NATIONAL NEWSLETTER

June, 1980

SUPPLEMENT TO THE JOURNAL OF THE ROYAL ASTRONOMICAL SOCIETY OF CANADA

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GLENLEA OBSERVATORY REOPENED BY WINNIPEG CENTRE

Back, left to right: Greg Bailey (2nd Vice President), Roy Belfield (Past President). *Front, left to right*: Guy Westcott (President), Maestro Piero Gamba (Honorary President).

Photo by Phyllis Belfield

Left to right: Roy Belfield, Greg Bailey, Phyllis Belfield, Guy Westcott, Maestro Piero Gamba, Mrs. Richard Bonchonko.

Photo by Rosemary Dawson

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Glenlea Observatory Officially Reopened

from Winnicentrics

Twenty-six people turned out to the RASC Winnipeg Centre observatory at Glenlea on the night of March 29th, 1980. The occasion was the official reopening of the observatory by the Honourary President of Winnipeg Centre, Maestro Piero Gamba, and also the inauguration of the Centre's new Celestron 14″ telescope.

The President opened the evening by saying a few words about the clean-up and paint job done to the observatory over the past season, the long awaited arrival of the C-14, and the installation of the instrument into the dome. For the Past President Mr. Roy Belfield the wait has been very long. Roy originally put the motion forward to purchase a large telescope back in 1973. Funds were raised but the motion was shelved when it was decided to build an observatory first. The real work of raising funds for the telescope restarted in Roy's last year of office. Leading up to the 1979 eclipse, slide set sales, a well planned Post Eclipse Banquet, Post Eclipse Seminars, plus donations from members all played a major part in raising the funds.

On the joyous occasion, the President offered Maestro Piero Gamba some scissors, hastily scrounged from the Centre's First Aid Kit. Maestro Gamba declined the use of the scissors, saying that he preferred to use the "tools of his trade". He magically produced his famous conductor's baton, and proceeded to break the ribbon with one musical uplift of his arm. Many people know Maestro Gamba as the conductor of the Winnipeg Symphony Orchestra, but in his rare breaks from work he is a very learned amateur astronomer. The Centre would like to thank Maestro Piero Gamba for coming out to the Glenlea and opening the observatory and the telescope.

The rest of the evening was pleasantly spent viewing through the C-14 and the University of Manitoba's 16″ telescope. We also express warm thanks to Mrs. Helen Stevens and Mrs. Barbara Westcott for preparing the refreshments; snacks, coffee and fruit juice.

Calgary Centre Members Experience Successful Eclipse Expedition

by Don W. Hladiuk

On February 16, 1980, less than one year after the last total solar eclipse, the moon's shadow touched the earth again. In a grassy plain just outside the Kenyan town of Voi, a small group of 20 of us eclipse chasers prepared to view one of Mother Nature's most spectacular light shows.

As the moon moved across the sun, the temperature dropped approximately 8°F(86°–78°F). This caused the moisture in the air to condense and form thin clouds in the vicinity of the sun. When the last bit of sunlight disappeared the corona materialised around the dark silhouette of the moon. The corona was different from the one observed in 1979.

This one had several large streamers or spikes radiating in all directions from the sun. The bright red prominences visible in the last eclipse were replaced with much smaller and dimmer prominences.

To the lower left of the eclipsed sun Mercury was visible, and further left still was the brilliant planet Venus. Around us the horizon glowed like a 360° sunset. Four minutes and two seconds after second contact the diamond ring emerged, indicating the end of another total solar eclipse. The two and a half week, 20,000 mile journey was a success.

International Union of Amateur Astronomers Plans August Meetings

Fifth World General Assembly

The Fifth General Assembly of the Union will be held in Brussels, Belgium in early August, 1981. The Belgium Committee of Amateur Astronomers, as host society, is presently making arrangements for the assembly and wishes to know as soon as possible the number of participants expected. Accommodation can then be made at as reasonable a rate as possible.

Participation is open to all interested amateur and professional astronomers. Official languages of the Assembly will be English, French and Dutch. The I.U.A.A. is an international, nonpolitical union with corporate and individual members from 30 countries (The RASC is a Corporate Member. Ed.) and is the amateur equivalent of the International Astronomical Union. References to the Union can be found in *New Scientist*, September 14, 1978 and *Sky and Telescope*, November, 1978.

For further information, address inquiries together with a 4″ by 9″ self-addressed envelope and international postal reply coupon to:

The Executive Secretary–I.U.A.A.
26 Cedarwood Park
Ballymun Dublin II
Ireland.

NB: Please mark your inquiry–GA5

Sun Spot

by O. Westcott
Winnipeg Centre

We are now in the year of predicted solar activity maxima, this being the case I thought it would be an excellent opportunity to do a series of articles and photographs on solar observing. The equipment used for my observing consists of a Celestron 8, mounted on a cement pier in the back yard, The telescope is fitted with an offaxis solar filter of photographic quality. I find the best viewing is done with a 40 mm eyepiece with a backup for large grouping of spots being a 24 mm eyepiece. For photographic work I am using an RTL convertible Praktica fitted with a clear focus screen and a grid overlay. This camera when mounted at prime focus gives the same results found when viewing through the 40 mm eyepiece. This setup is extremely useful for sketching and photographing at the same time. Recently I have had the good fortune to be able to use the newly installed Celestron-14 at the Winnipeg Centre Glenlea Observatory. This instrument has helped greatly where details are required in the sketches, but I find it very difficult to relate to the whole solar disc when only about one quarter can be seen at the lowest magnification.

