where to start? Let's start with dust. Dust is everywhere and is the ever-present enemy of all telescope owners. The big danger is that many telescope owners do not appreciate that dust is composed largely of sand in the form of sharp little quartz crystals. Cleaning a dusty lens with a cloth or similar object just rubs those quartz crystals into the surface. The result is fine scratches and irrepairable damage to what was a fine optical surface. The many hundreds of fine scratches will eventually lay a fog upon the image.

The best advice for the owner of a dusty lens or minor is to leave well alone until the dust affects the image. The desire for cleanliness must be restrained until cleaning really become necessary. The best way to remove dust from an optical surface is to very gently brush it off with a fine camel hair brush (available at most telescope and camera shops). Use the lightest possible touch and do not brush any more than absolutely necessary.

If there are any other contaminants on your lens such as grease from fingerprints or contact with eyelids, all dust must be removed before cleaning off the grease. The grease is removed by wiping with a cotton swab moistened with distilled water or a high-quality cleaning fluid. Use short, straight strokes. Do not use circular strokes. Once again be very gentle in your wiping actions.

Prevention is always better than a cure ... so keep your optical surfaces covered when not in use. Shower caps work well for Newtonian reflectors.

A few final pointers on the care of your telescope:

1. Avoid extremes of temperature.
2. Avoid high humidities.
3. Do not store a telescope that is heavily dewed. Let it air dry first.
4. Keep your telescope out of damp basements or similar places.

Remember: Too much cleaning can be hazardous to your telescope!

Reprinted from Toronto Centre's *Scope*

Fibre-Linked Spectroscopy at the David Dunlap Observatory

The David Dunlap Observatory (DDO) has recently increased the number of instruments available for use on the 1.9 metre telescope with the construction of a fibre-fed photon counting spectrometer (PCS). The fibres feed the light from the telescope to a new pseudo-coude room in the dome. This fibre optic link will play an important part in future instrumentation development at the observatory, the four fibres currently installed can be used for a variety of different instrument configurations. The PCS is only one of the instruments that will be in use on the optical table of the new room. Others include a bare Reticon detector on a high-dispersion Echelle spectrograph.

The intensified Reticon detection system of the PCS is based on a successful design from the Centre for Astrophysics but several interesting modifications have been incorporated into the DDO instrument. With this instrument it is possible to profitably study stars as faint as magnitude 13 and radial velocities have been obtained to an accuracy of +/– 1 km/s at a reciprocal dispersion of 11 A°/mm. The fibres will also permit sky subtraction with the simultaneous detection of the object and the sky. The electronics incorporate a digital encoding scheme for fast data transmission with a serial connection to the host computer.

The construction of a temperature-controlled room to house spectrograph optics is particularly useful for the PCS because it allows the heavy thermoelectric cooling system to be mounted off the telescope. At the telescope, the fibres are mounted in guide heads where formerly interchangeable collimators were located in the Cassegrain focus spectrograph. The light is put through a focal ratio adapter, thus permitting the existing guide TV-camera probe on the Cassegrain spectrograph to be used. The fibres lead to the pseudo-coude room where the light passes through two image slicers designed by Harvey Richardson at the University of British Columbia, and then to the Reticon detector.

The fibre-fed PCS has been in use for only a few months and it has largely performed as expected. Additional work will be carried out to bring the system to its optimal level. Work is also underway to improve the seeing conditions of the dome. The innovative instrumentation that is being used with the 1.9 metre telescope will enable the David Dunlap Observatory to continue its contributions to astronomy for many years to come.