

MONTHLY NEWSLETTER

HALIFAX CENTRE

ROYAL ASTRONOMICAL SOCIETY OF CANADA

MARCH 1961

An off-axis reflecting telescope is one in which the light coming from a sky object is not obstructed by the Newtonian diagonal or its struts thereby avoiding diffraction. A Newtonian diagonal and its struts produce two types of diffraction in light reaching the mirror's surface. One diffraction is caused by the obstruction of the light and the other, "temperature diffraction", when the diagonal and struts are slightly colder or warmer than the surrounding air inside the tube.

Thus we must prevent these light diffractions caused by the Newtonian diagonal and struts from reaching the mirror's surface to be reflected back to the diagonal and eyepiece confusing the image by mixing in with the pure unobstructed light from the sky object. To accomplish this we can place a black paper pattern representing the "shadow" cast by the Newtonian diagonal and strut on the surface of the mirror. For telescopes with a focal length up to 80 inches cut the pattern $\frac{1}{8}$ inch wider all around than the diagonal and strut. Care must be taken to place the paper pattern where the diffraction pattern falls on the mirror. It is true that by placing this pattern on the mirror you lose a little light gathering area but this is a confused diffraction area that you can well afford to get rid of.

There are numerous ways to properly collimate the paper pattern to the diagonal and strut "shadow" on the surface of the mirror in order to mask off the Sun's umbral and penumbral effect. One is to line up the telescope with an overhead electric light, remove the ocular, place a piece of cardboard over the opening and observe through a small hole punched in the centre.

Anchor the paper pattern on the mirror with tape fastened to the cell's edge.

REPORT FROM AURORA GROUP: The aurora is one of the many different kinds of atmospheric luminosity. In some of these, light coming from outside the atmosphere is modified by the air or its dust or cloud particles. Rainbows, haloes and the beautiful colours of twilight and dawn are of this type. In a quite different class are luminosities in which light is generated in the atmosphere. They include lightning, meteors and the aurora and airglow. Lightning is produced by strong electric discharges associated with thunder-clouds, in the lowest layer of the atmosphere - the troposphere. Meteor light is caused by the entry of small or large pieces of solid matter, with high speed, from outside the atmosphere. The night airglow is produced by chemical reactions in the high atmosphere, energized by sunlight absorbed during the day-time. The aurora is produced by the entry into the atmosphere of positively charged atoms, mainly of hydrogen, together with electrons; they come from the Sun, and enter the atmosphere with speeds far exceeding those of meteors.

The aurora is distinctive in several ways: in colour, form, times of incidence, geographical distribution, and in its many associations with other phenomena, such as sunspots, magnetic storms and ionospheric storms.

The aurora commonly occurs only in high latitudes, and is known as the aurora borealis (northern lights) or aurora australis (southern lights).

The frequency with which auroras are visible is linked with the geomagnetic latitude of the viewpoint, that is, with the latitude relative to the geomagnetic axis of the earth. The northern pole of this axis is at 78.6 degrees N, 70.1 degrees W. (geographic coordinates)

In connection with the frequency of auroral appearances, it is convenient to divide the earth's surface into five parts.

The part of the surface lying between the circles of geomagnetic latitude 45 degrees north and south is called the MINAURORAL BELT. This region includes 70.7 per cent of the earth's surface. The name MINAURORAL is given to this region because it is the part of the globe where the frequency of auroral occurrence is minimal. Auroras are on record as having been seen in geomagnetic latitudes down to 10 degrees, and even as low as 8 degrees; it may be that they are at times visible at still lower latitudes possibly down to the geomagnetic equator. The frequency of auroral appearance in the minauroral belt is not properly known; it increases from the geomagnetic equator to the borders of the minauroral belt. At these borders the aurora will be visible once every three or four years, on a long-term average.

