NOVA NOTES

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1978 Halifax Centre Executive

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UP COMING MEETINGS:

Friday 15th September at the Nova Scotia Museum

Speaker: Dr. Gary Welch, Dept. of Astronomy, SMU

Topic: The Centre of the Milky Way

The Milky Way is of course our very own galaxy. By comparison to other galaxies, it is large in size and mass. To the casual observer all looks calm towards the centre but recent studies might lead to a different conclusion. Dr. Welch will discuss the state of our knowledge of the galaxy, including the determination of the distance to the centre and what we might find there. Clues to that nature may be obtained from observation of galaxies such as M87. We're sure you will find this talk most interesting and informative.

It is also hoped Bill Parnell will be able to attend and present a summary of activities at this year's Stellafane gathering in Vermont.

Saturday 23 September: an observing session at Mount Uniake House to celebrate the Autumnal Equinox at dusk.

Friday 20 October: Regular monthly meeting at the Museum Speaker to be arranged.

DISCOVERING THE UNIVERSE

Membership dues are now payable for 1979. We are looking forward to having your continued support and indeed, we cannot survive without it. Some of the activities which we will be undertaking in the next year will be continuations of present programs such as monthly observing sessions. We expect to be participating in the museum's Societies' Show next spring. Several members are gearing up to begin construction of a Centre observatory which will be a major step in the deveolpment of our Centre and which will be available for use by the general membership. This is a long term project but with luck and hard work will be partially ready for use next summer. Another long term project is preparation for the joint RASC/CASCA General Assembly scheduled for 1980. Halifax is rapidly gaining a reputation for action and leadership in the RASC--please help us to continue our efforts to promote astronomical education in the Maritimes. Fees are:

Regular:	$16.00	
Student:	$10.00	(under 18 yrs.)
Life:	$200.00	

Send your membership fees to:

Alan Bent
6148 Peperell St.
Halifax, B3H 2N9

with

THE HALIFAX CENTRE, R.A.S.C.

Minutes of the June and July Meetings

The June meeting was held at the Museum on the 23rd. The executive met at 7 pm with the main meeting commencing at 8. Larry Coldwell, our center representative at the '78 Assembly, gave a report on those events that took place in Edmonton, May 19 - 21. Larry also presented the paper which he gave at the Assembly concerning his unique multi-mirror telescope project. The meeting closed over slides (by RLB), refreshments, library books, and conversation.

The July meeting was back into the standard format: third Friday at the Museum, executive at 7, main meeting at 8. Randall Brooks gave an illustrated account of his travels to England (in May) with the librarian of our center. His personal impressions and experiences associated with several historic sites, many of astronomical significance, made a memorable talk. After refreshments, Jody LeBlanc, our Observing Chairman, gave a report on the Halifax West Astronomy Club. It is satisfying to see the interest and activities that can be stirred up by the enthusiasm of a couple of astronomy buffs. The evening closed with a selection of slides of the Edmonton G. A. by Mike and Peter Edwards.

R. L. Bishop
VP/Secretary

DISCOVERY AND IMPLICATIONS OF PLUTO'S MOON

- Diane Brooks

Early in July of this year James Christy, an astronomer of the U.S. Naval Observatory, exposed a plate of Pluto with the 155 cm. telescope in Flagstaff, Arizona. The exposure revealed an elongation of the planet's image. Could this elongation indicate a moon circling Pluto? Speculation runs high in this direction since Pluto would necessarily be six times greater in length than in width to create such an image of its own accord. Similar exposures had previously been obtained at Flagstaff in 1970 and 1965, at the Cerro Tololo Inter-American Observatory in Chile with the 4 m. reflector, and also at the McDonald Observatory in Texas. However, the moon still has not revealed itself as a separate entity.

Cheron, so-named by Christy after the mythical oarsman who transports souls into Pluto's underworld, has received the official designation, 1978-P-1. The satellite, which is 10 times fainter than Pluto, describes an orbit 17,000 km. from the planet's center. Its period of revolution has been calculated at 6.4 days, equal to Pluto's rotational period. Furthermore, estimates inform us that Charon's diameter is 40 per cent that of Pluto, granting it the distinction as largest moon in proportion to its planet in the solar system.

