NOVA NOTES

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1979 Halifax Centre Executive

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(please see note below)

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The Obituary Notice of Father Michael Walter Burke-Gaffney, S.J. will be found in the February issue of the Journal, RASC. Our group owes a great deal to his efforts and it was with sadness that we learned of his death on 14 Jan.

UP COMING EVENTS:

Friday 16 March at the Nova Scotia Museum, Summer St.

Speakers: R.L. Bishop, R.C. Brooks and Wm. Calnan

Topic: Astronomy in Nova Scotia to 1900

The research of the three speakers has turned up a much richer heritage, astronomically speaking, than one would ever suspect. The activity was largely associated with navigation and hydrographic surveys in a day when astronomy was the only way to determine your location on sea or land. The French, and later the English, undertook comprehensive surveys of the province and surrounding waters leaving behind a string of observatories established by such men as de Chabert, DesBarres and Holland. In the 19th century, Halifax saw the establishment of several transit observatories which were operated as part of businesses. Halifax and Cambridge, Mass. were, in this century, connected by telegraph in the first international attempt to directly compare longitude, and Canso was part of a network for a similar purpose in 1892. Colleges also established observatories at the end of the period and a number of artifacts from these are still extant and can be found in:

The Annual Societies Show of the Nova Scotia Museum

The Show runs from 3 March to 16 April and the theme for our Centre's display is the History of Astronomy in N.S. We have collected together quite a number of old instruments associated with astronomy and navigation to demonstrate the development of the tools of "practical" astronomers. We think you will find them interesting and very pretty to look at. Some of the instruments date to the 18th century and some can be bought tomorrow. Why not drop in and browse around our display and those of the Gem Soc., Heritage Trust, Weavers Ass'n, etc. Save March 16th for the associated special meeting noted above.

Annual Centre Dinner

Our second annual dinner is scheduled for 20 April. The details have not been finally set, however, it will begin at 7:00pm and will cost $8.00. Your tickets will be sold at the March meeting--as you would expect, it is necessary to give the restaurant an accurate estimate of the number attending. After dinner we will have a Members Night where you are invited to bring your favorite slides, home movies, etc. as long as they vaguely relate to astronomy. Don't forget to mark off the calander now for the Friday 20 April Dinner! FLASH! It's at CHINA TOWN!

Observing Sessions

If you miss a meeting but want to know when the next observing session is to be held, call Jody LeBlanc at 443-9509.

Library Notes

We have a new Librarian, Brian Guest. He fills the vacancy left by Diane Brooks' move to Vice-President/ Secretary. If you're looking for a particular book or one on a specific topic consult Brian and the card index. We have about 100 volumes and a number of magazines. James Gall of Gall Publications in Toronto has donated a copy of the Astronomical Directory. If you're looking for information on any astronomical organization or any business associated with astronomy, this book has it!

Minutes of the January and February Meetings

The monthly meeting was held on January 19 at the N.S. Museum. The president announced the death of our honorary president, Father M.W. Burke-Gaffney, on Jan. 14. The observing chairman brought to our attention that Pluto moves within Neptune's orbit on Jan. 20. The Simon Newcomb Award, constructed by Randall Brooks, Mike Edwards and John MacNeil, was unveiled.

The speaker for the evening was Dr. David Tindall and his topic was "Eclipses Past and Present". Dr. Tindall gave a very interesting talk on the mechanics of and historical references to solar eclipses, illustrated by diagrams of lunar aspects and motions, maps for the paths of totality of eclipses belonging to the same saros series (saros series refers to a group of eclipses with similar lengths of totality), photographs of the 1972 total solar eclipse as viewed from Arisaig, N.S., and maps of the path of totality for the February 26th eclipse. He provided the audience with a sheet of data for the latter eclipse visible in its partial aspect from N.S. He reminded us that the next total solar eclipse visible from any Canadian province will be in 2024. However, there are three eclipses visible elsewhere in North America before then: 1991 in Mexico, 2008 on Baffin Island, and 2017 in the U.S.A. The meeting closed after refreshments.

