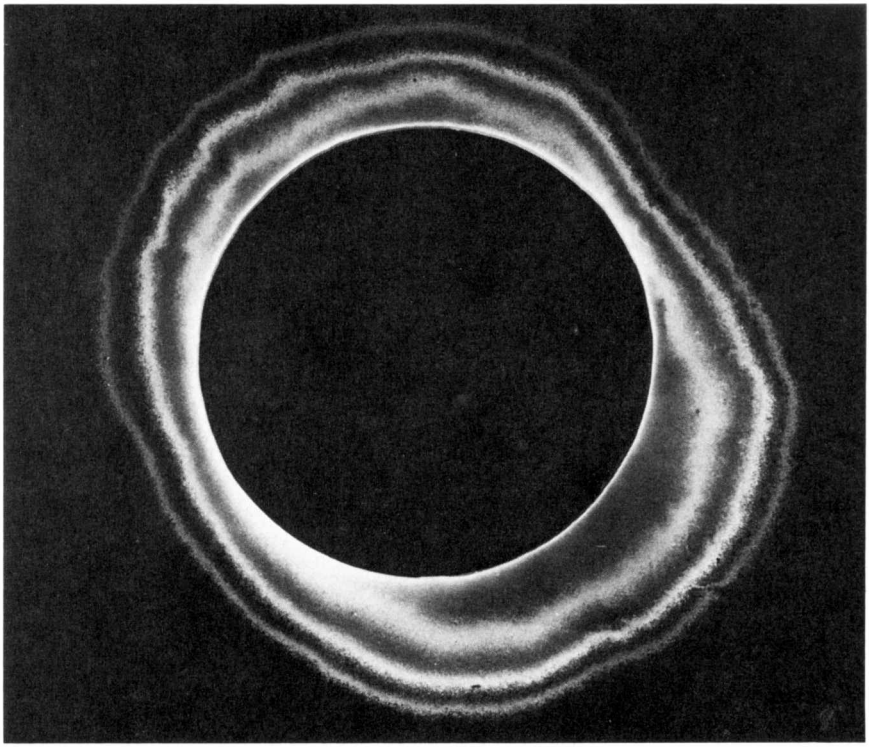
NATIONAL NEWSLETTER

December, 1980

Supplement to the JOURNAL OF THE ROYAL ASTRONOMICAL SOCIETY OF CANADA

Vol. 74, No. 6



Réseau d'Equidensités sur la couronne solaire, par Andre Paul de Société d'Astronomie de Montréal.

Solar corona showing lines of equal density, produced by Andre Paul of the Société d'Astronomie de Montréal.

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Victoria Revisited, 1979

by Dr. Helen Sawyer Hogg
David Dunlap Observatory

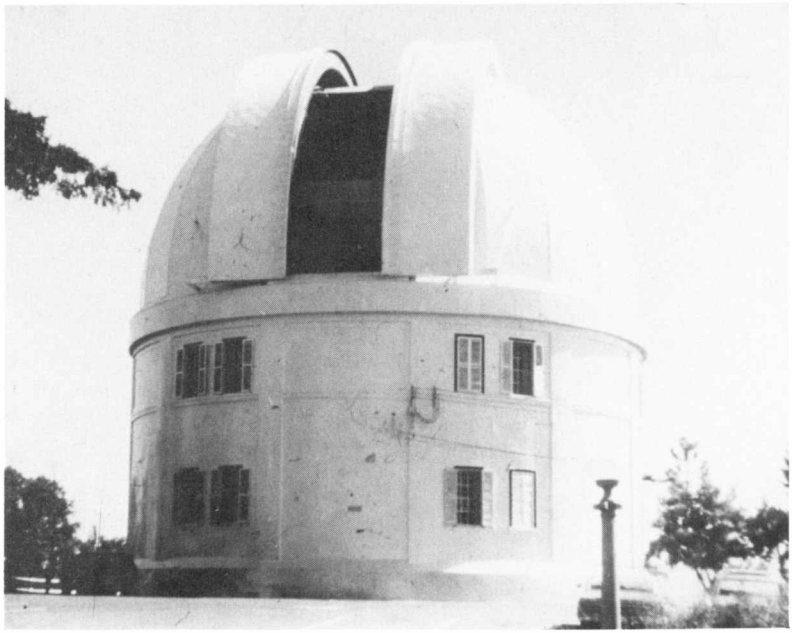
In August, 1931 my husband Frank and I drove across the continent from the Atlantic to the Pacific in our model A Ford named "Wishbone". In places in the United States where the transcontinental highway was not yet completed across the Rockies, we drove over mountain pastures, directed and spurred on by the road workers.

We arrived in Victoria in late August, to be warmly received by the Director of the Dominion Astrophysical Observatory, Dr. J. S. Plaskett and his wife, at Observatory House on the hill. Frank had been appointed to the D.A.O. staff and while no paying job was available for me, Dr. Plaskett assured me that I could use the 72-inch telescope (the second largest telescope in the world) as much as I wished to photograph variable stars in globular clusters.

These stars were the subject of my work at the Harvard Observatory and of my doctoral thesis under Dr. Harlow Shapley. In June of that year I had received my Ph.D. from Radcliffe College. However, at the Harvard Observatory the plates on which I worked had been taken by various assistants at Harvard Observatory stations in both northern and southern hemispheres. Now it was up to me to take the plates.

With the help of my husband and the night engineer Tom Hutchinson, I began photographing globular clusters with the 72-inch on September 22, 1931. Before this program began the Newtonian platform and plate holder had to be cleaned up a bit. They had lain idle for some years. Soon after the 72-inch went into use in 1918 a few show plates had been taken at the Newtonian focus, but this focus had not really been used for research till I came along.

At the Harvard Observatory I had become familiar with all the globular clusters then



Dominion Astrophysical Observatory, Victoria, B.C.

known, about 93, when I measured their integrated magnitudes and diameters. Only 34 of these clusters had then been searched for variables. To start my program I selected four of the unsearched; M 10, M 12, M 14 and NGC 6934. My first published report on the program was to the American Astronomical Society (Pub. A.A.S. *7*, p. 185, 1934), mentioning that M 10 and M 12 had few variables but that I was finding many in M 14 and NGC 6934.

In January, 1935 Frank was appointed to the staff of the Department of Astronomy at University of Toronto as lecturer (he became Chairman of the Department and Director of the Observatory in 1946). On the night of July 25, 1935, the program of variables in globular clusters was begun with the David Dunlap Observatory 74-inch telescope, first with a 40-minute exposure on M 14, then with one of 45 minutes on NGC 6934. With the help of my husband, Gerry Longworth, Ruth Northcott and various assistants, many hundreds of plates were taken. Gradually I added many more clusters to my working list.

A paper on the variables in M 10 and M 12 was published in 1938 (Pub. D.D.O. *1*, No. 2). In M 14 I had found 72 variables and in NGC 6934, 51 variables. Because of these large numbers and because these clusters were difficult objects to photograph well, the publication of light curves was delayed. In both of these clusters Dr. Amelia Wehlau of the University of Western Ontario has been collaborating with me. In 1964 she found the nova in Messier 14 which appeared on all the plates I took of that cluster during one week in 1938. We have published the light curves of 40 variables in that cluster and are still working on it.