If the satellite truly exists, calculations of Pluto's mass could achieve great accuracy through studies of the moon's orbit. Harrington believes that Pluto's mass is 0.002 that of Earth's--40 times lighter than popularly believed. A planet of this mass and with a 3000 km. diameter (Kitt Peak's estimate) must be less dense than water, implying a frozen gaseous structure. This low density calls to mind several of Saturn's satellites, as well as Chiron, an asteroid found between Uranus and Saturn in 1977. The similarity raises the question of reclassifying Pluto as an asteroid, or lends credence to the theory that the planet is a former

satellite of Neptune.

The likely existence of Cheron also promotes speculation of a tenth planet. Harrington and Thomas Van Flandern, of the Naval Observatory, theorize that a planet several times more massive than Earth travelled through Neptune's system with disruptive results. Matter was ejected from Pluto which, itself, was expelled. The errant planet suffered a near-collision with Neptune which perturbed its orbit to the extent of flinging it 50 to 100 astronomical units from the Sun. A theory by Dennis Rawlins and Max Hammerton somewhat corroborates this scenario. They believe that Neptune's motion complies with an object more massive than Earth and positione at greater than 50 A.U.'s from the Sun between longitudes 310^{o} and 350^{o}.

Observations of Pluto will very soon be curtailed for the remainder of the year by the Sun's glare as the planet progresses along its orbit. However, 1989 marks Pluto's perihelion, and early 1979 will find Pluto within the orbit of Neptune for the next 20 years. Furthermore, it has been predicted that Pluto will occult a Southern 12th magnitude star in 1980. The time appears apt for additional discoveries concerning Pluto's enigmatic companion.

MONCTON MEMBERS TAKE NOTE

Now that Moncton has achieved Centre status, Halifax members living in New Brunswick may wish to renew their membership with the new Centre. As far as I am aware the fees will be identical and you will continue to receive Nova Notes from Halifax. Moncton also has its own newsletter to keep you informed of the activities in that Centre. Anyone wishing information concerning the Moncton Centre should contact Don Williams, PO Box 358, Salisbury, N.B., EOA 3EO. The Halifax Centre also extends an invitation to all Môncton members to take part in any of our Centre's activities and to submit articles to Nova Notes at any time. We hope that our close proximity will lead to friendly competition between our Centres with resultant benifits to both.

ASTRONOMY for YOUNG RASCals

THE MEASUREMENT OF GRAVITY WAVES

Gravitational waves is a term you are probably familiar with but is one which continues to frustrate astronomers and physicists. General relativity theory predicts their existance and theoretical physicists are convinced they do, but thus far it has not convincingly been shown experimentally that they do exist. Gravitational radiation results from interaction of mass and, like electromagnetic radiation (light for instance), has a wavelike nature. These gravitational waves are quite exciting for the possibilities that they could open up for study of astrophysical processes. It has been suggested that once we achieve the technical expertise to routinely measure these enigmatic waves, a revolution will occur in astronomical thought greater than the one which we are presently experiencing with our recent ability to observe high energy cosmic ray emissions such as those emitted from black holes, Seyfert galaxies and Quasars, etc.

Every student who has taken a course in physics is familiar with the experiment where a pith ball is accelerated when a charged glass rod is brought up to it--ie. electromagnetic waves have pushed the pith ball away because of interaction of electrically charged particles. Gravitational waves however act on every particle in the Universe which has mass.. The gravitational waves accelerate each particle an imperceptable amount. This poses the question, if gravity waves cause every particle to move, how can one measure its absolute displacement? Fortunately, the amount of acceleration is different from place to place in the Universe. Thus we can try to measure relative motions of adjacent particles as the

wave passes--the waves are said to be deforming space which in turn deforms the mass within space.

To measure the passage of a gravity wave requires equipment capable of measuring displacements of 10^{-16} to 10^{-17} cm.--this is approximately 1/1000th of the diameter of the nucleus of an atom! Is such a feat possible? Well just about. Ten yeras ago, a University of Maryland scientist, Joseph Weber, reported the detection of disturbances in his one ton bars of aluminium designed to observe gravity waves. Using piezoelectric crystals mounted around the huge cylinders, he is able to detect disturbances as small as 3×10^{-15}cm. Using two such bars 1000 km apart, he hoped to record concurrent events at the two stations, thus eliminating the problem of isolating thermal, geological and other sources of vibration in the bars themselves, from the minute vibrations caused by the passage of a gravity wave. He reported detection of several of the hoped for disturbances but others have been unable to duplicate his observations.