The February meeting took place on the 16th at the N.S. Museum. Dr. Steven Boulton presented a most informative and richly illustrated talk entitled, "The Other End of the Telescope". His presentation dealt with the eye as a lens and its application to astronomical viewing.

The seven and one-half gram human eye is a superbe mechanism if treated with care. Without a smoothly operating lens, the eye will not focus properly, and the ability to focus on close objects decreases with age. The cone cells are sensitive to colours, while the rod cells are responsible for light sensitivity. Steve suggests that a simple method for preserving your night vision is to cover the eye which is favoured for observing when you must be exposed to light. This enables you to find those star charts while maintaining your dark adaptation. A red cellophane covering over your flashlight is effective because the rods in the eye do not respond well to red light.

Resolution is the important factor for achieving naked eye observations of the Galilean satellites. Callisto is 10' of arc from Jupiter and should be resolveable. It is the scattering of light from the planet which usually blocks out the moons. The next time you're testing your eyesight on Jupiter's moons, orient yourself so that Jupiter is behind a telephone wire.

Looking directly at the sun results in a thermal burn to the retina, which produces a permanent fuzzy spot in the centre of vision. For solar observations, Steve recommends a double thickness of fully exposed black and white film, welders' glass, projection, a sextant, or that old stand-by, TV.

Before the audience dispersed for refreshments, Roy Bishop treated us to a brief movie of the 1970 solar eclipse and a tape recording of the animated conversation just before and during the 1972 eclipse. For those of us not able to view the upcoming eclipse, Roy's presentations conveyed something of the excitement produced by this event.

Diane Brooks
VP/Secretary

ASTRONOMY

The science of Astronomie
I thinke farto specefie,
Withoute which, to telle plein,
Alle othre science is in vein
Toward the scole of erthi thinges;
For as an Egle with his winges
Fleth above alle that men finde,
So doth this science in his kinde.

John Gower, c. 1390 A.D.
"Confessio Amantis"

The Time Machine

Nearly a century ago H. G. Wells wrote that classic of science fiction "The Time Machine", an account of the adventures of a man who devised a machine of brass and crystal which could transport him forward or backward through the fourth dimension: time. A decade later and with profound insight Albert Einstein noted that the structure of space and time actually does possess the flexibility necessary to allow one half of Wells' fantasy: it is indeed possible to travel into the future. As in Wells' novel, one's own clocks continue to eat time at an unchanging rate; nevertheless the clocks of others will spin wildly into the future for he who takes a high speed return trip. The technology required to transport a man a significant way through time goes far beyond that of Wells' "glittering metallic framework". Even NASA's expertise is too primitive to produce the Wellsian machine that Einstein's equations permit, although atomic clocks have measured the effect at the feeble speeds of jet planes.

The other direction for Wells' time machine —— backward, into the past —— has two facets. The direct travel of an observer into the past as in Wells' novel is inconsistent with the second law of thermodynamics, not to mention basic logic of cause and effect. The arrow of time can be altered in length, but apparently it cannot be reversed in direction. The Persian astronomer-poet Omar Khayyam has described the unidirectional arrow of time in these words:

> The Moving Finger writes; and, having writ,
> Moves on: nor all your Piety nor Wit
> Shall lure it back to cancel half a Line,
> Nor all your Tears wash out a Word of it.

that the guiding waves arrive constructively at the foci. A converging lens is thicker toward its center in order to retard rays on the more direct paths. The mirror of a newtonian has the shape to provide the same time to a focus as rays would require to reach a plane normal to their initial direction: the locus of such a figure is a paraboloid. The elegantly simple but painstaking Foucault test is in essence a means of determining that a mirror provides equal times for incident light to a precision of about 10^{-16} of a second, the time for light to travel a small fraction of its wavelength.

Man has looked back to the creation. He has learned to extend his vision with isochronal frameworks of metal and glass. If he survives his own follies, one day he will doubtless have the technology to make half of Wells' time machine a reality. I for one, however, would not buy a one-way ticket into the future.

Roy L. Bishop
Maktomkus Observatory

The Bird of Time has but a little way
To fly — and Lo! the Bird is on the Wing.