For NGC 6934 periods of 30 variables had been published, but not their light curves. By dint of effort and chance the complete paper on 51 variables in NGC 6934 was finished in time for the IAU Symposium No. 85 at Victoria in August 1979. So with great satisfaction I returned to Victoria then to present the finished paper. This time, to get to Victoria from the east, I crossed the Canadian Rockies on the Trans Canada Highway, Route 1, via the IAU chartered

bus for astronomical tourists. The complete paper on 51 variables in NGC 6934 appeared in the February, 1980 issue of the Astronomical Journal. The excellent volume of the Symposium, edited by James E. Hesser, has already appeared.

Meanwhile Amelia Wehlau and her student C. Stagg are continuing the saga of NGC 6934 with the period changes of the variables derived from plates taken with the 40-inch reflector of the University of Western Ontario as compared with early plates from the telescopes of the D.A.O. and the D.D.O.

from *David Dunlap Doings*.
Vol. 13, No. 4, June 20, 1980

A Revolution in Amateur Astronomy

by Leo Enright
Kingston Centre

A revolution is currently taking place in amateur astronomy. What other word could be used to describe the series of outstanding advances in equipment and techniques that we are now witnessing? Equipment being made by and sold to the amateur astronomer is now ofthe kind that we only dreamed of a decade ago. It would certainly be only a dream of ten years ago for some of it had not been invented and some was found only in the hands of professionals at the world's most renowned observatories. The techniques, too, now used by the amateur astrophotographer were a short time ago employed only as experimental ventures by the professional.

One of the most noticeable aspects of the Equipment Revolution has been the Aperture Explosion. A decade ago the typical amateur astronomer may have owned a telescope whose aperture was 3½ or 4 inches, aspired to building a "6-incher", and beguiled himself in his wildest fantasies (for fantastic yearnings they surely were) that he would one day own an "8-inch". He knew of one person in his half of the country who owned a "10-inch"; well, he did not *really* know him, but once at a club meeting he had met a person who had a friend of the 10-inch-owner, and that friend had even looked through it. That was a decade ago.

Let us now remind ourselves of the situation today; 10, 12, and 14-inch telescopes seem to be everywhere. The Dobsonian Era has dawned; the age of the massive light-bucket is upon us. With this simple now-common type of mounting, faint and far-distant vistas of our universe are open to our wondering gaze. One member of our Kingston Centre has almost finished his project of constructing a 16-inch – to be used in hunting down faint comets. Another member of our Society has told me of purchasing a 17½-inch mirror – from a very reputable manufacturer and at a price that a short while ago would have been reasonable for a high-quality 6-inch telescope. Now when his telescope is assembled he will have an instrument with over eight and one-half times the light-gathering power of the 6-inch instrument he might conceivably have been tempted to invest in a few years ago. The manufacturer of the mirror just mentioned, an organization not usually inclined to idle boasting, has stated that, with it, literally every N.G.C. object can be detected, and as most amateurs well know, of the thousands of objects in the N.G.C. catalogue, many are very faint and many extremely faint. A brief perusal of my copy of the catalogue led me to a few examples: N.G.C. 5503 – Magnitude 16.0, N.G.C. 5527 – Mag. 16.0, N.G.C. 5421B – Mag. 17.0, N.G.C. 1606 – Mag. 17.0, and N.G.C. 96 – Mag. 17.0. It is amazing that such faint objects can be seen now in amateur instruments. Another member of our Society has recently told me of his latest project – building a 25-inch Dobsonian. It is not a wild dream; his previous projects have included some superb instruments, perhaps the finest home-built telescopes any of us have seen. Who knows where the Aperture Explosion will end?

The Equipment Revolution is also operating at the eyepiece end of the telescope. Better oculars are readily available to the amateur. New configurations of lenses, higher quality in the glass and other materials used, larger oculars, rich field adapters, oculars with greater eye

relief for a given focal length – all of these items tend to create a better view of the heavenly wonders. Add to that the nebular or L.P.R. (Light Pollution Reduction) filters and you have a welcome concept in filters – a piece of glass that actually brightens the faint nebulous object in your eyepiece, (or seems to) by reducing the harmful effect of light pollution.

The equipment and techniques now used by the astrophotographer are enabling him to produce results stunning as never before. Proof of this can be had by merely looking through recent astronomy periodicals or attending some of the slide shows at current meetings. Besides their outstanding results, astrophotographers notice something else about the latest wave of equipment; it is more convenient to use. For a few years now, cold cameras have been bringing to amateurs the impressive results of chilled film emulsion. It used to be an inconvenient operation with the insertion of one frame of film at a time into the camera. Now a whole roll – 36 exposures of 35mm film – can be popped into the camera and the film merely rolled on as usual after each exposure. It no longer requires an hour's patient work to go from one frame to the next. That's an hour that can now be spent in making three outstanding twenty-minute exposures of deep-sky objects.

The latest addition to the list of techniques and processes which are assisting the astrophotographer is one which I have found almost amazingly helpful. It is the use of hypersensitized film. Film which has been gas-sensitized gives outstanding results in the photography of nebulae and other astronomical objects. The colour balance of the film is improved and there is a tremendous gain in film speed (or sensitivity to the faint light from the nebulae). My first experimental use of sensitized film gave colour slides of well-known nebulae, pictures of only five or six minutes, which were similar to ones that might have been three or four times as long with ordinary film. Guiding for five minutes is easier than guiding for fifteen or twenty and there is only a fraction of the chance that Murphy's Law will take over. In fact, amateurs are now beginning to do their own sensitizing of the film right in their own homes, again something that until this year was almost never done except at the big observatories.

The list of new techniques and new kinds of equipment now used by the amateur could go on. Suffice it to say that the Equipment Revolution is a major part of the greater Astronomy Revolution now taking place.

This is a revolution that is leading to a greater enjoyment of the wonders of the night sky by more and more people and a greater appreciation of its awesome vastness and profound complexity. Let this Revolution continue!

Where the Astronomers and the Buffalo Roam

by Chris Rutkowski
Winnipeg Centre

Our president, Guy Westcott, was looking right into the eyes of a leaping wolf! His wife and children stood, shaking in their boots under the gaze of a glaring moose! Several other members of the Winnipeg Centre were attacked and bitten!

Braving the elements, Guy Westcott and family, Manfred Hirschfeld, Len Gamarache, Chris Rutkowski and family, and Bill Krosney, went to Riding Mountain National Park for the August 1st long weekend. They were to give two astronomical presentations to the campers at Lake Audy and Lake Katherine. Friday and Saturday were gorgeous, and the evening's show at Lake Audy campground saw 50 campers enjoying the stars with the group. Telescopes were set up in the park, and a slide show was run off car batteries. Before the show the Aurora display was unbelievable. To get to the site travel through the buffalo enclosure was necessary. Wild animals were everywhere. But then, on Sunday – the deluge. The astronomers awoke the next morning to a downpour, which soaked the park but didn't dampen anyone's spirits. Telescopes in the town of Wasagaming at noon gazed at a cloudy sky, with the sun not poking through long enough to see sunspots clearly.

The rain continued into the night, and the evening's presentation was moved indoors to the

Interpretative Centre Theatre. In the museum, next door, were stuffed animals which the party enjoyed observing (including the aforementioned wolf and moose).

The show was well received by a group of diehard, soggy campers. The RASC members returned home the next day, in the rain. Leaking tents were too much for them.

However, all things considered, the "working astronomy vacation" was enjoyed immensely, and the members are to be commended on their efforts out at Riding Mountain National Park.

And the attacks? Well, you should have seen the size of the mosquitoes!