He and others are now constructing second generation detectors which it is hoped will be able to detect deformations of the order of 3×10^{-17} cm or 100 times better than Weber's first experiment. The new detectors are of four types:

1) A more massive bar (10 tons) which has been cooled to 4^{o} K will have smaller thermal excitations with subsequent greater ability to pick out gravity waves.

2) A monocrystal can be made of high purity and have a weight of many kilograms. Such a crystal has smaller coupling of vibrations to the thermal motions with resultant greater sensitivity. This method is being attempted by three groups including Weber's.

3) A Michelson laser interferometer is being tried also. A laser beam is transmitted back and forth along two arms by means of pendulum mounted mirrors. Gravity waves will disturb the mirrors causing interference patterns in the combined laser beams.

4) The forth method involves attempts to measure waves of 1 x 10^6 km wavelength (verses 3 x 10^4 km for the above methods) and uses frequency differences in Doppler shifts resulting from measuring the motion of a spacecraft as it moves far out in space. As a gravity wave moves through the Earth and spacecraft, the high precision doppler shift measurements which are made continuously, will show a sudden jump. The method will not be terribly sensitive and will only be able to detect a few of the events available to other methods. It will be in space, however, that we must eventually rely for gavitational wave measurements and this is just the pioneering effort in this direction.

Assuming we can build devices of the desired accuracy (eventually to 10^{-19} cm. deflections), what will we be able to "see"? First, we will be able to "see" into the cores of massive stars before and as the uncontrolled thermonuclear evolution violently disrupts the stars in supernova explosions. Gravitational waves will allow us to penetrate the massive clouds of gasses expanding from the star at the critical times (for instance, remember the expanding shell about the Crab Nebula). We shall be able to study the pulsations of neutron stars, and black holes. However, these events are far between in time within even our massive galaxy--one event in perhaps 10-30 years. To make such expenditures of time and money worthwhile, it will be necessary to be able to detect events in other galaxies. A possibly fruitful part of the sky to concentrate on would be Virgo where a vast collection of galaxies is to be found.

To achieve the level of sensitivity necessary to study the Virgo cluster, a third generation of detectors will be necessary and which will be required to measure deflections of only 10^{-19} cm. This is at the level of accuracy where the Hiesenberg Uncertainty Principle plays a dominent role. This principle states that you are at such a state of accuracy that in simply making the measurment, you disturb the measured object and hence can never find out exactly where it is located. This would

seem to present an insurmountable barrier. But scientists are devious in their means and there are at least two methods which might enable us to surpass this obstacle. In making a measurement, an oscillation is set up. If the period of the oscillation is known, then by taking an observation at the same point in each oscillation, ie. after one cycle, the bar will have returned to the same position as when the first measurement was made. As long as no outside force is acting, the bar will appear to return to this point, but with the passage of a gravitational wave, a jump will be recorded in the measured position. An alternative method which has also been suggested in the last year or so to circumvent the Heisenberg Uncertainty Principle limitations, is to measure simultaneously and continuously position and velocity. This would be achieved by use of transducers which would transmit the observations to a computor. The resultant measured voltages would be mathematically treated to determine position continuously from the accelerations of the body. The proposed methods differ in that one operates continuously while the other is a pulse technique. Which is likely to be successful is difficult to say at this early time. But when we reach the magic 10^{-19} cm. sensitivity, literally a whole new universe will be open to our investigations and we will experience a revolution which may make the Copernican Revolution seem insignificant by comparison.

Bk

FROM the CENTRES

AN INEXPENSIVE SPIDER

Walter J. Campney
Montreal Centre

A short while ago a need for a diagonal holder and spider came up. Since I was short of funds, as usual, I decided to assemble one with the parts on hand.

After a careful survey of the useable material, accomplished by stirring boxes of junk with more junk, I had the beginnings. Truely, old bicycle spokes are versatile items. They have one important feature in addition to being cheap. The end is threaded! Now that I had the struts for the spider it was necessary to find a way to join them to the diagonal. This problem is not as easy as it sounds. First I had to find a way to join the four spokes together. A short period of mental exercise brought about a dubious solution.

I started by turning a piece of aluminum to approximately an inch and three quarters in diameter, and three quarters of an inch thick. The idea was that by drilling four holes on an angle at the four points of the compass, a spoke, bent at the end, would stay put when under pressure. The bend would be at an acute angle so as to hook into a piece of aluminum. By using a piece of scrap to prop up the aluminum disc, I hoped to drill each hole at approximately the same angle. The experiment was not a success. In short, I managed to break off three different drills inside the aluminum.