Omar Khayyam

The other facet of entry into the past has been before us for three centuries, ever since Römer used the Galilean moons to establish that the speed of light is finite: we always see other objects as they were at some time in the past. Ironically, the equations of relativity which point the way into the future also tell us that within our own reference frames we must invariably view the past since no signal can exceed the speed of light. The much slower ion pulses along the cell membranes of the human brain insulate us from the short steps into the past associated with daily affairs. Even conversations relayed from synchronous satellites seem instantaneous. However, at the distance of our Moon and beyond, the times required are longer than those for our thought processes. We view our Sun as it was eight minutes ago, and the hot stars of Orion as they were at the fall of the Roman Empire. The myriad stars in the vault of a summer night are sprinkled across the entire time span of civilization.

The astronomical telescope is the nearest we have yet come to realizing Wells' time machine of brass and crystal. A telescope multiplies the detail, the number, and the distance of events in the past which can be viewed by man. An amateur's 20 centimeter mirror will reveal the Virgo cluster in the eocene epoch, the quasar 3C-273 in the pre-cambrian era. The glass giants of Palomar and Zelenchukskaya reach back before the birth of the Solar System. The ultimate time machine was that of Penzias and Wilson with which we first viewed the glow of the creation of the Universe itself.

An image forming optical system such as an eye or a telescope is a time machine in a subtle way as well: all the paths taken by light rays in tumbling through its optics to a point in the image are paths of equal time. This ensures

ASTEROIDS AND COMETS--THE PLANET THAT WAS?

As long ago as 1801 the German astronomer, Heinrich Olbers suggested that the asteroids originated from a shattered planet that once made its orbit between Mars and Jupiter. Lagrange later added that comets could possibly have had the same origins in a planetary explosion. I think every school pupil has heard this idea at some time or other.

Now T.C. Van Flandern of the US Naval Observatory has provided some fuel to the discussion of this possibility in a recent issue of Icarus. He analysized the orbits of very long period comets and suggests that they originated at the same time some five million years ago. If they were fragments of a catastrophic explosion, then the long period comets observed in recent times were those fragments which marginally failed to escape the solar system and are now seen on their first reentry. Since this is their first reentry, they have thus far escaped the perturbations or pull by larger planets such as Jupiter and Saturn and retain their original orbits. Other bits of matter either escaped the Solar System or have been perturbed or shifted into short period asteroids or comets.

Computor models of the Solar System constructed by Michael Ovenden of the Univ. of British Columbia tend to support the idea. He has found that the inner planets became stable in their orbits while there was a massive (90 x's the Earth's) planet in an orbit between Mars and Jupiter. Presently, there is only one thousandth the Earth's mass in the form of asteroids, comets and meteors, mainly in the asteroid belt. This suggests the explosion would have been very violent and released great energy sweeping most matter to interstellar space with much of the remaining matter being swept up by the other planets.

What evidence is there for such an explosion? Well, some debris may have found orbits about planets...for instance Phobos fits this description in its shape and in the fact that its orbit is unstable and will strike Mars at some point in the future. Comets and meteors could constitute debris and the meteoric origin of tektites is cited as possible evidence. The latter are the small glassy particl found on Earth, mainly in Australia and southeast Asia. One of the more dramatic effects Van Flandern suggests may have effected Earth, would have resulted from the influx of water vapour. This vapour would have triggered off the series of ice ages which began a few million years ago. He also suggests that Jupiter's red spot may be a result of this supposed planetary breakup. What was the cause of the explosion?..well, he has no idea but thinks the event would have outshone the Sun temporarily. 5million years ago.

Personally I think this is VERY weak evidence. The consequences of such an explosion in the inner Solar System would have been tremendous and there is certainly no evidence of a sudden increase in meteoric impacts in such recent times on the Earth. The suggestion regarding the red spot of Jupiter seems to be off base as well. Finally, anyone who has tried to analyze cometary orbits for nearly parbolic examples, will tell you of the inadequacy of the observations. In fact, there is a significant portion of comets for which we cannot say if they are periodic or just chance passers-by of the Solar System, and it is with these cometary orbits Van Flandern is working. Most astronomers will need much more convincing about this suggestion.