Before observing, one word of warning. Look at the sun ... but WATCH OUT! Never look directly at the sun with the naked eye or for that matter through any type of instrument without the proper filters attached. Always fit your solar filter to your instrument before lining up on the sun, and when not viewing turn the telescope away from the sun. This will prevent any heat build up in the instrument and also possible accidents occuring. If you have a telescope of the closed in Cassegrain type do not attempt to project an image with it. The resultant heat build up will seriously damage the telescope. For projection work the best telescope to use is an open ended reflector type. If you have an eyepiece filter the best place for it is in the garbage. This type of filter is very unreliable and tends to crack or blister when in use, causing irreparable eye damage to the observer.

Most fascinating and easiest to observe, are the sun spots, for which little equipment is required. Individual spots, and large groupings appear, develop, and drift across the sun’s disc as it rotates. These spots can survive for weeks or dissipate and vanish in a matter of days.

If you’ve been looking at the sun for the past three to four weeks, with safe astronomical equipment, you will no doubt have seen the large number of sun spots on the solar disc. These are some of my recent notes:

May 19, 1979. I sketched and counted 43 sun spots. This figure remained fairly stable throughout the year with a difference of about 10 to 15 in either direction.

December 16, 1979. 64 sunspots distributed roughly into 3 groups, the largest being on the eastern limb of the sun’s disc.

December 30, 1979. The count had gone down to 53. Four main groups and using a 25 mm eyepiece it is quite easy to break the groups down into individual spots linked together with feathery filaments flowing in the magnetic field.

January 1980. The total count dropped drastically to 16 sunspots on January 25th, and 25 sunspots on January 26th. Lack of numbers was more than made up by the large size of the spots.

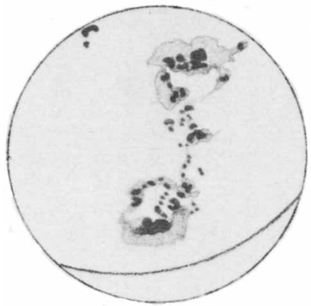
February 3, 1980, 38 sunspots were counted. Small filaments were observed on the open sun space between groups.

February 17. The count had decreased to only 24.

March 25, 1980. The count was up to 52 spots. The groupings were so interesting that I decided to photograph as many as possible. I used Kodak Tri-X film shooting through the Celestron 14 with a 40 mm eyepiece projection. I found that the best exposure to use was six seconds. The greatest contrast between umbra-penumbra and sun surface was obtained at a lower exposure of 4 sec.

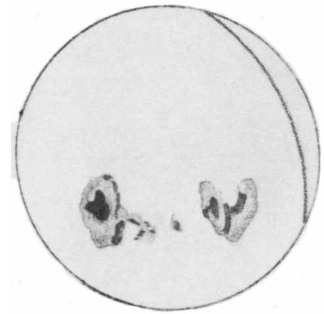
With a firm conviction that only about 60–70 sun spots would be counted in April, I went observing on **Friday, 4 April.** To my surprise there was an enormous cluster of spots. Total

SOLAR ACTIVITY AS OBSERVED BY GUY WESTCOTT, APRIL 1980.



APRIL 4th.

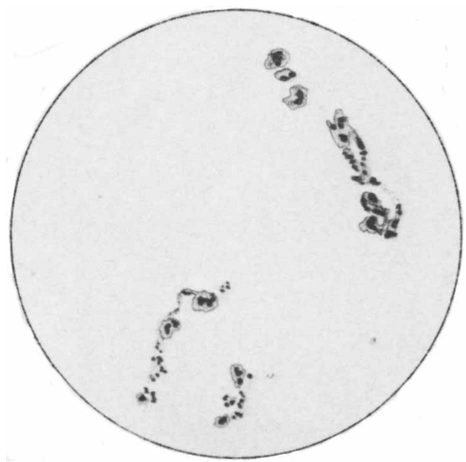
APRIL 6th.



APRIL 8th.

As seen through a 25mm eyepiece, fitted to a Celestron 14. These are not total solar disc views.

All sketches are drawn from photographs taken at about 12:00 noon on respective days.



APRIL 10TH.(67 spots)
Total solar disc view,
composite view through
40mm eyepiece fitted
to Celestron 14.

count for the day was 137 spots confirmed by at least two independent sources. The cluster was later estimated by the Planetarium staff at the Winnipeg Museum of Man and Nature to be in excess of 450,000 km long. The smaller filaments stretched out joining the two main groups together, granulation around the spots was clearly visible as were the faculae as one looked toward the rim of the sun. With a 25mm eyepiece fitted into the Celestron-14 I could only get about two-thirds of the group into view at any one time.

Sunday, 6 April. Slight haze kept viewing fairly stable. The original spots first seen on April 4th were still visible and the two large groups have moved closer together forming more intricate bridges between them. The spot count was 98.
April 10. Total count 67 spots. The two large groups are moving together and towards the rim of the sun. Interspaced behind them is a sprinkling of new spots starting up. The penumbra is very clearly defined and there is a definite boundary between the shades of penumbra, where the magnetic lines of flux are channelling the cooler material off into spiralling loops back to the surface of the sun.
April 12. Total count 146 spots. The two large groups are still moving towards the limb of the sun. Three large groups have appeared around the opposite limb, and are breaking up into smaller distinguishable spots.

It would appear that the sun is building up for a bumper summer of very high sun spot counts. This is all very well and fine for observers but the other consequences have really yet to be counted. For the last ten nights I have spent a total of 63 hrs at the Glenlea observatory trying to see and photograph deep sky objects. For five of those nights the aurora borealis has been so intense that the whole sky is washed out. Radio communication, or lack of it, has been next to impossible for the past three weeks. Now the hydro company is complaining that the ground current build up, when we have a solar storm, is overheating and burning out their transformers. What will happen next is anybody's guess. But I think I'll stick to solar observing for this summer. To build up a total and complete picture, any observations from other Centres across Canada would be most welcome. Let's find out about our star, the Sun.