In preparation for the second attempt it was necessary to remove the broken drills by the judicious use of a hacksaw, followed by a session with a lathe to clean it up. The second attempt went without incident. I then drilled and tapped a 3/8-16 hole in the centre of the piece of aluminum. The bolt to attach the diagonal

holder had to be threaded the entire length, and as none was available I threaded my own. It is locked to the aluminum plate with a nut.

The diagonal holder is a piece of sheet aluminum cut roughtly elliptical and has a tab protruding from the back. This tab was formed by cutting out a rectangle on three sides with a hammer and a chisel, inside the ellipse. A three-eighth inch hole was drilled in this tab, which was then bent back forty-five degrees. The bolt was inserted with difficulty through this hole and fastened securely with a nut. The diagonal is glued to this plate.

To assemble it, I cut the spokes to length and bent them in the proper place. It was then just a matter of screwing the two main parts together and plugging in the spokes.

When placed in the telescope tube, the spokes extend halfway through the wall of the tube. It was then fastened and tightened using the nut which came with each spoke, and four washers.

The whole unit functions quite well except for a slight tendancy to twang along the axis of the tube. Perhaps it would be sturdier with the use of strapping for struts, but I don't care. It performs quite nicely for its cost of $1.80, which includes the replacement of the three drills.

INFORMATION SOUGHT

Several members of the Halifax Centre are very interested in learning about the history of astronomy in Nova Scotia and the Maritimes in general. To this end we are requesting any information you might have concerning the whereabouts of old telescopes or other astronomical apparatus. If possible we would like to have the names of persons associated with the equipment, dates and any other relavent information. Early references to astronomical activities which you might recall would be particularly interesting. Information may be sent to the Editor.

HINTS for TM's

EYEPIECES

One of the most frequently overlooked components of the telescope is the eyepiece. Most astronomers buy theirs off the shelf giving the choice little thought other than the magnification it will yield and the cost. What I'd like to do in this article is to point out considerations to be investigated for choosing one, and how you can determine the focal length and field of view.

To some degree the choice is dictated by your telescope and by your preference for certain types of objects. If you own a refractor, its focal ratio will likely be about f/15. Therefore it will be best suited to planetary observation and you will not need to be concerned about quality of the image to the edge of the field under high magnification. Also with such long focal length telescopes colour correction need not be so rigorous because the lens aberations are less pronounced than in the short f/ratio reflectors. Hence, except for the very high powers (30-40/cm of aperature) a Ramsden will perform well and will have reasonable eye relief. Eye relief is a term used to describe ease of use and this is achieved by having an eyepiece with a wide exit pupil--ie.the diameter of the (almost) parallel rays coming from the eyepiece is large and easily intercepted by the eye fairly close to the eyepiece. Higher power and smaller field of view will result in greater eye strain while observing. For high power a good 3-element achromatic Ramsden (ie. a Kellner) is recommended for colour correction &is needed if a good quality image without distortion is to be achieved without colour fringes around the object.

For reflectors the situation is different because of the smaller f/ratios normally encountered, ie. f/7-9. Here one is more likely to be interested in observing nebulae. A Ramsden will of course give good images near the centre of the field but coma caused by field curvature will cause

star images to become perceptably elongated. By field curvature is meant that the rays focus at different distances from the eyelens of the ocular--ie.as you move your eye off the optical axis, you will have to withdraw your eye slightly back from the telescope to keep objects in sharp focus. A Kellner eyepiece gives a flatter field and for this reason is recommended for low power use (up to 10 x/cm of aperature). For higher powers, the orthoscopic eyepiece should be your choice. It is free from colour distortion, has a moderately wide field of view with flat field. One other type of lens should be mentioned but unless you are using a short f/ration instrument under high power, it is doubtful whether the expense will be worthwhile. It is the Erfle eyepiece. Because of its very wide field (70^{o}), it will give very wide angle ($2-3^{o}$ or more) views through an f/6 or shorter f/ratio telescope. Marvelous for comets and very extended objects--but expensive! Finally, avoid Huygenian eyepieces except for use in guide scopes where a cross hair is required and ensure that every ocular you buy or make has a field stop diaphram. Without it, a lens is improperly made and views with such a lens will be disappointing. Use eyepieces with focal lengths less than 8 or 9mm sparingly, if at all.