Astrophotographie: réseau d'équidensités photographiques

par Andre Paul
Société d'Astronomie de Montréal

INTRODUCTION

Une des techniques qui met le plus en relief la forme de la couronne solaire lors d'une eclipse totale que l'on a réussi à photographier est la production d'un réseau d'équidensités photographiques. C'est ce que je vous propose de réaliser par Ic biais de cet article.

L'EFFET "SABATTIER"

C'est une inversion de I'image l'on obtient en interrompant le développement au milieu de sa course tout en soumettant celle-ci à une réexposition à la lumière blanche diffuse. Les secteurs blancs de l'image seront exposés tandis que les régions noires ne subiront aucune modification, puisqu'elles sont déjà saturées. En réintroduisant a nouveau l'image la tente dans le révélateur pour achever le développement, les regions initialement blanches se noirçiront tandis que les secteurs noirs ne subiront presque aucune modification. Ce qui caractérise ce processus, c'est qu' à lajonction des régions sombres initiales et les regions sombres obtenues lors de la réexposition, une ligne blanche apparaît sur le contour de la couronne solaire. (Ligne de "MacKie").

Nous avons par ce procédé isolé dans la couronne solaire une isophote, qui correspond à un contour d'équidensité sur la pellicule.

DETERMINATION DU TEMPS D'EXPOSITION INITIAL

A partir d'un négatif de la couronne solaire on tire une épreuxe de tests sur papier haut contraste de grade #5 Ilfospeed format 8″ x 10″ de préférence. Il est primordial à ce stade de ne plus refaire la mise au point de l'agrandisseur ou de déplaçer le margeur à papier. Examinons les différents temps d'exposition dans les plages de blanc de la couronne. Choisissons le temps ou le secteur de la couronne apparaît légèrement gris. A titre d'exemple pour le cliché accompagnant cet article ce temps est de 12 secs. à f/4.5 avec une lentille de 75 mm.

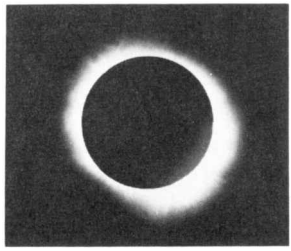


Fig. 1

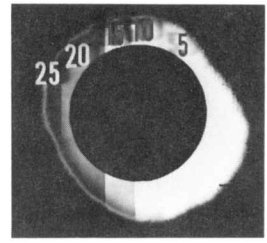


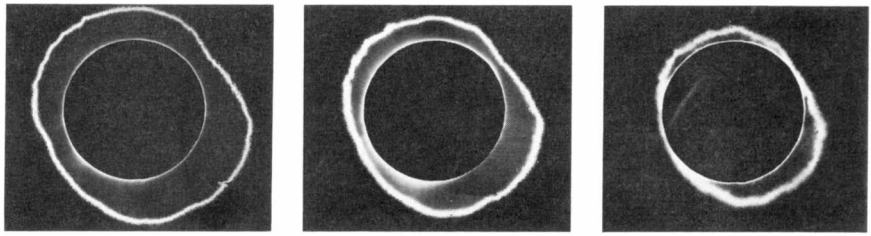
Fig. 2.–On a choisi ici une réexposition de 30 sec.

DETERMINATION DU TEMPS DE REEXPOSITION À LA LUMIERE BLANCHE

A partir du négatifde la couronne solaire on tire un nouveau positifsur papier haut contraste llfospeed #5 format 8″ x 10″ en utilisant la misc au point effectuée au paragraphe précédent tout en ne déplaçant pas le margeur lors du chargement du papier. Le temps d'exposition est celui déterminé au paragraphe précédant, soit 12 secs. Ce travail est effectué en éclairage inactinique, soit au rouge pour chambre noir. Introduisons le papier dans le révélateur et au bout de 50 secs. on le retire et on le lave abondamment à l'eau courante, ceci arrête le développement en milieu de course. Plaçons l'épreuve dans un bassin (pour éviter les éclaboussures), masquons celle-ci avec un carton noir et effectuons une série de 5 réexpositions avec une lampe blanche de 7½ watts diffuse, maintenue à 3 pieds de l'epreuve. Les réexpositions sont obtenues en prenant soin de découvrir une nouvelle partie de la couronne à toutes les 5 secondes, en déplaçant notre carton noir qui masque partiellement l'épreuve. Nous obtiendrons 5 zones dont les temps de réexpositions s'échellonneront de 5 à 25 secondes. Retournons l'épreuve dans le révélateur pour 30 secs., et nous verrons apparaître la ligne de "MacKie" dans les différentes zones. Fixons l'épreuve et rallumons l'éclairage normal. Le temps de réexpositions normal sera déterminé par une ligne de "MacKie" légérement grise tandis que le reste de la couronne sera d'un gris foncé, alors que le disque solaire sera noir.

PRODUCTION D'UN RÉSEAU D'EQUIDENSITÉS

Pour produire un réseau, il faudra isoler plusieurs isophotes de la couronne solaire en produisant un positif pour chacune. A ce stade nous nous limiterons à 3 isophotes, soit la production de 3 positifs en parfait régistration avec des temps de poses doublant l'exposition précédante. Notre positif #1 sera produit en introduisant un papier haut contraste Ilfospeed #5 dans le margeur en évitant de le bouger et en ne retouchant pas a la mise au point de l'agrandisseur.



#1
Ex. 12 secs.

#2
Ex. 24 secs.

#3
Ex. 48 secs.
Réexpo. 30 secs

Fig. 3.

L'exposition sera celle déterminé pour l'epreuve de test soit 12 secondes. Par la technique de "SABATTIER" nous effectuerons une réexposition à la lumière blanche de 30 secs., tel que déterminé dons notre épreuve de test pour le temps de réexposition. On procède ainsi pour le positif #2, sauf que le temps d'exposition sera double du positif # 1 soit 24 secs., et la réexposition sera de 30 secs.

Pour le positif #3 on double le temps d'exposition du positif #2, soit 48 secs., et on réexpose pour 30 secondes à la lumière blanche, prenez garde lorsque vous charger les papiers dans le margeur de ne pas déplacer celui-ci. Nous voilà maintenant en possession de 3 positifs de la couronne solaire avec des lignes d'équidensités différentes. Il nous reste maintenant à recombiner celle-ci sur une même éprcuve par la photographic de ces 3 positifs sur une même pellicule.

PHOTOCOPIE DES LIGNES DEQUIDENSITÉS POUR FORMER UN RÉSEAU

Utilisez un trépied très stable ou mieux une table pour la copie de documents. Eclaircz les positifs avec des lampes ' ' PHOTOFLOODS' ' pour copier des documents en les disposants de part et d'autres du margeur qui vous servira de masque de régistration pour rephotographier les 3 positifs. Eclairez les positifs sous un angle de 45° et utilisez une carte de test grise de 18%, pour determiner le temps d'exposition avec un posemétre oû si vous ne possédez pas cette carte substituez lui une feuillc de papier blanche et divisez par 5 la lecture obtenue. Si vous possédez un reflex avec posemètre incorporé mais du type à lecture TTL ("through the lens") substituez la carte grise à votre positif et prenez une lecture et fiez-vous à celle-ci, elle est aussi valable. Introduisez le positif #1 dans le margeur, cadrez et photographicz-le. Il ne faudra plus bouger le margeur pour la pose des positifs #2 et #3. Introduisez le positif #2 dans le margeur et maintenant il vous faut photographier cclui-ci sur le même cliché, peu de reflex 35 mm. permettent ceci. Une façon de contourner cet obstacle consiste a appuyer et retenir le bouton qui enclenche le rebobinage de la pellicule tandis que vous actionncz celui qui avance la pellicule.