Regional Symposium–Modern Techniques for Non-Professional Astronomy

To be held in Bologna, Italy–August 28 to 31, 1980. Organization: A.A.B.–Bolognese Amateur Association under the auspices of the S.A.It.–Italian Astronomical Society.

The symposium, as previously announced, will be in the form of a residential course. It will be held in a comfortable hotel, near the town of Bologna. It will consider the application of modern instrumental techniques in all phases of amateur astronomy. For four days, distinguished lecturers will speak on the following topics: variable star observation, photographic and photoelectric photometry, solar observation, planetary studies, radio-astronomy. Director of the course: Prof. Mario Rigutti (Director, Napoli Astronomical Observatory). Provisional list of lecturers:

Prof. Oto Oburka(Brno)
Dr. Viicius Barocus (Preston)
Prof. Giuseppe Bartolii (Bologna)
Prof. Marcello Fuchignoni (Rome)
Prof. Gianfranco Sinigaglia (Bologna)

Galaxy-Wide Discoveries Noted as Astronomers Honoured

Dr. Arthur Covington was recently honoured when a sundial was unveiled at Ottawa. It is a tribute to Dr. Covington as an outstanding pioneer in the field of Radio Astronomy. Appropriately the sundial contains a piece of antenna from the very first radio telescope used by the NRC. Leo Enright of the Kingston Centre sums up our feelings most succesfully: "Congratulations to a wonderful gentleman whom we have even had the privilege of seeing at some of our meetings!"

Dr. George Herbig, an astronomer at Lick Observatory and professor of astronomy at the University of California, Santa Cruz, has been awarded the 1980 Catherine Wolfe Bruce Medal by the Astronomical Society of the Pacific.

This medal, which has been awarded each year since 1898, recognizes distinguished service to the science of astronomy. It is considered one of the highest honours in the field.

In receiving the award, Herbig is being recognized for his pioneering research on young stars and the interstellar medium from which they form. He is particularly known for his work on T-Tauri stars (extremely young stars in which the nuclear reactions which power normal stars have not yet had a chance to begin) and of the peculiar nebulous knots found in the regions of star formation (which are now called Herbig-Haro objects after him and his co-discoverer).

Dr. James W. Liebert of the University of Arizona and Dr. Luis F. Rodriguez, of the Mexican Institute of Astronomy, will share the 1980 Trumpler Prize of the Astronomical Society of the Pacific. The award is given each year for an outstanding PhD thesis in the field of astronomy. This is the first time in the history of the prize that the Society's Board of Directors have presented two awards in the same year.

Liebert's dissertation, done at the University of California, Berkeley, involved a manyfaceted observational study of white dwarfs–faint stars which are composed of super dense matter and represent the last stage of a normal star's life.

Liebert used special equipment at the Lick Observatory of the University of California to make a systematic study of the spectra of these white dwarf stars. In the process, he discovered large shifts in some of the spectra which he successfully interpreted as being due to enormous magnetic fields (millions of times stronger than the average field of our Sun).

He also discovered a number of bizarre white dwarfs: for example, one with strong features of molecular carbon and another with extremely red colours in contrast to the usual blue expected on a hot white dwarf. Fitting these objects into the overall scheme of stellar evolution will provide a major challenge to theoretical astrophysicists.

Rodriguez, who received his PhD from Harvard University, used several large radio telescopes to study the nature of the different complexes of gas located at or near the centre of our Galaxy (the Milky Way).

He discovered three distinct types of gas: first, there are giant clouds of ionized hydrogen that lie in a ring located some 650 light years from the galactic centre. (By contrast, the Sun is about 30,000 light years out.) At the centre of this ring lies the second component, a huge cloud of ionized hydrogen (known as Sagittarius A West) whose motions were measured in detail by Rodriguez. He concluded that these motions could be best explained by the gravitational pull of a compact mass at the centre with at least five million times the mass of our Sun. The nature of this mass is not clear, but a black hole would be one possibility. The third component is the hot gas that lies between the centre and the ring. This gas appears to have been heated by a burst of star formation producing about 10,000 hot, massive stars some ten million years ago.

Walter Sullivan, science editor of *The New York Times*, is the winner of the 1980 Dorothea Klumpke-Roberts Award of the Astronomical Society of the Pacific. The award, which is presented each year for outstanding contributions to public understanding and appreciation of astronomy, has previously been given to such noted scientists and science writers as Carl Sagan, Isaac Asimov and Fred Hoyle. Sullivan is the first journalist to receive the award.

Sullivan is the author of two fine books on astronomy: the prize-winning *We Are Not Alone* (which is a primer on the scientific prospects for detecting extra-terrestrial life) and his recent

Black Holes (which explains these bizarre objects in language the average person can understand).

Frank Bateson, of New Zealand, has won the 1980 Amateur Achievement Award of the Astronomical Society of the Pacific. This award is given each year in recognition of the many fine contributions amateurs have made to the field of astronomy.

Bateson, who is now retired, was an accountant and manager of a trading company most of his life, much of it spent in the Cook Islands. He developed an interest in astronomy while in college, although at the time it was impossible to study the field professionally in New Zealand.

In 1927 he founded the Variable Star Section of the Royal Astronomical Society of New Zealand and has directed its activities ever since. During his long career, he has made well over 100,000 observations of variable stars (whose brightness and other characteristics change with time). Since there are far too many variable stars for professional astronomers to keep track of, this is a field in which amateurs can make invaluable contributions.

As one of his colleagues has written: "It is difficult to overstate the positive influence Bateson has had on astronomy in New Zealand. His enthusiasm, painstaking care and interest have provided two generations of amateur astronomers with a friend and mentor."