Once you have a new lens in hand, you should immediately determine its focal length and field of view. The determination of the field of view when used with your telescope is easy. Observe two stars, one near the celestial equator and one at higher declination, δ ,but both near the meridian. Place one of the stars at the east edge of the field with motor off. Determine the time for the star to disappear at the west edge to an accuracy of ½ s. Ensure the star passed through the centre of the field. Repeat for the second star. The field diameter is found from:

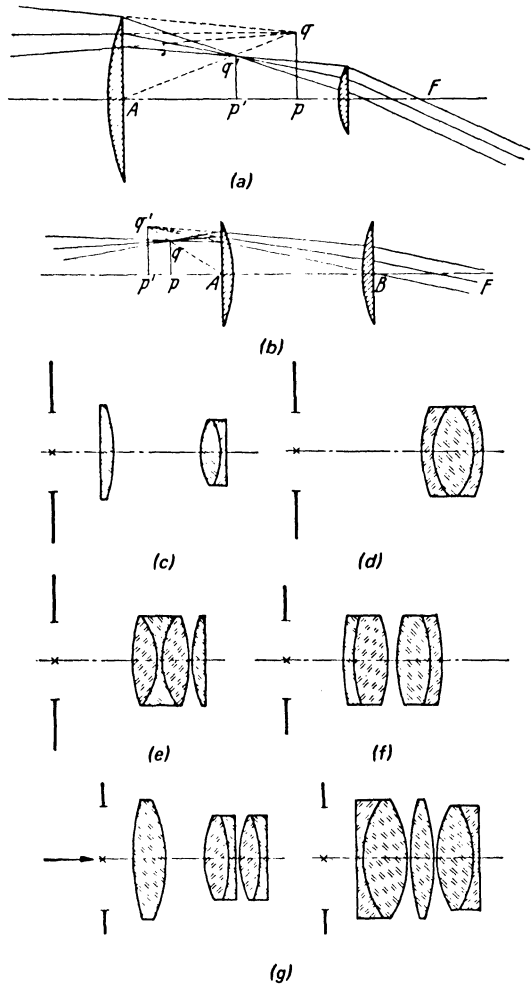
$$d = t \cos \delta/4 \qquad \text{(t in solar seconds)}$$

For fields of 5^{o} or more a slightly more accurate formula is:

$$d = \arccos[1 + \cos^{2} \delta (\cos t - 1)]$$

(t in sidereal seconds)

Timing to an accuracy of ½s. yields a field diameter



(a) The HUYGENS eyepiece. (b) The RAMSDEN eyepiece. (c) The KELLNER eyepiece. (d) STEINHEIL's monocentric eyepiece. (e) ABBE's orthoscopic eyepiece. (f) PLÖSSL's orthoscopic eyepiece. (g) The wide-angle eyepieces designed by ERFLE with 70° field of view. From *Handbuch der Astrophysik*, Vol. 1, pp. 151–153. Berlin: Springer, 1931.

accurate to 0.1' !

Several methods are available to determine magnification but the following is one of the simplest. Set the ocular in a horizontal plane looking out a window. Place a 1.5 meter board at the same level about 1 meter from the eyepiece and at right angles to the optical axis. Now with your eye close to the board, move to one side noting the position where no light reaches your eye through the eyepiece and mark this point A on the board. Repeat on the opposite side of the optical axis, marking this point B. Then the distance A to B is:

$$AB = 2y$$

x is the distance from the plane of the exit pupil to the board. The exit pupil is, in most lenses, very close to the eyelens of the eyepiece and measurement from this point will be adequate, but you can estimate its actual position a bit more accurately by finding the position of your eye from the ocular when viewing--have someone estimate the eye-lens distance when you are looking through the telescope and when your eye has the least strain. The exit pupil may be as much as 1 cm back. The apparent field of view, a, is:

$$a = \arctan (y/x)$$

and the magnification is:

$$m = a/d$$

If the focal length of the telescope is known to 1mm, then use

$$f = F/M$$

to determine the effective focal length of the eyepiece f, to an accuracy of 0.1 mm.

If you intend doing any serious observing of lunar phenomena, variable star observing, solar, planet or comet patrols, then it is essential to have accurate knowledge of the physical parameters of your telescope and accuracies. And anyway, its just fun to determine them for yourself.