La pellicule n'aura pas avancé mais l'obturateur pourra a nouveau être actionné. Cette méthode peut ne pas fonctionner sur votre appareil alors consulter votre manuel d'opération ou la compagnie qui a fabriqué votre reflex afin de savoir s'il existe un moycn de faire des expositions multiples sur un même cliché. Photographicz le deuxième et troisième positif avec le même temps de pose déterminé par la carte grise 18%. Utilisez une émulsion Kodak PIus-X ASA 125 ou Ilford HP 4.

Développez dans le révélatcur D-76 de Kodak pendant 7 minutes ½, passez au bain d'arrêt et puis fixez. A titre d'exemple pour la photo accompagnant cet article le temps d'exposition était de 1/8 sec à f/16 avec 2 "PHOTO FLOODS" de 500 watts à 3 pieds du margeur avec une emulsion de sensibilité ASA 125. Après séchage, tirez un positif et vous obtiendrez une photographic unique du soleil et de sa couronne avec des lignes d'équidensités tel que a la couverture de NNL.

RESEAU D'EQUIDENSITES EN COULEURS

A ce stade vous avcz réalisé 90% du travail requis pour produire une photographic couleur. En effet, il vous suffit de rephotographier sur une emulsion sensible à la couleur, tel que Kodachrome 25 (diapositif) ou Kodacolor (photo). Rephotographiez les positifs comme expliqué pour le noir et blanc, sauf qu'avant chaque exposition on interpose un filtre de coulcur pour obtenir chaque region de la couronne entre les lignes d'équidensités en couleurs différentes.

A titre d'exemple

Positif #3 + Filtre 47 B (bleu) = couronne externe bleu
Positif #2 + Filtre 25 (rouge + bleu) = couronne moyenne magenta
Positif #1 + Filtre 58 (vert + rouge + bleu) = Couronne interne (blanc Jaune).

Avec le filtre 47 B et 25 augmentez le temps de pose de 8X et le filtre 58 de 4X ou compensez

par une ouverture équivalente. Vous n'êtez pas limité à ces couleurs. Vous pouvez produire toutes les couleurs et saturations de celle-ci en employant d'autrcs filtres.

Exemple
Positif #3 + filtre (80B + K3) couronne externe verte.
(Bleu + Jaune)

En consultant un ouvrage traitant du développement de la pellicule ou papier couleur vous pourrez trouver les filtres qui vous permettront de produire les couleurs désirées. Faites développer votre pellicule couleur normalement, ou mieux si vous le pouvez développez vous-même avec le procédé E-6 de Kodak et tirez vos épreuves sur Cibachrome.

CONCLUSION

Quelquc soit le but que vous voulez atteindre en astrophotographie, une chambre noire, même modeste vous permettra de réaliser ces photos toujours un peu spéciales qu'un laboratoire commercial, de par sa nature, ne peut entreprendre pour vous.

Au début tout semble impossible, mais après de bonnes lectures et une documentation adequate tout est possible en photographic. Souvenez-vous que: si quelqu'un l'a fait, vous pouvez aussi le faire.

Bonne chance!

OUVRAGES ET REFERENCES UTILISES

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Astrophotography: Photographic Generation of Equidensity Contours

by Andre Paul
Société d'Astronomie de Montréal

INTRODUCTION

One of the techniques that brings out the true form of the solar corona at total eclipse which one may have photographed is the production of lines of equidensity by additional photographic treatment of the existing material. It is to that technique that I direct the following article.

THE "SABATTIER" EFFECT

This is an inversion of image which may be obtained by interrupting the development at a midpoint and reexposing the print to diffuse white light, then continuing the development. The white areas of the image will be reexposed, but the black areas will not undergo modification as they are already saturated. When this new exposure is again placed in the developer to complete the process, the originally white areas will darken while the black areas undergo little or no modification. What makes the process achieve our purpose is that the junction areas of the originally black image adjacent to the white areas do not darken, resulting in a white line of separation or contour demarking this boundary. On the solar corona it will be a line of equal density; the "MacKie Line".

Thus we have achieved our objective; demarked on the solar corona an "isophote", which corresponds to a line of equal density in the film.

DETERMINING EXPOSURE TIME

From a selected negative of the solar corona we make a series of test exposures on high-contrast paper, such as Ilfospeed #5, preferably 8 x 10 size. It is essential throughout these not to alter the focus or size of the enlargement, or to move the easel in the slightest degree. It must be possible to return the print to the exact position subsequently. From this test we will select an exposure time and an area of the corona which appears a light grey. In the case of the illustration used here this time was 12 seconds at f/4.5 with a 75 mm. lens. (See Fig. 1)

DETERMINING TIME FOR REEXPOSURE TO WHITE LIGHT

Again using the same negative as before, we make another print on Ilfospeed #5, 8 x 10, no change in the position of the enlarger or the easel having been made meanwhile. Assume the chosen exposure, as above, is twelve seconds. Of course the above exposures have been made in non-actinic light, such as the usual darkroom red light. Put this print in the developer for about 50 seconds, and then quickly rinse it freely under running water. This arrests development in an incomplete stage. Lay the print in a tray (to catch the drips), and mask a series of successive steps across it with a black cardboard while exposing it to the white light of a 7½ watt bulb (frosted) held three feet above the print. That is to say, uncover a new section of the coronal image each five seconds, displacing the mask to achieve a step-test structure. We thus get five zones with varying exposure from 5 to 25 seconds. Return the print to the developer for an additional 30 seconds, and the "MacKie" lines should appear separating the various zones. Fix the print, and examine it under normal light. The desired exposure to white light will be that giving the MacKie lines as lighter grey than the adjoining corona, while the solar disk is fully black. (See Fig. 2)

CREATING THE FINAL PRINT WITH EQUIDENSITY CONTOURS

To produce a pattern or grid, we must make several isophotes of the corona and then produce a positive for each. For the present let's limit ourselves to 3 lines, which will require producing three prints in exact registration, but with exposure times each double the preceding. Print No. 1 will be done by using the high-contrast Ilfospeed #5 paper in the unmoved enlarging outfit as above. In the illustration herewith exposure time was twelve seconds, as determined above. By the "SABATTIER" technique we reexpose it to 30 seconds of the white light as outlined. Similarly we proceed with print No. 2, but the exposure time is doubled to 24 seconds, re-exposure time still held to 30 seconds.

For print No. 3 we double the last exposure time, making it 48 seconds, but the reexposure time is still 30 seconds. Be careful not to shift anything as you set the successive papers in your enlarger.

So far so good! Now we must recombine these three prints on a single negative. (See Fig. 3)

PHOTOCOPYING THE EQUIDENSITY LINES TO FORM A GRID

Use a very firm tripod, or better still a table to make the copies. Light the prints with "PHOTOFLOOD" lamps for copying documents, arranging them outside the area of the prints you intend to copy. Set the lights up to illumine the prints at a 45° angle, and use a grey-scale of 18% for determining the exposure time with a photometer or exposure meter. If you don't have a grey-scale card of 18% as above, you may substitute a sheet of white paper and divide the exposure reading time by 5. If you possess a reflex camera with built-in exposure meter of the "through-the-lens" variety, take the reading on the grey card, it'll work. Set up print No. 1 and photograph it. Use your easel, or some such holder which will allow you to substitute prints Nos. 2 & 3 without losing the alignment. Photograph each print on the same negative. Some 35mm cameras may present a difficulty here; it may be difficult to reset the shutter without winding the film. On some types this may be done by holding the button which releases the film for rewind while operating the advance lever to reset the shutter. Look at your instruction book, or consult the store where you bought the camera, or as a last resort write the manufacturer for instructions for your own camera.