"Victoria's the One in '81"

Our Victoria Centre of the RASC is looking forward to being the host city for the General Assembly in 1981. Appropriately for a city of that name, Victoria Day weekend, May 15, 16 & 17 are being considered. Further details of the program will be available in the fall of this year. In the Interim please address inquiries to:

Mr. Chris Aikman, Secretary,
Victoria Centre RASC,
4335 Tyndall Ave.,
Victoria, B.C.
V8N 3R9

Start thinking now about visiting the "City of Flowers".

(Editor's Note: We have put the above in Bold Face because Dr. Orr, Editor of the *Skynews* of Victoria Centre, in that publication referred to having to get out a magnifying glass to decipher a date in the NNL. On receipt of that we looked up our file copy, and decided we should buy Dr. Orr an extra 30 watt bulb!)

Mirror Coating

by Grant W. Dixon
Hamilton Centre

Before 1856 astronomical mirrors were not made of glass, but of a metallic substance known as 'speculum metal'. From the time of Sir Isaac Newton (1668) until the use of glass, any alloy of copper and tin was used to make the mirror plate. The amount of tin varied from 25% to 33.4%. It was not (as far as I have been able to determine) until Herschel that the ideal ratio of 4 copper atoms to 1 tin atom was used; giving an alloy consisting of 68.2% copper and 3 1.8% tin. Once a mirror blank of speculum metal was cast, it was ground and polished as mirrors are today. The finished mirror was not coated, but the speculum metal itself was the reflector.

The 'speculum metal' mirrors had two major drawbacks; the first that the speculum metal did not have a high percentage of reflectivity, the second that the mirror would tarnish. When the mirror tarnished, which was frequently, it had to be removed from the telescope and repolished. The repolishing of a mirror would take weeks to accomplish and would mean that telescopes fitted in this fashion would have considerable down time.

In 1856, Karl August von Steinheil developed a process of surface-silvering a mirror. A plate of hard substance was ground and polished; this plate was then called a mirror. A coating of silver was placed over the mirror to a thickness of about 4 x 10^{-6} inches. Due to the thinness of this silver, it became so evenly spread that it took the contour of the mirror. The silver coating became known as a *replica*.

Silver had two advantages over the speculum metal: first that it was more reflective; second, although the silver tarnished, the silver replica could be removed in seconds with an acid bath without damaging the mirror, and a new replica be added in minutes, reducing the down time to only hours.

In the 1930's chemically deposited silver gave way to aluminum deposits. A process of coating the mirrors with a chromium replica followed by a deposit of aluminum replica was developed by Robert C. Williams.

The process of aluminizing a mirror starts by hanging strips of exceedingly pure aluminum over tungsten filaments. These filaments are then suspended a few inches to several feet above the mirror. This setup is then placed inside a chamber which is evacuated. Closing the filament circuit heats the tungsten, and the strips of metallic aluminum suspended over them, being less refractory than tungsten, are quickly vaporized. This vapour condenses onto the mirror in much the same way that frost forms on a window pane, but in an even film. The aluminum coats the glass to a thickness of 4 x 10^{-6} inches. Immediately after the aluminum replica comes in contact with oxygen (in the atmosphere) it begins to oxidize. This oxide is only a molecular film, but it is extremely hard, thus eliminating tarnishing and reducing minor abrasion of the mirror.

It is interesting to note that aluminum oxide, Al_20_3, better known as 'corundum', is transparent and possesses a hardness of 9 on the mohs scale. If impurities of chromium are added to corrundum, we obtain a ruby; and if iron or titanium impurities are added we then get sapphire.

Finally, there is a misconception that an untarnished silver mirror will reflect more light than an aluminized one. It is true that silvered mirrors reflect 95% of visual light while aluminized mirrors reflect only 90% of visible light. Also, a silvered mirror reflects more light in the red end of the spectrum than an aluminum mirror does. The big plus for aluminum comes in its ability to reflect enormous amounts of ultraviolet light compared with silver, which is very poor at these wavelengths. Although ultraviolet light is non-visible, it can be photographed. When the 60-inch and 100-inch telescopes of Mount Wilson were finally aluminized they became 60% brighter photographically than the same mirrors silvered. Since aluminizing these mirrors, they are able to photograph stars half-a-magnitude fainter than before, even though visually they have lost .05 magnitude. Therefore I feel safe in suggesting that aluminized mirrors reflect more total light than silvered mirrors.

It is easy to see why aluminum has become the leading choice for replica. Aluminum is more durable and brighter by far than its nearest competitors.

How I Saw A Grazing Occultation From My Back Yard (Despite Doing Everything Wrong)

by Alan Whitman
Vancouver Centre

A Centre member who has been on several organized graze expeditions which were unsuccessful asked me to submit this account of a graze observed from my own backyard in Kelowna on Mar. 8, 1980. Refer to track 39 on page 76 of the 1980 "Observer's Handbook". This track crosses the Okanagan although on this very small-scale map it appeared to pass somewhat north of Kelowna. I did not send a request to Dr. Dunham for the details of the event so I only knew that there would be a near graze or a near miss (which seemed more likely) at my location. In November I had added the notation "graze" to the Handbook's list of March events.

Now I work a shift which requires that I arise at the miserable hour of 4A.M. On the evening of Mar. 7, only six hours before that time, I was checking the Handbook for upcoming events rather than sleeping as I should have been. To my great dismay, I was reminded that there was a graze at 2:02 A.M. (time of central occultation). Thus I was faced with sacrificing most of my sleep before going to work and compromised by setting the alarm for as late as possible, which is my excuse for nearly blowing the whole event.