SATELLITES FOR SATURN

1979-1980 is a period when Saturn will cross the plane of the Earth's orbit. This means that the rings will present a thin line as we look at the system edge on. The last time this occurred was 1966 when the Earth passed through the rings' plane two or three times in a few weeks. At that time, A.C. Dollfus discovered the tenth moon, Janus. It is the inner most of the planet's moons and is only 175 km in diameter. This year's passage through the plane may well add one or more moons to the lists found in the Observer's Handbook. Apparently, it is possible that bodies may lie between the outer ring (A) and Mimas, the second most moon from Saturn. Evidence from old photographs confirms this optimism.

Saturn will soon be up at reasonable hours. Why not drag that dusty telescope out and watch the rings disappear in the next few months? Don't bother to strain your eyes in the hopes of discovering a new moon about Saturn, however, that's best left to the big mountain-top observatories such as Pic du Midi where Dollfus works.

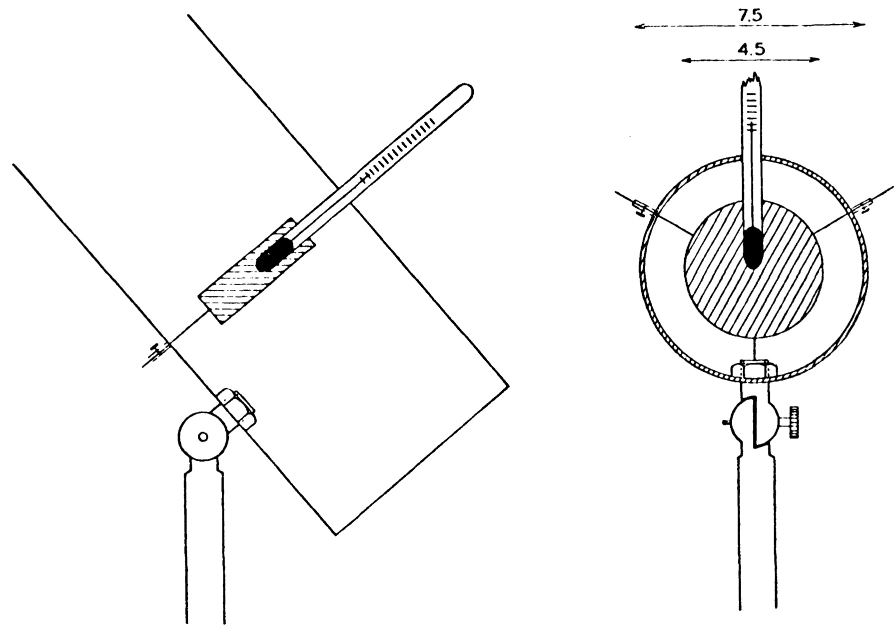
ASTRONOMY for YOUNG RASCals

DETERMINING THE SOLAR CONSTANT

The Solar Constant is the term used to express the amount or flux of energy falling on the upper layers of the Earth's atmosphere. In this experiment we wish to measure the quantity using a "pyrheliometer" similar to one used by Abbot in which he used a silver disc to absorb the radiation. You can use either a brass or lead disc and thermometer for your pyrheliometer. The measurement will be,with care, within an order of magnitude of the correct value.

Setting up the pyrheliometer:
Make a disc of brass 4-5 cm in diameter and about 1 cm thick. In the side drill a hole just large enough to insert a thermometer with gentle pressing and rotating-- be careful not to break the thermometer and it is a good idea to wear gloves while inserting the thermometer. This disc and thermometer are to be placed in a tube of cardboard and suspended in the centre. The back end of the tube is to be covered with a piece of wax paper. Now place the device on a camera tripod and locate outside away from walls and other sources of reflected heat. Point the pyrheliometer in the direction of the Sun but cover the end of the tube so the Sun's rays do not start to heat the disc. Record the time and determine the angle of the Sun from the zenith by using a rod stuck in the ground. Measure the height of the verticle rod AB and the length of the shadow AC. Then AC/AB = sec Z (Z = zenith distance).