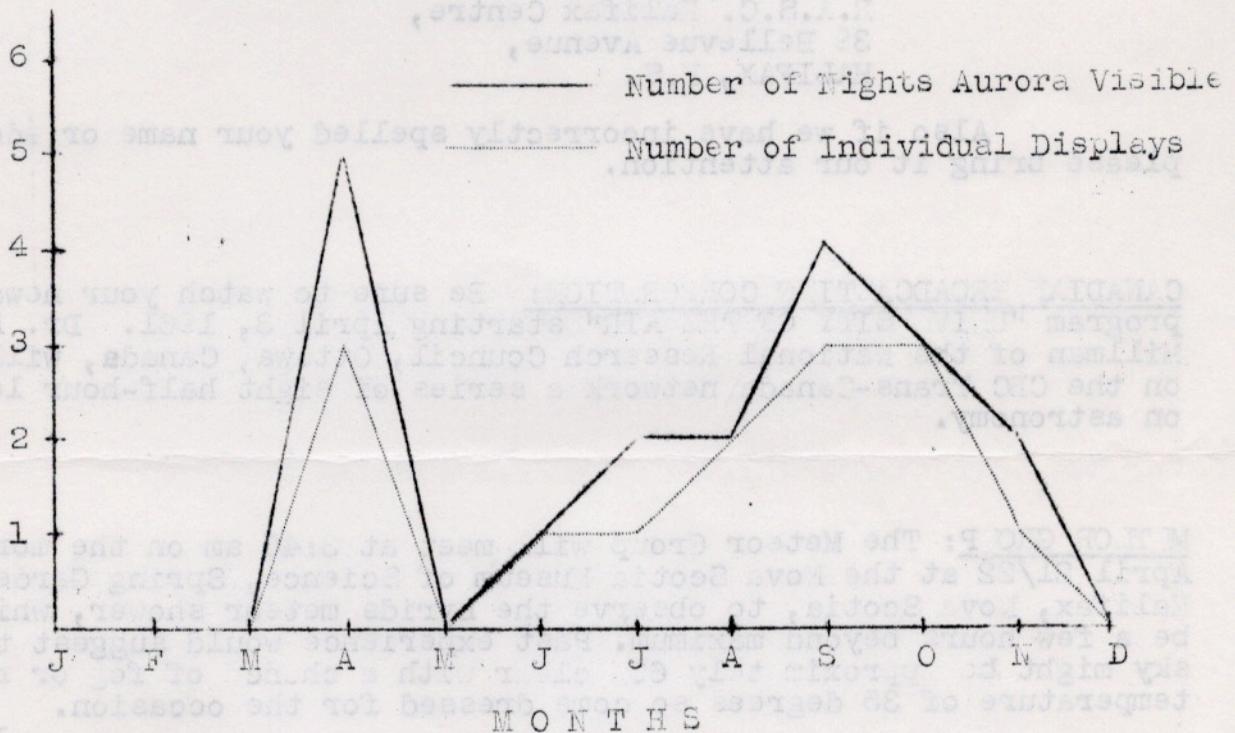
The minauroral belt is bordered to the north and south by the two belts, called SUBAURORAL, between 45 degrees and 60 degrees geomagnetic latitude. Each of these belts includes just over 7.9 per cent of the earth's surface.

In the subauroral belts, as in the minauroral belt, the frequency of auroral appearance increases with geomagnetic latitude. The rate of increase of frequency per degree of latitude much exceeds that in the minauroral zone. At the polar borders of the subauroral belt the average number of auroras visible per year is probably at least 30. It is more in the years near sunspot maximum than in those near sunspot minimum, and more in the months near the equinoxes than in those near

the solstices.

The two remaining regions of the earth are the polar caps within the circles of geomagnetic latitude 60 degrees north and south. These are called the AURORAL REGIONS. Each includes 6.7 per cent of the earth's surface. In these regions the frequency of auroral visibility does not increase steadily with increasing geomagnetic latitude, as in the subauroral and minauroral belts. In each auroral region (N and S) the frequency is greatest along the auroral zone (N or S). This zone is a narrow band, about 3 degrees wide, lying about equally on either side of an oval line that coincides approximately with the circle of 67 degrees geomagnetic latitude. The region enclosed by the zone is called the auroral cap (N or S). Along the auroral zone the aurora is probably visible at some time on almost every clear night. From the zone the frequency decreases towards the polar border of the subauroral belt. It decreases also towards the centre of the auroral cap. There its value (not well determined) is supposed to be about 50 times per year, on a long-term average.