I got up in a rush, brought out the telescope, looked around in the dark for my extension cord which my three-year old had dragged off, focused quickly on Gamma Virginis, and finally had my 20 cm. Newtonian pointing at the moon only five minutes before scheduled central occultation. The moon was bright (64% illuminated) and faily low (just rising out of the trees- in Scorpius), the mirror hadn't yet settled down, and the star ZC 2280 is fairly faint at mag. 6.8. There was no star visible at either the south or north limbs and I regretted not having followed it in the previous half-hour. I decided that if it wasn't already occulted it must be at the southern limb as this was a southern limit graze (obvious enough perhaps but this mad rush wasn't very conducive to calm consideration of geometry). Finally I noticed what appeared to be an illuminated peak on the limb just beyond the terminator. In desperation I watched it just on the off chance that I was wrong and it was, in fact, the star. To my surprise, it blinked out about a minute after I started watching it! I don't own a stopwatch and made no attempt at timings, not even mentally. However, it was probably gone at least twenty seconds when it reappeared, stayed visible perhaps twenty seconds, then disappeared for about two to three minutes before reappearing a second time and moving away from the moon. I was surprised that the first reappearance lasted as long as it did.

The libration in latitude was at a minimum (south limb exposed) on March 8 and the south limb was more rugged than I recall seeing it before. The path of the graze would thus be abnormally wide and it is to this that I attribute my good fortune in seeing my first graze from my regular observing site.

Occultation Observers, Extinct or in the Closet?

by Neil Laifra
Vancouver Centre

Since it is traditional (if not mandatory) for the moon to be well up and very bright during periods of clear skies in the Lower Mainland Area, it seems that there should be more occultation observers in our midst. However, we never seem to hear much (if anything) from them. Since this year we have the opportunity to watch several disappearances of Aldebaran plus several bright stars in the Hyades cluster, in addition to other stars along the moon's orbit, this makes for several timings that could be made by almost anyone with even a small telescope. The reason for getting some communication between observers of events is to check reported times to confirm the observations.

At present, I have been checking my few sightings against those of Art Holmes, also of Vancouver Centre. He does his observing in South Langley, while I did mine up in Maple Ridge. There have been differences in time of over 10 seconds! This may be in part due to my being new at this game, but it is also due to the distance between us. There was also some notable event detail disparities; one star (magnitude 6.4) that we both watched disappear February 22 at 23:11:20.9 PST in Maple Ridge (23:11:19 in Langley), was gone in an instant for Art, but to me it seemed to go "out" gradually, over a one-second period! If only I could get someone to confirm either sighting, the reports we send in to Greenwich Observatory would be much more significant. (Since the moon's apparent movement at this distance is equivalent to about 1 kilometre per second, and mountains of this size are not uncommon on the moon, it's possible that my view was of the star being cut off along the edge of a steep slope.)

If our Centre had an Occultation Group of more than two members, of if members of other centres would contact us, there would be something constructive to do on luminous lunar evenings.

NOTE: This October 10, 1980, early in the morning (00:03 PDT) there should be an occultation of a faint star by an asteroid visible only in the coastal regions of Oregon, Washington and the lower parts of B.C. (See *Sky and Telescope* Jan. 1980, Page 38). With some practice this could turn out to be an excellent chance to contribute to the study of this asteroid.

Aside from that, there are several bright star events all year long. Just consult the *Handbook* starting on page 58.

Any other star watchers out there who do participate, let's hear from you. Drop me a line c/o H. R. Macmillan Planetarium, 1100 Chestnut Street, Vancouver, B.C. V6J 3J9.

An Astronomy Program for Young Children

by David Levy
Kingston Centre

(The following is the text of a paper presented by David Levy at a session on the teaching of astronomy held in conjunction with the I.A.U. Congress in Montreal last August (1979). This text is taken from the proceedings of the above mentioned session, as reprinted in the Newsletter of the Kingston Centre.)

This paper arose from a four-year summer astronomy program that had been devised for the six hundred children who attended a large day camp near Montreal. The program began with a question: would it be possible to introduce astronomy to children between the ages of four and ten? The resulting experience indicated that the answer is yes.

I was astonished at some of the theories the children presented. In one session, for example, we discussed the origin of meteors. I asked the children if they had any ideas of their own on the subject. One child certainly did: "They could have been made," she proposed, "by a larger rock blowing up and falling apart into smaller rocks." Much closer to our standard theory of meteors coming from asteroids this gird could not get.

Though the program varied from one year to the next, there was considerable overlapping as many children in succeeding years were new. During a discussion about the moons of Jupiter, one child recalled my previous year's statement that Jupiter has more than twelve moons. "I looked it up in the encyclopedia after last summer," he objected. "Jupiter has only twelve moons." While it took some convincing that his source was out of date, I noticed that he had been interested enough to check out something he heard and that he remembered both my comment and his investigation of it from a year earlier.

The idea that young children will be excited by something "big" is well known, but it has not been widely exploited in the schools. In astronomy this is particularly evident. The children in my program wanted to learn astronomy. Some of them couldn't believe that scientists had given a child-like name to the major theory of the universe, the Big Bang. Although the program was broad in scope, I could always count on their attention when the subject turned to bigness, either of dinosaurs or of the universe. On the subject of dinosaurs, many of the children were already expert. And here was an opportunity to combine two areas of "bigness"; perhaps a supernova was the cause of the extinction of this large and successful species more than 65 million years ago. From discussions such as this we began to explore the concept of evolution, and the children were surprised to discover how short a time humans have been on this earth. They were left with an idea of what we have done to our planet in this short time, and they gained new respect for the colossal ages of the earth and the universe.