All three exposures should be the same. I suggest using Kodak Plus-X ASA 125, or Ilford HP 4. Develop in Kodak D-76 for 74 minutes, rinse and fix. As an example the exposures for the accompanying illustrations were $^{1}/_{8}$ second at f/16 with 2 Photofloods of 500 watts at 3 feet with emulsion ASA 125. When your negative is dry, print it, and you'll have a unique photograph of the solar corona with your own equidensity contours. (See front cover)

EQUIDENSITY GRID IN COLOUR

At the above point you've achieved 90% of your goal! That is, if you want to dress it up with colour. To do this, it is only necessary to repeat the photographing of the prints using film sensitive to colour, such as Kodachrome 25 for a slide, or Kodacolor for a print. Repeat the photographing of the prints as above for black-and-white, but before each exposure fit a colour filter over your lens, thus creating each zone in a different colour image. Exposures will have to be compensated for the filter factors.

For example:
Print #1 + Filter 47 B (blue) Outer corona blue
Print #2 + Filter 25 (red + blue) Mid corona magenta
Print #3 + Filter 58 (red + green + blue) Inner corona yellow-white.

With filter 47B and 25 increase the exposure time 8 times; and with the 58 filter increase it 4 times; or increase the lens aperture an equivalent.

You aren't limited to the above filters. You could produce any colour or any saturation by this method and different filters. One example; Print #3 = filter (80B + K3) will give the outer corona a green hue. By looking up published data on developing and colour films and papers you can achieve any result you want. You could produce a colour print by using the E-6 Kodak process, or make your own on Cibrachrome.

TO SUM UP

What you need for astrophotography is a dark room, some modest equipment, and patience! You can then achieve results not available in commercial work, because by its nature there are special requirements. But it's quite within your capabilities! Remember: What one man has accomplished, others can do too!

Good luck!

(See references and figures with French version.)

Resultats du Sondage des Membres Independents de la S.R.A.C.

Results of a Canadian Survey of Unattached Members of the RASC

Monsieur R. Auclair, de Cornwall, en Ontario, a mené un sondage parmi les membres canadiens de la S.R.A.C. qui ne sont pas rattachés à un de nos centres. Bien que cc sondage ne puisse exprimer l'opinion dc tous ces membres (il n'a reçu que 58 réponses sur les 193 questionnaires envoyés), ici les résultats conformément au désir de l'assemblée générale de 1980 et parce que nous pensons que les membres y sont intéressés.

Ce sondage voulait determiner le besoin de former une sorte d'association au sein de ces membres indépendants. Peut être nous publierons plus tard les opinions de M. Auclair (et celles, nous espérons, d'autres membres sur ce sujet).

Mr. R. Auclair, an unattached member from Cornwall, Ontario, conducted a survey of all unattached members in Canada. Although this survey is not really conclusive, (he received 58

responses to 193 questionnaires) here are the results, as per the decision taken at the 1980 General Assembly, and also because we feel that the unattached members are interested in seeing the results.

The original goal of the survey was to determine whether some sort of association among the unattached members should be formed. In this issue we publish only the results of the survey. A future issue may carry Mr. Auclair's assessment of these results, (and hopefully opinions by other members on the same subject).

1. Number of years as member of RASC (as of summer 1979). Average: 6.77 years
1. Depuis quand êtes-vous membre de la SRAC (été 1979). Moyenne: 6.77 ans

2. Are you a member of other astronomical societies, clubs, associations?
2. Etes-vous membre d'autres sociétés, clubs, associations astronomiqucs?
   yes/oui: 11 no/non: 47

3. Is your work related to astronomy in any way?
3. Existe-t-il un lien entre votre travail et l'astronomie?
   oui/yes: 20 non/no: 38

4. Are you getting as much out of your membership as you expected?
4. Obtenez vous les bénifices auxquels vous vous attendiez?
   yes/oui: 38 no/non: 12 no answer/pas de réponse: 8

5. Reason for 'unattached' status.
5. Pourquoi le membre n'est pas rattaché à un centre.
   pas le temps/lack of time: 7 pas satisfait des centres/dissatisfied with centres: 4
   distance (& other/ou autres raisons): 47
6. If accessible centre was formed, would you join it?
6. Vous joindriez-vous à un centre qui vous serait accessible?
   yes/oui: 41 no/non: 15 no answer/pas de réponse: 2

7. Are you getting MORE or LESS, from your membership, as members attached to a centre?
7. Soutirez-vous PLUS ou MOINS de bénifices qu'un membre rattaché à un centre?
   Plus/more: 0 moins/less: 36 pas de réponse (incertains)/no answer (or not sure): 22
8. Would it be beneficial to find out about other members and their interests?
8. Serait-il bon de connaître les autres members et leurs préférences?
   yes/oui: 41 no/non: 5 no answer/pas de réponse: 12

9. FOR or AGAINST forming an 'association' among unattached members?
9. POUR ou CONTRE une association au sein des membres indépendants?
   pour/for: 41 contre/against: 7 pas de réponse/no answer: 10

10. Should unattached members have a journal or newsletter of their own?
10. Devrait-il y avoir une publication spécialement pour ces membres?
    yes/oui: 32 no/non: 10

11. Could you contribute to the content of this publication?
11. Pourriez-vous contribuer au contenu d'une telle publication?
    oui/yes: 26 non/no: 19

12. WHAT would you like to see as content?
12. Quel contenu voudriez-vous retrouver dans cette publication?

information on other members	nouvelles des autres membres
information by other members	articles par les membres
calendar of astro. events	calendrier d'évènements astron.
more theory	plus de théorie

astrophysics	astrophysique
radio-astronomy	radio-astronomic
amateur projects	projets des autres membres
astrophotography	photographic astronomique
results of meetings	compte-rendus de réunions
consumer type of info.	renseignements pour consommateurs
schedule of talks (centres)	horaire des rencontres (centres)
history of astronomy	histoire de l'astronomie
some humor	un peu d'humour
etc.	etc.

13. Would you be ready to pay extra for such a journal?
13. Seriez-vous prêt à payer un supplement pour cette publication?
yes/oui: 38 (!)

14. What else should the association do?
14. Quels devraient être les préoccupation de l'association?
–provide info. on projects (centres)
renseigner sur les projets (centres) :39
–list of members showing their fields of interest
liste des membres et de leur intérêts astronomiques :35
–publish a journal/publication: 31
–provide support for un. members' projects
fournir de l'aide pour les projets des membres :28
–library/bibliothèque: 17
–meetings/réunions: 12
–etc.

15. Ever attended a General Assembly?
15. Avez-vous déjà assisté à une assemblée générale?
oui/yes: 5

16. Are G.A. decisions beneficial to unattached members?
16. Les décisions prises lors des A.G. sont bonnes pour les membres indép.?
yes/oui: 23 no/non: 2

17. Is there enough input from unattached members at G.A.?
17. Les idées des membres indép. sont-elles suffisamment connues lors des A.G.?
oui/yes: 4 non/no: 13

18. Do YOU feel represented at G.A.'s?
18. VOUS sentez-vous représenté lors des A.G.?
yes/oui: 6 no/non: 18

19. Would you take an active part in setting up this 'association'?
19. Pourriez-vous participer a la mise sur pieds de l'association?
oui/yes: 18

20. Regardless of your desire to join or not join such an association, do you think it would work if it was formed?
20. Sans tenir compte de votre désir de joindre ou ne pas joindre, pensez-vous qu'une telle association, si elle venait à exister, pourrait survivre?
yes/oui: 28 no/non: 7 no answer/pas de réponse: 21

NOTE: Most questions have been abridged to save on printing space.