Point the instrument at the Sun quickly checking that the shadow of the disc is concentric with the tube on the translucent paper on the back end. Cover the tube with a dark screen protecting the pyrheliometer from the Sun. Begin the readings by recording the temperature at 30 sec.



intervals. Read the thermometer to tenths of degrees. Immediately on making the reading at 3 minutes, remove the screen and again take the temperature at 30 sec intervals for 3 minutes. At the end of this period, cover and repeat the measurements in shadow.

This series of observations should be repeated at hour intervals throughout an afternoon.

You will notice that the first observation at 30 sec. does not show the same rise as the following measures. Therefore, ignore this value. The reason for this behavior is the effect of conduction of heat in the disc and other inertia effects. Neglecting this point, we compute the mean rise per minute.

a) during the first shadow period (s_o)

b) during the sunshine period (s)

c) during the second shadow period (s'_o)

The influence of the surroundings, apart for sunshine, is given by $(s_o + s'_o)/2$ and may be either positive or negative. The corrected temperature increase per minute in the Sun is:

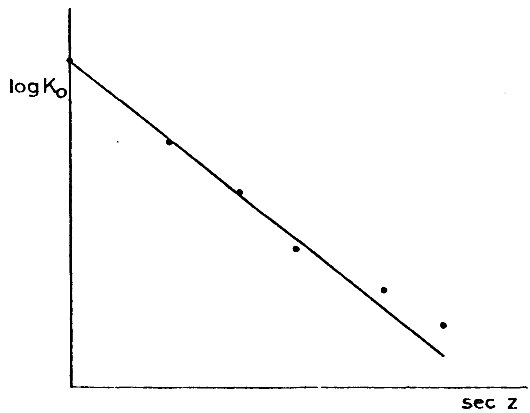
$$S = s - (s_o + s_o')/2$$

Now, it is necessary to compute the calorimeter constant:

$$G = \frac{\text{specific weight x specific heat x volume of disc}}{\text{irradiated area of disc}}$$

For brass, the specific heat and weight are 0.093 and 8.5
For lead, specific heat and weight are 0.031 and 11.3 resp.
The smaller G is, the more sensitive the pyrheliometer.
The increase of S degrees per minute corresponds to an amount of K = GS calories min^{-1} cm^{-2}.

If the atmosphere did not attenuate the radiation, K would be the Solar Constant we are looking for. However, the measurements made throughout the afternoon show the effect of longer light path through the atmosphere. We must correct for this influence by the following method. Plot the values log K vs. sec Z (the zenith distance angle) for each series of observations. The diagram will look like this...



We draw the straight line which most closely passes through all the points extending the line to zero air path. This point gives the Solar Constant K_o and as well the extinction coefficient A if it is desired. Extinction is not the same for all wavelengths, so use of a straight line is not strictly justified. Correct extrapolation would increase K_o by about 10%.

K_o is 1.95 calories/minute. How did you do? Can you think of ways to improve your equipment or technique?

HINTS for TM's

ED. NOTE. Something different for "HINTS" this time... The following was found in the Royal Society's publication Philosophical Transactions for 1770. Mr. Short was the most eminent telescope maker of the mid-eighteenth cent. He specialized in Gregorians and many examples are still available from antique dealers at high prices today.

LXVIII. *A Method of working the Object Glasses of Refracting Telescopes truly spherical. By the late Mr.* James Short, *F.R.S.**

Read Jan. 25, 1770.

PREPARE two plates or tools of brass, the one convex, and the other concave, being both portions of a sphere of the same radius as the focal length of the object glass you want to have, or rather of a radius somewhat longer than the focal length you want, for a dioptrical reason; let these plates or tools be between two and three times the breadth of the object glass desired; or, in long focal lengths, twice the breadth will be sufficient: let these tools be of a sufficient thickness in proportion to their breadth or diameter, and let them be ground with fine emery exactly true to one another, working them alternately, the one above the other, to preserve the same focal length; or, if it is desired longer, you must work the convex above the concave; or, if desired shorter, you must grind the concave above the convex.