Since this was a day camp, observation of the sun became a major ingredient of our program. The most successful method was projection of the solar image onto a small screen, with the image up to two feet in diameter. Children were impressed the size, and they were not made impatient by the long lines that are usually a problem with traditional viewing sessions. With solar image projections, studying the sun's behaviour did not have to take more than five or ten minutes. This left more time for other matters, and also enabled us to repeat the viewing several times during the summer. The children therefore could be left with an idea of sunspots marching across the face of the rotating sun.

The program has been expanded to include children as young as four years. With a little imagination and more than a little enthusiasm, I found that it was possible to give this younger group a nodding acquaintance with the universe. We imagined that the nature room had become a spacecraft capable of travelling at superlight speed to visit several of our sister planets. Evidence that our voyage was successful came the following week when several four-year-old girls returned to the nature room and requested a second journey to the planets.

(The final part of the paper consisted of a slide presentation designed to portray the mood that the program generated in the children. The presentation also attempted to underscore the aim of the program, which was not to present mere facts to children. Instead it tried to offer them an approach to the understanding of the universe, an approach that many of the children had not been exposed to before. This approach is a personal one that portrays a friendly universe whose ideas can be played with and enjoyed by young children. At the same time, the children are left with a feeling that they have a place to keep and to care for within the universe, and so they leave the program with a feeling of pride.)

Nouvelles des Centres Québécois

CENTRE D'ASTRONOMIE DE MONTREAL
par Lucien Coallier

A Montréal, les activités vont bon train. La conseil est formé de gens très dynamiques. ll boi~donne d'activités diverses. La CAFTA (Concours Annueldes Fabricants de Télescopes d'Amateurs), l'équivalent du Stellafane américain, prend de plus en plus d'ampleur. L'édition de 1980, qui aura lieu les 4,5 et 6juillet, sur le terrain de l'Observatoire, sera sans aucun doute le plus important à date. Des détails sont donnés régulièrement dans le Québec Astronomique. La construction et l'aménagement de notre observatoire à St Valérien progresse rapidement. Des équipes travaillent à la coupole, les planchers, la colonne etc. Notre département d'aluminure des miroirs marchent à plein. Notre souper annuel aura lieu encore à l'Institut d'Hôtellerie. l'évènement aura lieu le 16 mai et promet de connaître un franc succès. Le journalde la société prend une allure de plus en plus professionnelle. Le président de la société Lucien Coallier est très fiers de ses quelque 700 membres, nombre qui augmente sans cesse. Il se plait à leur dire combien il les aime tous. Nous attendons la visite de notre président national avec anxiété. ll ne fait aucun doute qu'il sera reçu comme il le mérite.

The 1979 February 26 Solar Eclipse on Short Wave

by Ken Tapping and Chip Wiest
Ottawa Centre

For most of the inhabitants of the Ottawa area, the eclipse across Canada a year ago, February 26, 1979, was a bit of a non-event. First, it was only partial in this part of Canada, and second, due to heavy cloud and snow, few people saw anything more than a slight darkening around noon.

However, 60 km above Ottawa, in the D-region, the sky was clear and the eclipse was producing marked changes in the atmosphere. The D-region is the lowest part of the layer of ionized gases which constitute the ionosphere. Although at this height the atmosphere is a pretty good vacuum, what goes on there is of crucial importance to radio communication. It is the multiple reflection of radio waves between the ionosphere and the ground which makes it possible for people on one side of the world to talk to people on the other via short wave radio. The ionosphere is produced by short-wavelength (UV and X-rays) radiation from the sun. This interacts with the gases in the upper atmosphere, breaking up their atoms to produce ions and free electrons–a process called ionization. The ionization so produced is removed by collisions with other particles. A balance is achieved wherein the sun produces ions at the same rate at which they recombine. If the sun is obscured (by an eclipse or night), the production rate falls and the concentration of ions decreases.

In the D-region, the frequent collisions between the particles remove ionization very rapidly. The D-region plays no part in the reflection of radio waves having a frequency higher than 2 MHz or so; however, it does absorb part of the signal coming through it. When the density of the ionization decreases the amount of absorption decreases. At night the D-region completely disappears and signals from distant transmitters can increase in strength by orders of magnitude compared with daytime level.

During an eclipse of the sun, the ionizing radiation is reduced according to the extent by which the sun is obscured by the moon. By monitoring the vartiations in the strength of the signal from a distant short wave station it is possible to follow the changes in the D-region. We therefore have a tool by which we can investigate the effect of the eclipse on a part of the upper atmosphere, even if we can't see it.

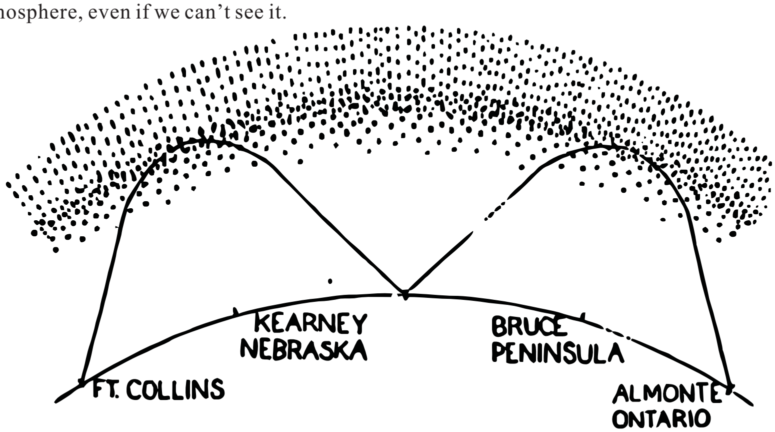


FIGURE 1

With this in mind, the following experiment was set up. On February 26, 1979, a radio receiver was set up to receive the transmissions from the WWV transmitter at Fort Collins, Colorado, on a frequency of 5 MHz. The path followed by the signal on its trip from Colorado to the receiver, which was situated near Altamonte, is shown in figure 1. It can be seen that the signal was reflected by the ionosphere at two points, labelled A and B in the figure. Point A was over Kearny, Nebraska, and point B was over the Bruce Peninsula. The signal therefore made 4 transits through the D-region while travelling to and from the point, higher up in the ionosphere, where it was reflected. In the case discussed here, the eclipse path was close enough to the signal path for a partial eclipse to occur at one of the reflection points and then at the other. The smoothed record of the signal strength during the eclipse is shown in figure 2.