NOTE: Les questions furent résumées à cause du manque d'espace.

Remote Focusing for Telescope

by B. Franklyn Shinn
Victoria Centre

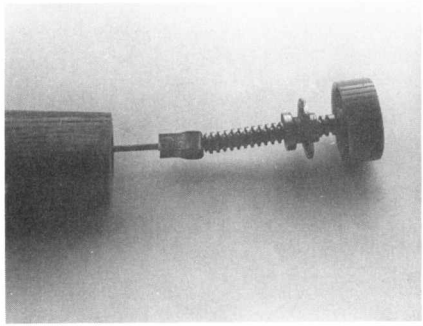


Fig. 1.

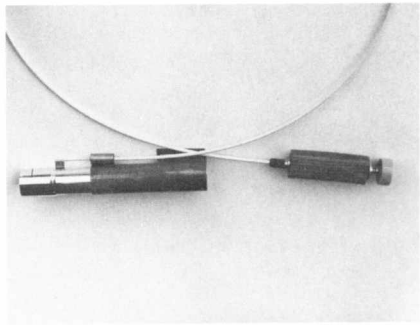


Fig. 2.

Have you ever found the wiggle of your telescope frustrating when you try to focus it? I have for years, but I've never been able to devise a way of changing the focus without touching the tube. Finally, this past month, the penny dropped, at least as far as some Newtonian instruments are concerned. It may be applicable to yours.

What is required is that the eyepiece assembly permit removal of the usual rack-and-pinion mechanism. My own instrument has a homemade eyepiece holder, so there was no problem in doing this. The modification then consists in fitting along the outer tube a brake cable intended for a bicycle. The casing is anchored to the outer tube of the eyepiece holder, and the inner, or Bowden cable is anchored to the sliding drawtube.

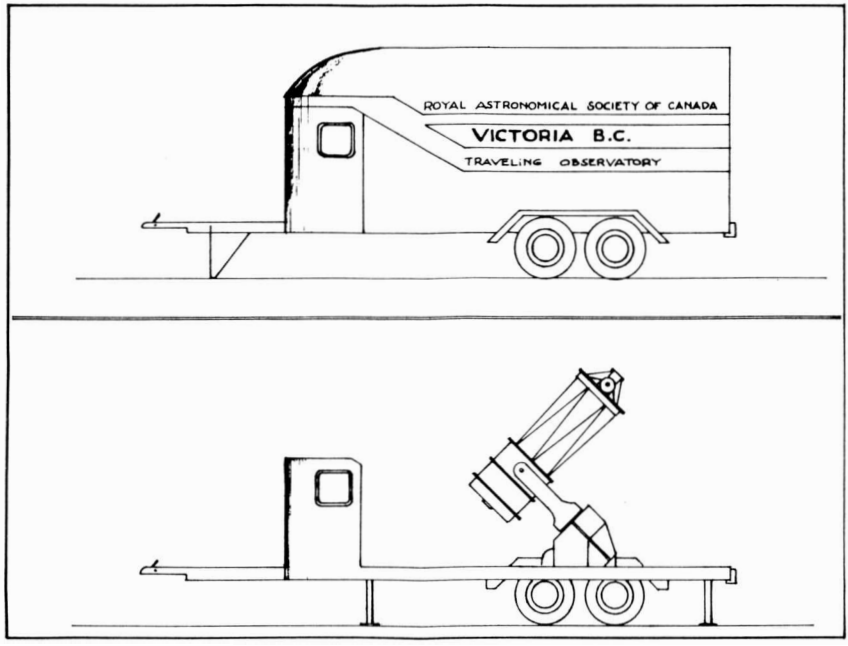
The other end of the cable has a threaded rod fitted to it. The one end of the rod is linked to the Bowden cable, while the casing of the tube is fitted to a piece of tubing large enough in diameter that its open end may accommodate a threaded fitting, or nut, through which the threaded rod turns. The outer end of the threaded rod is fitted with a radio knob of whatever kind appeals to you. Turning the radio knob thus screws the threaded rod in or out, driving the Bowden cable through the casing, and moving the drawtube back and forth to focus the telescope. Mine works more effectively than I expected it to do.

Precise details will, of course, depend on the type of holder on your telescope, and on the facilities you have for making up the few parts needed to complete the assembly, but it shouldn't be too difficult to do, and if you are as frustrated as I was with that wiggle, you'll accomplish it as I did.

The Royal Astronomical Society of Canada
Victoria Centre

Presents Travelling Observatory Project
by Leo Vander Byl

Due to the sudden availability of a 20″ diameter blank and sundry accumulated and readily available bits and pieces, the Victoria Centre has been put in the very fortunate position to acquire a major (by amateur standards) telescope. Normally the scope of such an undertaking would tax the financial capability of any centre, also the many technical skills required are



normally not readily available in a small group. So the Victoria Centre, which counts among its members many professional astronomers and other highly skilled craftsmen, is very fortunate indeed to be able to put all this talent to work on what could very well be a project that attracts the attention of amateur astronomers and telescope builders the world over.

As stargazing is becoming more sophisticated with better and larger telescopes, which show us ever more wonders of the universe, the amateur astronomer would like to be a participant, and this is what the project will hopefully accomplish by high quality optics and computerized drives. The scope of the project is a travelling observatory which has the advantage over a fixed installation that it can be moved to where occultations and eclipses (for instance) are observable. These events are becoming more important as we need to refine our knowledge of the true motions of celestial bodies. To do this, the alignment of the telescope mounting to the celestial pole is to be rapidly and accurately accomplished by moving the whole installation approximately in line and then fine-adjusting the mounting by remote control to the actual position of any number of available stars of which the coordinates are accurately known. Further it will be necessary to record WWV time signals as it coincides with the event being monitored. As a further refinement the event should be recorded by a high-resolution TV camera on a video recorder together with the time signal. To do this very accurately it will be of paramount importance to have the telescope driven at the exact sidereal rate by a computer controlled clock drive. The computer for this purpose can very easily be expanded with a memory bank that holds the position of alignment stars and, with proper feedback and position indications from the mounting, the computer can then operate the various motors until the required position has been attained, of course while keeping track of the time.

With the various pieces of equipment mentioned thus far we now have only to load the memory bank of the computer to hold a multitude of coordinates of more interesting and important objects for public viewing to make it a very effective educational instrument. The high light-gathering capacity of a 20″ mirror coupled with a high resolution TV camera will

bring many objects to the viewing public that were unattainable before with the average amateur telescope. While at the same time more people can enjoy seeing the objects on the TV screen, considerable time can be saved by eliminating the individual focusing at the eyepiece. At the Newtonian focus provision will be made for photography with a cold camera to allow those members making it their hobby to take better photographs of deep sky objects, galaxies, etc.

To sum up: a travelling observatory of this magnitude will be a considerable boon to the RASC members generally for deep sky and planetary objects, to the professional astronomer who needs a mobile instrument for eclipse recording etc., to the public who will be shown many more things in the same viewing session. Thus it becomes both a research and an educational tool.

Finally, for those members involved in the building of this facility it will be a source of great satisfaction to contribute another step in the progress of amateur astronomy. When the Centre finally procures a building with a permanent dome for its own, the telescope could be mounted in it, if so desired.