After this, you prepare another brass-plate or tool, of the same breadth and thickness as the two former,

* This paper, which was delivered, sealed up, by Mr. Short, at the Society, on the 30th of April, 1752, was, after his death, opened by the Council, and ordered to be printed.

and of the ſame radius of concavity; its being truly turned on a lathe will be ſufficient for this purpoſe; which tool is to ſerve afterwards for the poliſhing of the two ſurfaces of your object glaſs, and therefore called the poliſhing tool.

Prepare a piece of ſtraw-coloured glaſs, of the plate glaſs kind, of the proper diameter for the object glaſs you deſire, which ought always to be broader than the proper aperture for that length; let this piece of glaſs be ground flat, in another tool, on both ſides, and as nearly parallel as may be, and ſomewhat poliſhed, in order to diſcover whether there are any veins or flaws in the glaſs. When you are ſatisfied of the goodneſs of the glaſs, you are then to prepare a handle to faſten your glaſs to. Great care muſt be taken in this, for fear of bending your glaſs by the handle; my method is this; I take a flat piece of braſs, or rather of the concavity of the ſphere, to which the glaſs is to be ground; this piece of braſs ſhould not be thicker than $\frac{2}{3}$ of the thickneſs of the glaſs, of a circular form, leſs in breadth ſomewhat than the glaſs itſelf, and having ſides of the ſame form, at right angles to the flat piece of braſs, and theſe ſides ought to be of ſuch a ſhape as that the fingers may eaſily apply to it in working, and theſe ſides ſhould be as low as may conveniently be, and no thicker than about [illegible] of the glaſs. This handle is to be faſtened to the glaſs, by warming the glaſs and handle gently before a fire, and laying ſome pitch upon the glaſs thus warmed, till it becomes ſoft like melted wax; and then laying your braſs handle, a little heated, on the pitch, you preſs it a little, till you are ſure there is nothing between the

glaſs

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glass and handle but pitch; you then lay down the glass and handle upon something flat, taking care that the handle is in the middle of the glass, till it is entirely cold. It is very material to know, that the pitch, to be used for fastening the handle to the glass, must be soft pitch, that has never been used, nor melted; for any other pitch will infallibly bend the glass.

You then grind your glass in the concave tool with emery, and give it the proper figure and smoothing for the last polish in the common manner.

In order to give your glass the last polish, which is the most difficult part of the whole work, you are to prepare some pitch for covering the before mentioned polishing concave tool, which is done in this manner: Take some pitch, and melt it in an iron ladle, and let it boil for a quarter of an hour or thereabouts; by this boiling, the pitch, when cold, will become hard and brittle; or you may shorten this operation, by melting equal quantities of pitch and rosin, and then there is no occasion to let it boil so long. Your pitch being thus prepared, you again melt it, and take it off the fire, and let it stand till the pitch becomes pretty cold, or of a thickish consistence; and having warmed the polishing tool a little, to make the pitch stick to it, you pour out of the ladle upon the polishing tool as much of the pitch as you judge will cover the whole tool, when spread out, to about the thickness of 1/[illegible] of an inch; you then invert this tool with the pitch upon it, and press it upon the convex tool, which must be quite dry, clean, and cold, in order to give it the figure of the convex tool; in case it has not spread out so as to cover the whole surface

of

of the polishing tool, you warm the pitch by holding it before the fire, and pressing it upon the convex tool, as before, till it has entirely covered the surface of the polishing tool; you then plunge it into cold water, till the brass is quite cold.

N. B. In order to know if your pitch is hard enough, you press the edge of the nail of your thumb upon it, and if it receives an impression, the pitch is not hard enough.

You then proceed to prepare this polishing tool, for the last polish of your glass, by grinding this polishing tool upon the convex tool with pretty coarse emery, and a small quantity of water, in the common way that tools are ground one upon another; but this must be done only for a small space of time, and the polishing tool must have no other pressure than its own weight, for fear of some of the emery sticking in the pitch, and you must never allow the emery to grow dry; when you have ground the pitch so as to be all over of the same colour, you then wash the pitch from all the emery with a brush and clean water; after this you take a bottle of water, and holding the pitch tool in a sloping position, you pour water out of the bottle so as to fall upon every part of its surface.