It can be seen that there are two peaks in the curve. This is because 2 successive eclipses were observed: the first peak corresponds to the changes in the D-region over Kearny, Nebraska, since "Bruce" was closer to the path of totality, at that location the eclipse was more complete and produced a more marked effect.

In this way two eclipses were obtained for the price of one. The "chemistry" of the D-region is very complex and is not yet fully understood. However, simplifying assumptions make it possible to produce, for the above instance, an approximate relationship between the signal strength variations and the percentage change in the D-region ionization level:

$$y \simeq \left(1 - \frac{2x}{45}\right) \times 100\%$$

where x is the variation in signal strength in dB. It has been assumed that only a single ionization process is taking place and, as the eclipse occurred close to local "noon", the D-region was, immediately before and after the eclipse, in a state of equilibrium.

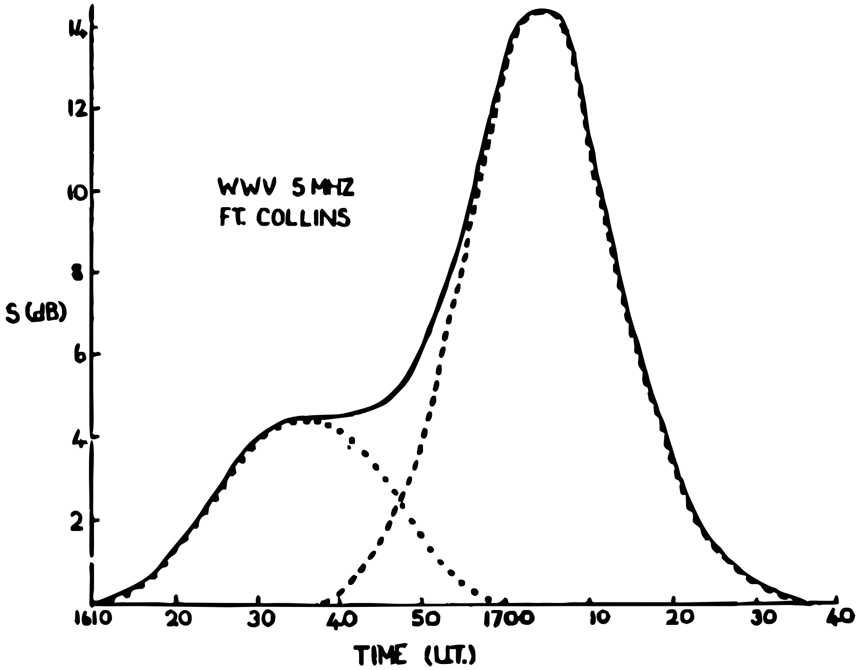


FIGURE 2

Using this relation the eclipse ionization profiles were calculated for the Keraney and Bruce events. These are shown in figure 3.

This experiment shows that, using simple equipment, it is possible to make interesting observations which yield a surprising amount of information for very little effort.