Simon Newcomb Award

At the meeting of the Council of the RASC on May 21, 1978, a proposal from the Halifax Centre, the *Simon Newcomb Award*, was adopted. The award is named after a native of Nova Scotia, an astronomer who was the foremost man of science of his time in America.

Simon Newcomb (1835–1909) was born at Wallace Bridge, N.S. At age 18 he moved to Massachusetts and later to Washington, D.C. where he spent his entire professional life. In 1861 President Lincoln commissioned him as Professor of Mathematics and Astronomy in the United States Navy. For 16 years he carried on astronomical observations at the Naval Observatory. From 1877 to 1897 he was Superintendent of the American Ephemeris and Nautical Almanac Office. Newcomb became the world authority on the orbital dynamics of the Moon and planets. Among the many honors which he received were the Gold Medal of the Royal Astronomical Society (1874), the Copley Medal of the Royal Society of London (1890), President of the American Association for the Advancement of Science, the first President of the Astronomical and Astrophysical Society of America (the present American Astronomical Society), and seventeen honorary degrees from leading universities in the United States and Europe.

Rules:

Topics

Awards will be given for articles relating to astronomy, astrophysics or space science. Topics should interest average to well-informed amateurs and may be of current or historical interest.

Presentation

Articles should be 1000–1500 words, written in proper grammatical form and presented typewritten and double-spaced. Diagrams need not be in finished form but should be complete and ready for drafting. Photographs may also be submitted and if possible original negatives should accompany the submission. The author(s) name(s) shall appear only on the title page and references to his Centre affiliation should not appear in the article.

Eligibility

Any RASC member in good standing may submit articles. The intent of the Simon Newcomb Award is to recognize literary ability among non-professional members of the Society.

Submission of Entries
Articles must be received by the Awards Committee of the RASC between January 1 and March 31. **Members of Centres** must first submit the entries they wish to their Centre Executive with the Executive choosing the entries they wish to represent their Centre. It is the responsibility of the Executive of the Centre to ensure the entries are received by the deadline above. **Unattached Members** will submit their entries to the Awards Committee directly.

Judging
Articles will be judged by the Awards Committee. Criteria shall include scientific accuracy, originality, and literary merit.

Presentation of Award
The award will be presented at the General Assembly by the Halifax Centre representative to the winner (or a representative of the winner's Centre). The award will remain in the hands of the winner's Centre for display and will be returned to the National Office by April 1 of the following year. If the winner is an unattached member, the award will be displayed at the National Office of the RASC. The award will be described at a later date once its design has been established.

NOTE: The Judging Committee of 1980 has urged contestants to pay greater consideration to the grammatical form and include references. The latter indicates evidence that the author(s) have read widely and have contributed thought and interpretation of their own.

The Dark Rings of Saturn

by Alan Whitman
Kelowna, B.C.

I recently made an observation with my Meade 8-inch Newtonian that may be of interest for the aperture. Let me quote from my observing journal:

> May 30, 1980 – "I had the impression that I could see the dark rings extending from the ring silhouette beyond Saturn's disk, faintly illuminated as in the Pioneer photos. The rings were inclined about 1.6 degrees, which is nearly maximum opening for the dark rings. (See the discussion on page 501, *Sky and Telescope*, December 1979)."
> June 11, 1980 – "The dark rings were visible in flashes of good seeing as extensions of the ring silhouette – I'm confident that it was actually the rings as they looked as they should, were sharp images, were always precisely in line with the silhouette, and were visible in good seeing, never when the image was bad. This confirms my original observation of May 30, 1980."

These observations were at 174X using a Meade Research Grade orthoscopic eyepiece and also at 348X with the addition of a Barlow. Both observations were during evening twilight, in good seeing conditions.
I would be interested in comments other readers might have on the above report.

Editor's note: The above report is in exact agreement with observations made personally, and by several other observers around similar dates here. Equipment here was an 8-inch Cave Newtonian, and 7½ inch Maksutov.

From *Nova*, September 1980
Vancouver Centre.

Esoteric Fact Number X plus?

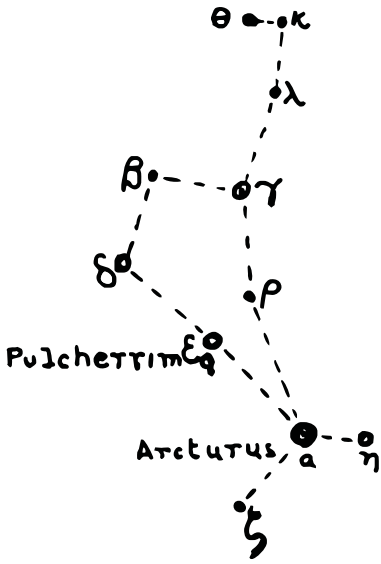
from *Regulus*,
Kingston Centre

Here is a fact to remember when someone says he has seen the most beautiful star or the most beautiful "double" in the sky.

There is actually a star that is named *The Most Beautiful One*. It is ε (epsilon) Boötis and, in fact, it is a double, really a binary system. For approximately a century and a half it has had the proper name, *Pulcherrima*. This is short for Stella Pulcherrima, two Latin words whose English translation could be "the most beautiful star (in the sky)".

How did a binary system come to be honoured with the name Pulcherrima? It was conferred by F. G. W. Struve, who in 1829 discovered the bright object to be a pair of outstandingly fine colour contrast. The primary star, at magnitude 2.47, is yellowish orange, and the other, at magnitude 5.04, is bluish in colour.

One observer clearly separated this pair with a 2¼ inch telescope, but less experienced observers may need a larger instrument, for this extremely fine pair has angular separation listed as only 3″ of arc.



The next time you are observing with a 4″, a 6″, or a larger instrument, when Boötes is in the sky, be sure to try to resolve this spectacular star system. ε Boötis is located about 10 degrees north-east of Arcturus.

Here is another interesting fact; the Pulcherimma Boötis system, at combined magnitude 2.39, is eighty-second on the list of brightest stars in the sky. (It is in the Handbook Page 112 (1981 edition) at 14h44.1m, +27°09′). It is certainly easy to see in the sky; so just get them resolved in *your* telescope for a real astronomical experience. Pulcherrima!

Victoria is the ONE in '81!

The Victoria Centre is looking forward to welcoming RASC members from across the land to our fair island for our first ever General Assembly in Victoria (although we did co-sponsor the 1972 G.A. jointly with the Vancouver Centre). 1981 June 26–29 are the dates of our gathering, at the campus of the University of Victoria, where residence accommodation will be available and where the scientific sessions will take place. The UVIC campus is relatively new, being about a decade and a half old, and is located not far from the sea in the north-east part of town, and has easy bus service to the downtown area. Friday evening will open the assembly with a wine-and-cheese reception, a slide party, and viewing thru the university's 50 cm reflector. Another evening will be spent touring the Dominion Astrophysical Observatory facilities on Little Saanich Mountain, with viewing of the heavens with the 1.85 metre telescope. In addition to these well established observatories, many members have their own backyard observatories which may invite private inspection, and we hope that the centre's trailer-mounted mobile 50 cm telescope may be close to realization by this time.

Time will be spared from the astronomical program for visits to the floral beauty of Butchart's Gardens, the new Institute of Ocean Sciences and Pacific Geoscience Centre at Patricia Bay, and the Provincial Museum. Victoria, which claims tourism as its first industry, has much to offer the visitor by way of gardens, scenic drives, museums, parks, restaurants and so on.