Halifax is located in the subauroral belt and it has been estimated that aurora should be seen on approximately twenty nights each year. During 1960 aurora was reported, in the Halifax area, on 19 different nights with 14 different displays. Five displays lasted for two nights.



With only 19 observations it is difficult to draw any significant statistical results but a look at the graph does show the preference for these displays to occur in the periods near the equinoxes. This is a well known property of visual auroral displays and not the result of easy viewing during the summer months and a lack of effort during the cold winter months.

Mr Harold Curran reported the greatest number of auroral displays and he is to be congratulated on his effort. Others who also

contributed to the results were Dr. R. L. Aikens, Mr Jim McGuigan and Mr. Tom Clahane.

During 1961 it is hoped that more members will take an active part in the Group. For information concerning the Group please contact Mr. Bert Allen.

No reported sighting of aurora, in the Halifax Area, has been made by any member of the Group since the last issue of GALAXY.

MARCH MEETING NOTICE: The next meeting of The Royal Astronomical Society of Canada, Halifax Centre, will be held on the evening of March 29, 1961, at 8:00 pm. in the Planetarium Room of the Nova Scotia Museum of Science, Spring Garden Road, Halifax, Nova Scotia.

ARE YOU RECEIVING YOUR MAIL? If you have changed your address please notify the Centre immediately. Only in this way are we able to keep in contact with you. Address all correspondence to;

Mr Jim McGuigan, Treasurer,
R.A.S.C. Halifax Centre,
39 Bellevue Avenue,
HALIFAX, N.S.

Also if we have incorrectly spelled your name or address please bring it our attention.

CANADIAN BROADCASTING CORPORATION: Be sure to watch your newspaper for program "LIVING CITY OF THE AIR" starting April 3, 1961. Dr. Peter M. Millman of the National Research Council, Ottawa, Canada, will broadcast on the CBC Trans-Canada network a series of eight half-hour lectures on astronomy.

METEOR GROUP: The Meteor Group will meet at 3:45 am on the morning of April 21/22 at the Nova Scotia Museum of Science, Spring Garden Road, Halifax, Nova Scotia, to observe the Lyrids meteor shower, which will be a few hours beyond maximum. Past experience would suggest that the sky might be approximately 60% clear with a chance of fog or rain and a temperature of 35 degrees so come dressed for the occasion.

J. McG.

ZODIACAL LIGHT: Zodiacal light is so called because the triangular band of light which extends from the horizon half way to the zenith follows the earth's ecliptic and hence passes through the constellations of the zodiac. This faint glow of light is best observed in the early evenings of March and April and just before dawn in September and October. Now is the time to watch for this light which appears as a 6th-magnitude star.

RULES FOR BORROWING BOOKS BY MAIL

from

THE ROYAL ASTRONOMICAL SOCIETY OF CANADA

252 COLLEGE STREET, TORONTO 2B, ONTARIO

The following rules govern the borrowing of books, by mail, from the Society's Library. The Library now has approximately 1,100 books available to choose from.

- (1) Books may be borrowed for one month - one at a time when by mail but, when requested, an extension of time would be granted provided no other request had been made for the item.
When requested in advance, the Librarian may grant a longer period when reason for doing so is approved.
- (2) Magazines and a few books in heavy demand may only be borrowed for two weeks.
- (3) There is a charge of two cents a day for items not returned when due.
- (4) Books may be returned postage free provided the return label, which will be enclosed in each package, is utilized and is unsealed for postal inspection but well tied with string.
- (5) Please enclose ten cents with your application towards postage.