Bk

From: THE STAR-SPLITTER

By: Robert Frost

'You know Orion always comes up sideways.
Throwing a leg up over our fence of mountains
And rising on his hands, he looks in on me
Busy outdoors by lantern-light with something
I should have done by daylight, and indeed,
After the ground is frozen, I should have done
Before it froze, and a gust flings a handful
Of waste leaves at my smoky lantern chimney
To make fun of my way of doing things,
Or else fun of Orion's having caught me.
Has a man, I should like to ask, no rights
These forces are obliged to pay respect to?'
So Brad McLaughlin mingled reckless talk
Of heavenly stars with hugger-mugger farming,
Till having failed at hugger-mugger farming,
He burned his house down for the fire insurance
And spent the proceeds on a telescope
To satisfy a life-long curiosity
About our place among the infinities.

. . . . .

He got a good glass for six hundred dollars.
His new job gave him leisure for star-gazing.
Often he bid me come and have a look
Up the brass barrel, velvet black inside,
At a star quaking in the other end.
I recollect a night of broken clouds
And underfoot snow melted down to ice,
And melting further in the wind to mud.
Bradford and I had out the telescope.
We spread our two legs as we spread its three,
Pointed our thoughts the way we pointed it,
And standing at our leisure till the day broke,
Said some of the best things we ever said.