We welcome ten minute papers for the scientific sessions from amateur and professional astronomers alike. Members interested in presenting a paper should write to:

B. Franklyn Shinn,
Box 32, Site 55, R.R. #1,
Lantzville, B.C.,
V0R 2H0.

with an abstract of 150 words or less, no later than May 15, 1981.

R.A.S.C. members are reminded that travel assistance to Victoria may be available from our National Headquarters in Toronto through your local centre.

Fly, drive, cruise by ferry through the scenic Gulf Islands, swim or paddle – but follow the stars westward to Vancouver Island for G.A. '81!

RETURN FORM

YES, I plan to attend the R.A.S.C. General Assembly in Victoria, June 26–29, 1981.

Name: . . . . . .

Address: . . . . . .

. . . . . .

Number in your party: . . . . . .

University Accommodation: Dates needed: . . . . . .

Other Accommodation: Yes . . . . . No . . . . . .

(We will supply a copy of the 1981 B.C. Government Accommodation Directory to persons responding affirmatively.)

Preregistration by May 1, 1981 would be appreciated. Please return this form to:

Victoria Centre of the R.A.S.C.,
c/o Dominion Astrophysical Observatory,
5071 West Saanich Road, R.R. #5,
Victoria, B.C.,
V8X 4M6.

En 1981, Victoria!

Le Centre de Victoria se prépare à accueillir tous les membres de la SRAC a travers le pays à l'occasion de notre premiere assemblée générale à Victoria (mentionnons que nous avons participé à la réalisation de l'assemblée générale tenue a Vancouver en 1972). Cette reunion se tiendra du 26 au 29 juin 1981 au campus de l'Université de Victoria, où les residences universitaires seront disponibles à nous, et où auront lieu également les sessions scientifiques. Le campus de l'UVIC, bâti depuis environ une quinzaine d'années, est relativement nouveau et est situé près de la mer dans la partie nord-est de la ville. Egalement, un service d'autobus rend accessible le transport au centre-ville.

L'ouverture de l'assemblée se fera vendredi soir, débutant par une réception amicale avec vin et fromage, une séance de diapositives, et observations avec le téléscope de 50 cm de l'Université. Un autre soir sera consacré à une visite de l'Observatoirc fédéral d'astrophysique sur la "Petite Montagne Saanich" où nous aurons l'occasion d'observer les merveilles du ciel avec le téléscope de 1.85 mètres. En addition de ces observatoires bien établis, plusieurs membres disposent d'observatoires privés sur leur propre terrain et inviteront possiblement les autres membres à y en faire une visite. Aussi, nous espérons que le projet réalisé par le Centre, c'est-à-dire la construction d'un téléscope mobile de 50 cm monte sur une remorque sera prét d'être achevé.

Ce programme scientifique incluera des temps libres pour visiter d'autres attractions de Victoria: les jardins de Butchart avec sa beauté florale, l'Institut de Sciences Océanographiques et le Centre des Sciences géologiques du Pacifique à Patricia Bay, et le Musée Provincial. Victoria, dont l'industrie premiere est le tourisme, a beaucoup à offrir au visiteur en matière dejardins, routes pittoresques, musées, parcs, restaurants, etc.

Nous invitons les astronomes amateurs et professionnels a presenter des essais de dix minutes (durée maximum) au cours des sessions scientifiques. Les intéressés peuvent écrire à:

B. Franklyn Shinn,
Box 32, Site 55, R.R. #1,
Lantzville, B.C., V0R 2H0.

avec un sommaire de 150 mots ou moins, avant le 15 mai 1981.

Rappelons que les membres se la SRAC pourront appliquer a notre Quartier Général à Toronto à travers votre centre local pour des frais d'assistance en ce qui concerne leur transport à Victoria.

Volez, conduisez, prenez le bateau qui vous conduira à travers les Iles du Golfe de Georgia, nagez ou pagayez – mais suivez les étoiles de l'Ouest qui vous mèneront a l'Ile de Vancouver pour l'Assemblée générale de 1981!

FORMULAIRE DE REPONSE

OUI, je projette de venir à l'assemblée générale a Victoria, le 26–29juin, 1981.

Nom: . . . . . .

Adresse: . . . . . .

. . . . . .

Nombres de personnes: . . . . . .

Accommodation universitaire: Dates requises: . . . . . .

Other Accommodation: Yes . . . . . No . . . . . .

(Nous ferons parvenir une copie de l'Annuaire provincial des accommodations en Colombie Britannique aux personnes qui répondront affirmativement.)

PRIÈRE de retourner ce formulaire avant le 1 mai 1981 si possible à:

Victoria Centre of the R.A.S.C.,
Observatoire federal d'astrophysique,
5071 Chemin Saanich W., R.R. #5,
Victoria, C.B.
V8X 4M6.

NATIONAL NEWSLETTER

Index for the Year 1980

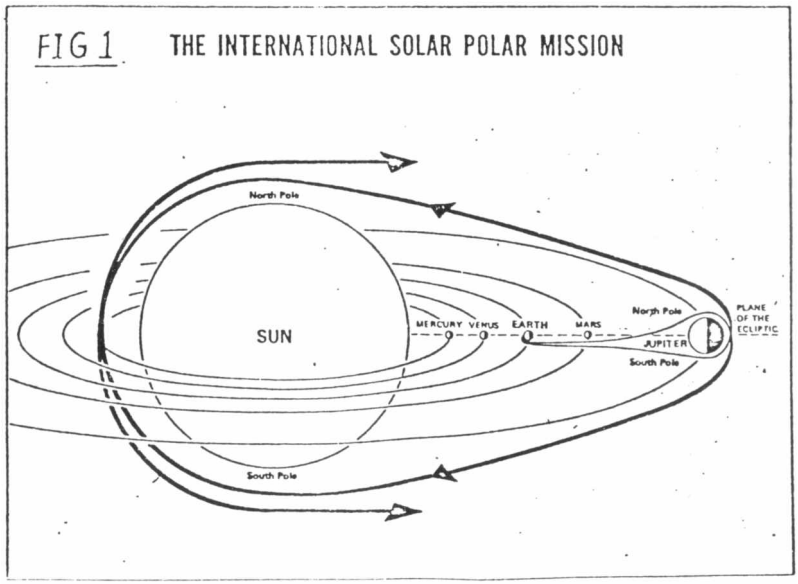
Supplement to the JOURNAL OF THE ROYAL ASTRONOMICAL SOCIETY OF CANADA

Vol. 74, No. 1 through No. 6

International Solar Polar Mission (ISPM)

from *Starseeker*, Calgary

Extracted and summarized from an article in the January 1980 issue of *SPACEFLIGHT*, the journal of the British Interplanetary Society.



Early in 1983 two space vehicles will be launched to study the polar regions of the sun, which cannot be seen clearly from Earth, or from any probe launched so far. In order to achieve their mission, the two craft must initially head towards Jupiter, where they will make use of the gravitational whip principle to gain sufficient energy to leave the ecliptic plane making them the first probes to enter the vast unexplored volume of space either side of the plane in which the planets orbit.

One vehicle will be developed and built by the STAR Consortium for the European Space Agency, the other by NASA. Systems for control of trajectory and altitude will be developed by British Aerospace Dynamics Group at Bristol, for the prime contracts – Dornier Systems – to mark Britain's entry into the select interplanetary club.

The mission is expected to improve understanding of the structure and dynamics of the solar corona, solar wind particle flow along with magnetic fields and electromagnetic radiations of the sun as well as those originating in galactic sources. The trajectory shown by figure 1 will take four years to complete.