PARTIAL LIST OF TITLES IN THE LIBRARY

<u>AUTHOR</u>	<u>TITLE</u>
Abetti, G.	The Sun
Alter, D.	Introduction to the Moon
Alter & Clemenshaw	Pictorial Astronomy
Armitage, A.	The World of Copernicus
Armitage, A.	Sun, Stand Thou Still
Baker, R. H.	When the Stars Come Out
"	Astronomy for Everybody
"	The Universe Unfolding
"	Astronomy
Baldwin, R. B.	The Face of the Moon
Barnett, L.	The Universe and Dr. Einstein
Barritt, L. & M.	Barritt's Celestial Album
Barkly, W.	Highlights of Astronomy
Bedell, A. L.	Album of Celestial Photographs
Beer, A.	Vistas in Astronomy I
Bernhardt et al	Handbook of the Heavens

Bok, B.	The Astronomer's Universe
Bok & Bok	The Milky Way (1941)
"	The Milky Way (1957)
Bonestell-Ley	The Conquest of Space
Bowditch	The Yankee Star Gazer
Boyd & Seaton	Rocket Exploration of The Upper Atmosphere
Burgess, E.	Frontiers of Space
"	Satellites and Space Flight
Butterfield, H.	The Origin of Modern Science
Bush, V.	Modern Arms and Free Men
Campbell, L.	Long Period Variables
Campbell & Jicchia	Variable Stars
Carter, L. J.	Realities of Space Travel
Chant, C. A.	Our Wonderful Universe
Coleman, J. A.	Relativity for the Layman
Conant, J. E.	On Understanding Science
Condady, A. H.	Applied Optics & Optical Design
Darwin, C.	Autobiography of Charles Darwin
Degani, M. H.	Astronomy Made Simple
Douglas, A. V.	Arthur Stanley Eddington
Du Nouy, L.	Human Destiny
Galileo, G.	Two World Systems
Gamow, G.	Mr Tompkins Explores the Stom
"	Mr Tompkins in Wonderland
"	The Birth and Death of the Sun
"	Biography of the Earth
Gaposchkin, C. P.	Stars in the Making
"	The Galactic Novae
Goldberg, L.	Atoms, Stars and Nebulae
Hamilton, J.	Our Own and Other Worlds
Hargreaves, F. J.	The Size of the Universe
Heuer, K.	The Next 50 Billion Years
Houghton, H. G.	Atmospheric Explorations
Hoyle, F.	Frontiers of Astronomy
"	The Nature of the Universe
Hubble, E.	The Nature of Science
"	The Realm of the Nebulae
Ingalls, A. G.	Amateur Telescope Making, Book I
"	" " " Book II
"	" " " Book III
Jones, H. S.	Life on Other Worlds
Kaempffert, W.	Explorations in Science
Kamp, P. van de	Basic Astronomy
King, H. C.	History of the Telescope
Krogdahl, W.	The Astronomical Universe
Kruse & Dieckvoss	The Stars
Kuhn, T. S.	The Copernican Revolution
Kuiper, G. P.	The Earth as a Planet
"	The Sun
"	The Atmospheres of the Earth & Planets