Contributed by Roy Bishop

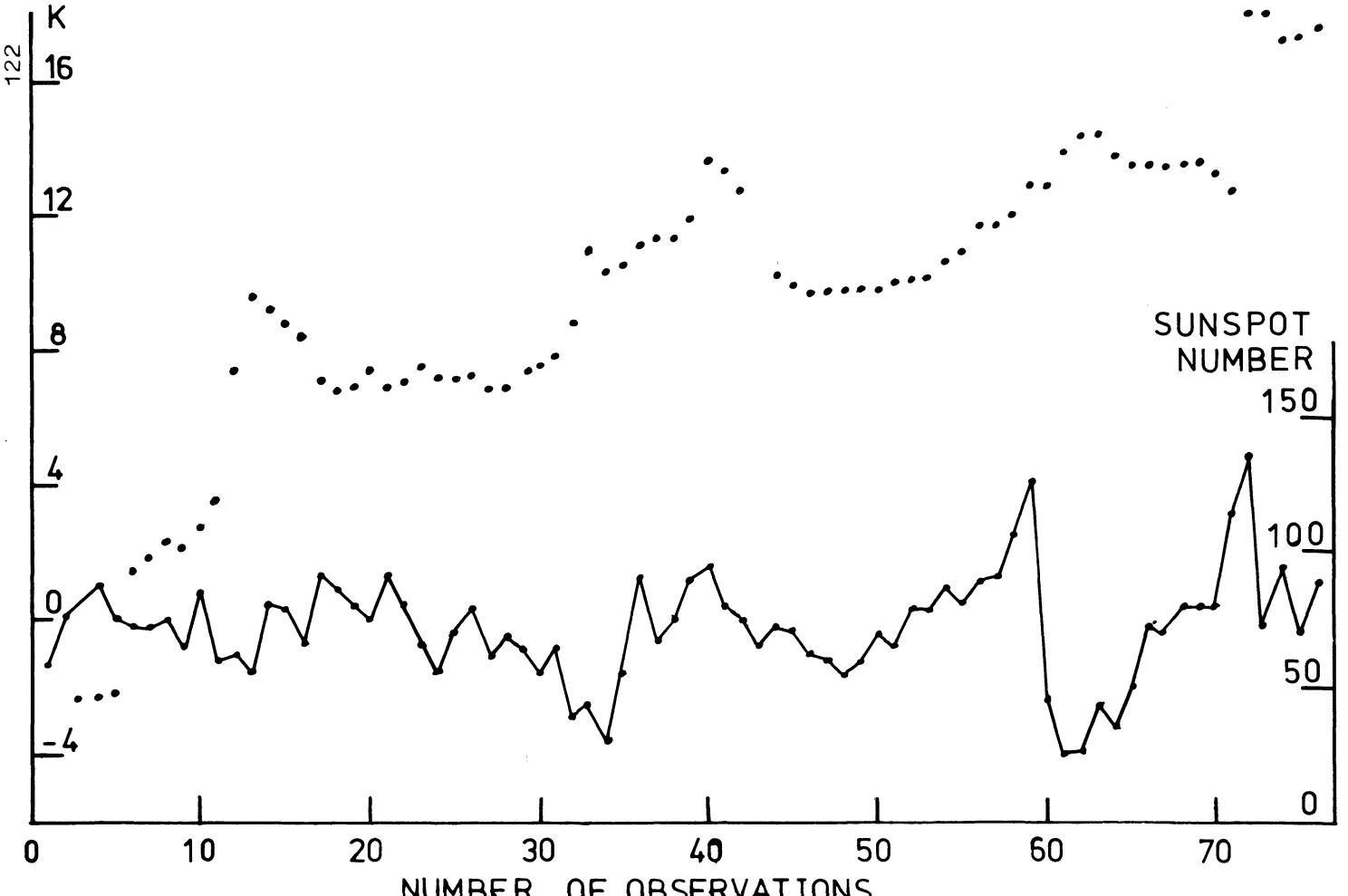
SOLAR OBSERVING

Steven Morris

Did anyone notice the naked-eye sunspot around July 18? It was easily visible to me in the evening haze that hung around London, Ont. during a three week heat wave that we were having here. Your intrepid solar observer is on vacation for the rest of the summer, and does not have access to a telescope suitable for solar work. I have been reduced to naked-eye observations and analyzing my collected data (seventy observations in the last five months).

You may recall, a few issues ago I posed the question, "What is the best value of 'k' in the sunspot equation, 'sunspot number = number of sunspots + k times the number of groups'?" My answer was "The best k is the one that keeps the calculated sunspot number from fluctuating very much". I derived a mathematical expression for this, and found a value for k close to 10, which is the value of k that everyone uses. I noted at the time however, that k might change wildly as the number of observations increased. I have since confirmed that belief as shown in figure 1. This figure shows two curves; the sunspot number and the best value of k derived from all preceding sunspot numbers. The best value of k seems to be mounting upwards, with no evidence of leveling off. It may take hundreds of observations for this curve to level off; perhaps the AAVSO solar data could be used to evaluate this. The jumps in the best value of k seem to correspond to times of large sunspot number. As the sunspot numbers are expected to increase in the coming years, we may find the best value of k becoming very large indeed. If k becomes much larger than 25, you might as well just count the number of groups and forget counting sunspots. I hasten to add that my results are of a very limited nature, and in any case there are other criteria for finding k than the method I have used.

I shall be back at the telescope in Sept. and shall resume my watch on Hyperion's orb. If any RASC members have been observing the Sun, bring your observations to the Sept. meeting and show them to me.


K
16
12
8
4
0
-4
SUNSPOT
NUMBER
150
100
50
0
0
10
20
30
40
50
60
70
NUMBER OF OBSERVATIONS

The CAMPING/OBSERVING WEEKEND

Michael Edwards

The annual Camping/Observing Weekend of the Halifax Centre was again held in the Blomidon area of the province. All the advertised functions, and more, took place, with the exception of a walk to Cape Split, the Friday Observing session and the main observing competition on Saturday evening. However members did receive a demonstration in the art of search and rescue in what had the potential for tragedy. Our next Camping/Observing Weekends must be more controlled.

As a former Observing Chairman, I could understand the thoughts of Jody LeBlanc as the skies opened over Halifax at about 3 pm on July 28th. Some hardy souls ventured to the camping grounds at Blomidon Provincial Park only to wonder where it was for the fog. Most arrived Saturday morning. The RASC cavalcade left the campground for the Look-Off to meet our tour leader, Roy Bishop. After a brief stop to admire the scenery, it was off to Black Hole, not knowing whether we would return or not. The accompanying photograph shows the brave group in front of Fred and Martha's home. I wonder what they thought of us? We were surely the most people seen at one time in that area. Following a picnic lunch, it was off to explore Black Hole. Did you know that it is possible to live in a black hole? There is even a water fall, brook and many caves to explore.

After the evening meal back at the campground, the cloud moved in once more. After becoming tired from frisbee throwing, a length of rope was brought on the scene. By the way, the executive (missing the V-P and Treasurer) defeated everyone else though not by much. After screwdrivers were lost and knees twisted by this savage type of "fun", most returned to the campfires for tales of the comet that got away before being catalogued. Sunday resulted in an afternoon drive home rather than the intended walk to Cape Split as most were too tired from the previous day's activities and early morning walks on the park's trails.