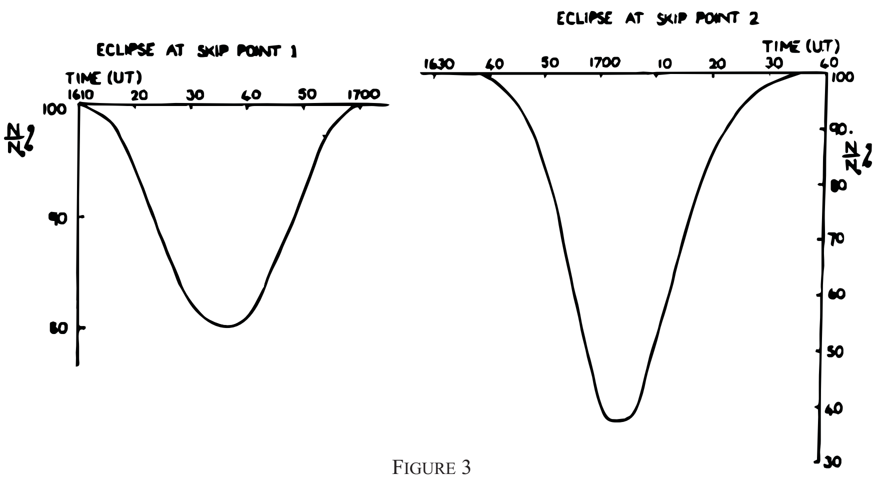


FIGURE 3

R Ursae Majoris

by Rick Huziak and MIke Wesolowski
Saskatoon Centre

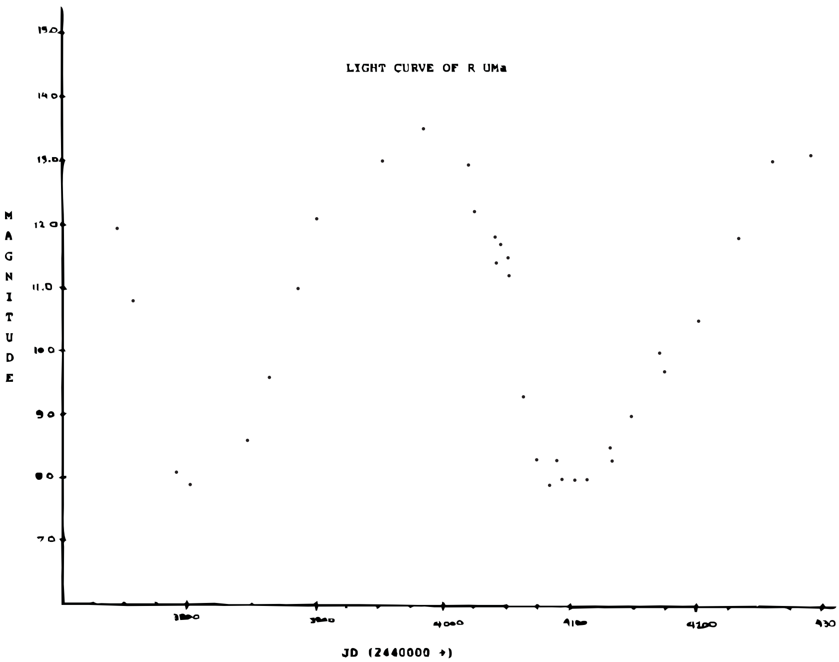
R Ursae Majoris (R UMa) is one of many bright long period variables, easily visible in binoculars or small telescopes as it comes to maximum. It is located at RA $10^{h}41^{m}.2$, Dec. +69°01′ (1950), in an easily identified field (see finder charts).

Discovered in 1853 by N. Pogson, R UMa was identified as a long period variable with a period of 302 days. Mean maximum and minimum magnitudes are 7.5 and 13.0, but actual values might differ by up to ½ magnitude. The rise to maximum takes about 116 days, so that the star fades in about 186 days, illustrated well in the accompanying light curve. Data obtained by the authors last year indicate that R UMa attained maximum on August 14, 1979, agreeing well with the AAVSO prediction of August 7. This year, maximum is predicted to occur on June 4.

As this newsletter comes out, R UMa will be very near maximum and easily visible in small telescopes. Readers are invited to follow the star as it reaches maximum and later fades, and to report their observations to: Mike Wesolowski, 11 Brown Crescent, Saskatoon, S7J 2R9. Observations should be made at 10-day intervals using the chart provided and should include a) date and time of observation (CST) to nearest half hour; b) magnitude estimate; c) comparison stars used; d) size of telescope or binoculars used.

Good observing!

A note on observations: comparison stars have magnitudes given without decimal points ie. 75 equals magnitude 7.5. To make an estimate of the brightness of any variable star, choose two or more comparison stars, a little brighter and a little fainter than the variable, and make the estimate in terms of the comparison stars.



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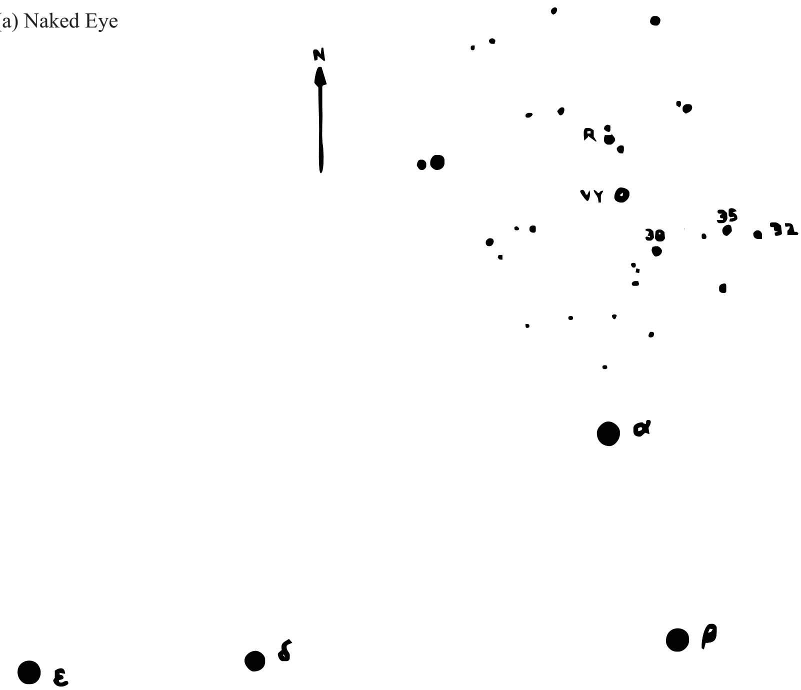
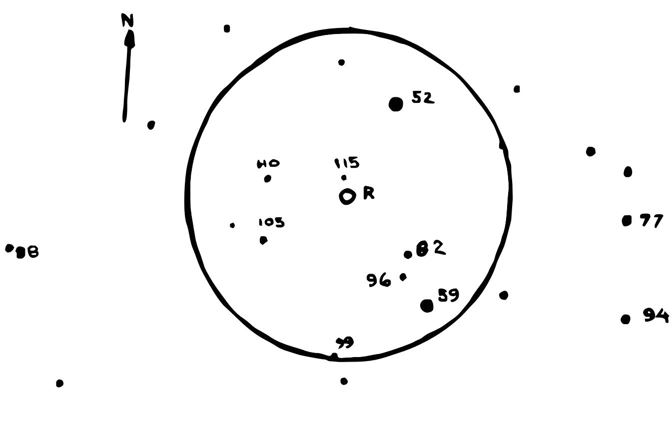
FINDER CHARTS FOR R Uma

(a) Naked Eye



(b) Binoculars/Small Telescope



1° Field