Ley, W.	Rockets, Missiles and Space Travel
"	The Exploration of Mars
Life Magazine	The World We Live In
Lovell, A. C. B.	The Individual and the Universe
Lovell & Clegg	Radio Astronomy
Lyttleton, R. A.	The Modern Universe
Mayall & Mayall	Sky Observer's Guide
Mensel, D. M.	Our Sun
Minnaert, M.	Light & Colour in the Open Air
Moore, P.	The Planet Venus
"	The Guide to Mars
"	A Guide to the Moon
Moyer, C.	Silver Domes
Munitz, M.	Theories of the Universe
Neal, H. H.	The Telescope
Newton, H. W.	The Face of the Sun
Finninger, H. H.	The Finninger Meteorite Collection
Norton, A. P.	Norton's Star Atlas
O'Connell, D. J. K.	The Green Flash
"	Stellar Population
Olcott & Mayall	Field Book of the Stars
Palmer, D. L.	Radio Studies of the Universe
Peck, B. M.	The Planet Jupiter
Pfeiffer, J.	The Changing Universe
Phillips, T. E. B.	Splendour of the Heavens, I & II
Pickering, J. S.	1001 Questions Answered About Astronomy
Rey, H. A.	The Stars, A New Way to See Them
Rosen, R.	The Naming of the Telescope
Rosin & Eastman	The Road to Abundance
Royal Society, The	Newton's Tercentenary Celebrations
Rush, J. H.	The Dawn of Life
Russell, H. N.	The Solar System
Scientific American	The Planet Earth
Selwyn, F. W. H.	Photography in Astronomy
Shapley, H.	The Inner Metagalaxy
"	Galaxies
Shternfeld, Ari	Soviet Space Science
Sidgwick, J. B.	Observational Astronomy for Amateurs
"	Amateur Astronomer's Handbook
"	Introducing Astronomy
Smyth, H. D.	Atomic Energy for Military Purposes
Sullivan, J. W. N.	The Limitations of Science
Tancook, E. C.	Starting Astronomy
Texereau	Making Your Own Telescope
Thomas, W. S.	The Amateur Scientist
Thompson, A.	Making Your Own Telescope
Van den Bergh, G.	The Universe in Space and Time
Vaucouleurs, G. de	Physics of the Planet Mars
"	Discovery of the Universe
Watson, F. G.	Between the Planets
Whipple, F. L.	Earth, Moon and Planets
Whitehead, A. N.	Science and the Modern World
Wilkins, H. P.	Clouds, Rings and Crocodiles

Wilkins & Moore
Wisar, R.
Wright, H.

The Moon
Man and His Physical Universe
Palomar, the World's Largest Telescope

REPORT FROM NAKED-EYE SUN-SPOT GROUP: Several new members have joined the Group making a total of seven. The list is as follows:

Miss Margo Dunsworth
Dr. G. Wheelock
Mr. B. McTavish
Mr. A. S. Hopkins
Mr. Wayne Beaton
Mr. Bert Allen
Dr. R. L. Aikens, Chairman

The report for the month of February is a negative one, no sunspots having been seen by any member reporting.

It is of interest to read in the February issue of "Skyward", which is the monthly publication of the Montreal Centre of The Royal Astronomical Society of Canada, that they too have been finding naked-eye sunspots to be very scarce. It is pointed out, however, that negative observations are very important and statistical studies of solar activity through the years show that records are **not** very complete for periods of sunspot minimum.

It is perhaps unnecessary to add a word of warning when carrying out naked-eye sunspot observations, but even so, it will be repeated that the sun should not be observed except through a proper glass and the one recommended is a welder's glass, color #14. In this respect, I have come across a letter in the February 11th. issue of the British Medical Journal and also an accompanying editorial on the same theme. This is with reference to the solar eclipse of February 15th. and it was pointed out that permanent blind areas may result if an individual observes the sun directly. They recommend projecting an image of the sun on a piece of white cardboard from a small hole in another piece of cardboard. This does not sound suitable for sunspot viewing but the welder's glass, as noted above, may be used or if a telescope is used, the image should be projected on a piece of cardboard.

R.L.A.

MEMBERSHIP LIST: Please make the following changes and additions to the membership list that appeared in the February issue of GALAXY:

Mr. Howard Cameron	64 Quinn Street, Halifax, N. S.
Mr. P. E. Devine	Kingston, N. S.
Mr. D. V. Gonder	124 Century Drive, Moncton, N. W.
Mrs. P. J. O'Hagean	19 Hammonds Plains Rd., Bedford, N. S.
Mr. Gordon Harris	56 $\frac{1}{2}$ Lawrence Street, Halifax, N. S.
Mr. John Manolopoulos	8 Waegwoltic Avenue, Halifax, N. S.
Mr. C. F. Moseley	11 Pine Street, Dartmouth, N. S.
Dr. G. H. Wheelock	S. S. #1 Armdale, N. S.