You then place the polishing tool in a horizontal position, and you put upon it some putty, washed from all its gritty particles, but it need not be the finest washing, and you put a good deal of water upon your polishing tool, mixing the putty and it together, and you polish your glass upon this pitch polisher in the common manner of polishing glasses.

After

After you have poliſhed your glaſs about ten minutes, you again grind your poliſher upon the convex tool with emery, as before, for fear the pitch has, by working, loſt any of its proper figure; and the oftener you do this, the truer will be the figure of your glaſs; and in this manner you proceed till the glaſs is quite poliſhed.

You then take your glaſs off its handle, by holding it before the fire, till it is ſo warm that you can ſlide the handle off the glaſs; and whilſt the glaſs is warm, you take off as much of the pitch as you can with the ſharp edge of a knife; you then lay the glaſs down to cool, and, when quite cold, you drop ſome ſpirits of wine upon it; and this, with a cloth, will wipe off the reſt of the pitch.

You then examine the center of the ſurfaces of your glaſs; and if it lies to one ſide of the center of your glaſs, mark that place with a ſpot of ink, and then put on your handle as before, upon the ſide that is now poliſhed, with its center over the ſpot of ink, and grind your glaſs as before, till the circular remaining part of the glaſs to be ground is as much diſtant from the center of the glaſs on the other ſide from the ſpot as the ſpot was from the center of your glaſs; you then by heat return your handle to the center of the glaſs, and proceed to grind and poliſh this ſide of the glaſs as before.

N. B. The concave and convex tools ſhould be ground with fine emery, after you have done one ſide of your glaſs; for the oftener theſe are ground together, you will be the more ſure of having your figure true.

FROM the CENTRES

AN AURORA WATCH

William Hodgson
Vancouver Centre

With the increase of solar activity in the next few years, auroral displays will be quite frequent, perhaps, even in the Vancouver area. In the past few months, I have been corresponding with Mr. David Gavine of the British Astronomical Society. Mr. Gavine is head of their Auroral Observing Network Team, which collects reports from most of Northern Europe. Mr. Gavine finds that there is no overall co-ordination throughout the world by amateurs, so I have decided to work together with him in forming a Canadian-American Auroral Team. What is needed now is an observer or two! If you feel you would like to take part, please let me know by dropping a line to me at:

23684 River Rd., R.R. #1, Maple Ridge, B.C., V2X 7E6

In this article we learn something of the observing code that was first adopted for the old IGY programme begun in 1957. This is reprinted from the sheet "Auroral Observing--International Quiet Sun Year Code".

1) Auroral Forms

Arc "A" -A slightly curved arch, or part of one, with a regular and usually well-defined lower border.

Band "B" -Like an arc but with an irregular, kinked or folded lower border.

Patch "P" -Sometimes also called SURFACE, a blob of light like an isolated cloud.

Veil "V" -A uniform luminosity which may cover a large part of the sky, sometimes as a background to other forms.

Rays "R" -Shafts of light like searchlight beams aligned in the direction of the lines of force of the Earth's magnetic field. The form may consist of a single ray, many rays or a bundle of rays.

"N" -Not identifiable. This is used for a glow on the horizon, or an aurora in cloud, where the form is uncertain.

The forms may then be described according to their appearance and properties.

2) Structure:

Homogeneous "H" -Lack of internal structure, diffuse or of uniform brightness.

Striated "S" -Fine, usually irregular striations parallel to the lower border, sometimes recognized, only when the arc or band is nearly overhead.

Rayed "R" -e.g. RA, rayed arc; RB, rayed band. Length of rays is denoted by R_1 (short), R_2 (med.), R_3 (long). Thus, R_1B is a rayed band with short rays. R_2R etc, indicated that the form is just a single ray, or group of rays, of medium length.