Quote of the day: (as Glen walked out of the woods) "Mr. LeBlanc, I presume?"

Photo by Bill Calnen

WHAT'S THAT STAR UP THERE or,

Lost Without a Chart

Michael Edwards

Have you ever started looking for a deep sky object where you thought it was only to become frustrated, confused, puzzled, and when the scanning method failed, angered and then more determined to find the object? Sure you have! And then on the way to telephone Brian Marsden to report the lost object, you thought you had better check out the charts first, so as to substantiate your unique discovery. (You didn't doubt your find but you didn't want to waste the telephone dime.)

Frequently when you become determined, the short look at your favorite object on a clear evening has turned into a major observing session as you march inside (destroying all dark adaption) to retrieve a set of charts. One quick glance at the charts then enables you to cement the object's position firmly in your mind. Back to the

telescope. "OK there's that star, and that one...it should be over about this far...or maybe that's too much, alright it's about here...WHERE...What, NOT THERE? IMPOSSIBLE! I should have brought out the chart I guess", might be the run of the one sided conversation.

Charts for use at the telescope can be subjected to many extremes of our environment. Dust, dew, wind, snow and of course, light pollution. Therefore they must be rugged. When selecting a chart, consider which of the extremes to which you will be subjecting the charts. You must also, of course, consider the type of observing you plan to do and the intended location of observations for consideration of magnitude visible from your location. If a good distance from city and container pier lighting, a set of charts to the 12th to 14th magnitude might be advisible. But if viewing is usually restricted to the city viewing, charts to the 9th or 10th magnitude will probably prove quite sufficient. No matter what the location, if outdoor use is planned for the new charts, a type of plastic protective coating is a must. Single charts of a set should also be protected so as to prolong the life of this tool of the trade.

Image scale is another important consideration when purchasing the charts. This too depends upon the type of observing equipment you plan to use. A fairly large scale is acceptable if you are using binoculars, whereas if using a 16" telescope, a smaller scale giving a larger distance between even the faintest stars would be necesary.

A good source of a selection of sky charts and other astronomical publications is the library of the Halifax Centre. One book in this library is itself an ideal source. This is the catalogue of Sky Publications of 49-51 Bay State Road, Cambridge, Mass., 02138 and is called "Scanning the Skies". There are also several star atlases which may be borrowed and which might help you to make a choice for the purchase of a set of charts. But once you have them, and once you have intently searched for and found a missing object, get to the telephone and spend that dime letting Brian Marsden know about the object you have lost...that is if someone else hasn't done so while you were checking the charts.

FUMBLING THROUGH FALL SKIES

Comfort should be foremost in every person's mind when they go out to observe. It should be of little more discomfort than sitting down and turning on the boob tube and it can be so or it can be one of the most frustrating and uncomfortable experiences . I've seen people who after a mere half hour of cursing at a mount that isn't working properly are cold, damp, disillusioned and thoroughly discouraged by the whole business. As I said before, it need not be so!

No one can enjoy themselves if they're getting frostbitten, but with the proper battery of sweaters, pants, gloves, hats and scarfs, the cold can have little effect even upon the most sensitive of people. A hot beverage also does a great deal as a warmer-upper at an observing session. It is also very hard to enjoy yourself if you have to observe with your neck kinked at a 90° angle. However, most everyone has some sort of chair that properly cushioned will make a very comfortable observing chair. Anyone who saw me at the Perseid Observing session at Ridge Park in Wolfville with my foam rubber mattress knows to what extremes I carry this craving for comfort and although it drew a few curious glances (and sneers), I believe I was probably the most comfortable and contented person there (I didn't do so badly myself; I fell asleep during cloudy intervals--Ed.)

It is not necessary to carry it to such extremes but at least when you're at home observing you should make yourself at home. Even little things like having a radio to listen to and putting on that extra pair of socks will go a long way towards making your next observing session a huge success, because as everyone knows, cold feet cause discomfort and discomfort can give some people cold feet towards astronomy.

What to observe? Well, you might be interested in the following: 26 Sept. will see a grazing occultation for observers near the 45° parallel; there are several reliable meteor showers; and if you've never observed a variable star why not find Beta Lyrae (bottom star in the parallelogram of the constellation Lyra with Vega, the brightest star in the northern half of the celestial sphere, in the top corner).

Glen Graham

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