3) Qualifying Symbol:
(placed when relevant, before the structure symbol)

Multiple "m" -two or more associated, usually parallel forms of the same kind.

Fragmentary "f" -Used when only part of an arc or band is present.

Coronal "c" -During great displays, the long rays sometimes converge nearly overhead (actually, the magnetic zenith) to form a structure like a fan or crown.

(Van.)Ed. Note : I certainly noticed the aurora as being on the upswing this summer. There were fine displays especially in the last week of August. The code above is the same I used to follow years ago while doing aurora watches for NRC in Ottawa. The reporting forms may be printed in the future.

-Ken Hewitt-White

PHOTOGRAPHIC MATERIALS DISCOUNT

Mike Edwards

There are, as you know, many benefits to being a member of the Halifax Centre of the RASC. One more reason for belonging to this group is the discount on photographic materials which has been arranged with John Vickery's Camera World, 5495 Spring Garden Rd., Halifax. A discount of 10% on films, dark room chemicals and papers, and some smaller pieces of equipment such as the less expensive tripods, has been arranged. The process for securing a discount on your purchase is to simply say that you understand that the members of the RASC have been granted this discount and also state that you are a member. No membership card is necessary, but if you have yours ready, it might make things flow more smoothly. Unfortunately, this only applies to film and chemicals, but it doesn't hurt to see if it could apply to a more expensive purchase.

MAKESHIFT EQUIPMENT I HAVE KNOWN (but,... not inevitably fallen in love with)

How often have you been 'stuck' without a needed piece of equipment or have run into an unexpected problem and needed a piece of equipment to fix things up? I'm sure that all amateur astronomers repeatedly find themselves in similar situations and that each of us have evolved our own techniques for handling them. Nonetheless, there are certain 'tools of the trade' that we are all familiar with. Paramount amoung these is my favorite modern invention, masking tape. This versetile tool has saved the day for me more times than I care to remember.

For instance, masking tape is probably the world's greatest shimming device. Now, I'm not saying that it can be used to convert 0.965 inch diameter eyepieces to 1¼ inch (that's where cardboard shims come in), but it can provide very snug fittings between parts. When combined with cardboard (don't ever throw out Kleenex boxes) you can adapt or attach almost anything to almost anything. Camera adaptors, filter holders, even complete telescope tube assemblies can be made in a matter of minutes. In fact, one camera adaptor I made for one-time use, lasted until I switched both cameras and telescope.

Discards such as paper towel tubes and fast food containers can be put to use: my Kentucky Fried Chicken (unpaid advertising not normally accepted--Ed.) solar projection box has seen lots of usage and after four years is still in good shape (better shape than the chicken anyway!).

String is often overlooked. I once constructed a small refractor that,when mounted on the hastily constructed makeshift mounting, refused to stay where it was pointed. A piece of string there, another piece here and pretty soon I had a neat set of slow motions that held the telescope in place. The only problem was that it looked more like a spider web than a telescope mount.

Optical bench equipment (taken in the very broadest sense of the word) is another area in which the tape and bubble gum (I once held a finder on a telescope with bubble gum after I ran out of elastic bands) school of thought can be applied. My precision pinhole (made from tinfoil and one of my Mother's precision pins) my light source (light bulb with homemade reflector, cooled by a hair dryer on 'cool' setting) and my lab bench (our pool table) pale in comparison with the wild and wonderful arrangements of lenses and whatnots I have played with. At one time or another, I've used everything from empty beer bottles to empty slide cartons.

Why not, just for the mental exercise, construct a tele-scope from materials around the house? I once did just that while on vacation and the resulting 40 power non-achromatic refractor was enough to show a friend the Moon, Jupiter and its moons, and even some star clusters. This getting back to basics of the basics is really kind of fun after being spoiled by expensive commercial equipment.

If anyone has some 'dodges' that have been found useful please let me know--don't worry, I won't mention any names. You know, as I mount my SLR on our commercial eight inch with commercial camera adaptor, some of the fun of the cardboard and tape versions (complete with 126 cameras) is missing. I wouldn't have passed that up for the world.

Jody LeBlanc
Observing Chairman

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