SOLAR DIVISION Bulletin

SEP 28 1954

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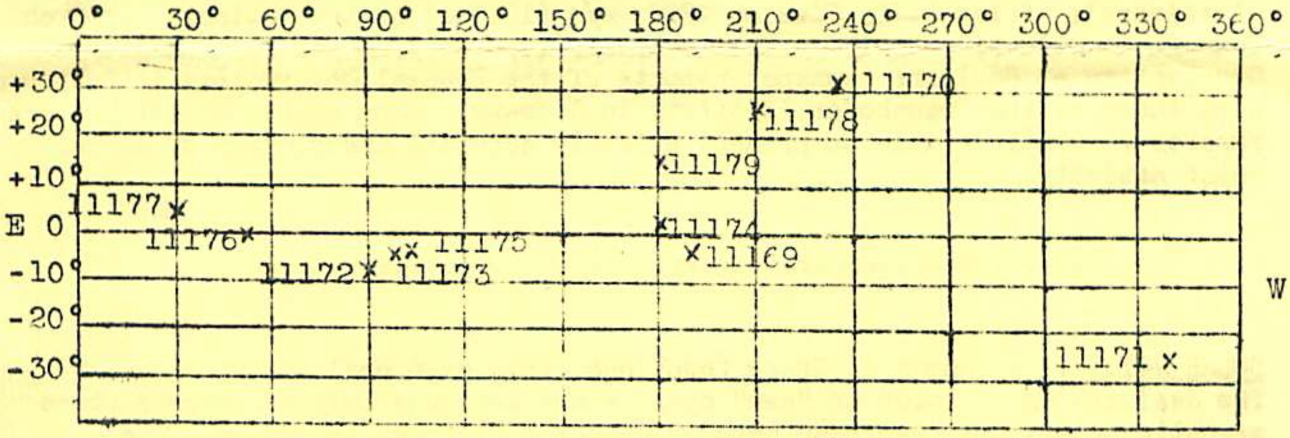

Approximate distribution of sunspot groups in latitude and longitude (Carrington's) as observed at the Mount Wilson Observatory during the first half of 1954. (see text bellow)

SOLAR ACTIVITY - Jan. - June 1954
Thomas A. Cragg

SUNSPOT OBSERVATIONS at Mt. Wilson Observatory:

Jan. 11 - very minute "hour" spot at S3°;E32°; seen at 18:15 UT
Feb. 8 - new cycle (2nd) group at N31; W27 (polarities confirmed)
Mar. 1 - new cycle (3rd) group at S25; W46; passed over west limb 3/4
Mar. 12 - old cycle group formed at S8; E59; magnetic polarity max. 3200 Gauss largest group in many months, Maximum area of 750 millionths of sol hemisphere (US Naval Obs.)
Apr. 6 - return of Mar. 12 spot; last seen Apr. 9th.
Apr. 9 - old cycle group of one day duration only at N3; W39
Apr. 15 - old cycle group (follower spot only on 4/15) at S4; W43 last seen bipolar on 4/16.
Apr. 20 - old cycle one day spot at S1; W54
Apr. 20 - high latitude strong "faint marking" at S51; W5; polarity of 200 Gauss observed by Mr. Cragg at 24:35 UT
May 14 - very minute spot at N4; W2; last seen 5/15
May 27 - faint spot seen on plates taken at the 60' tower telescope at N25 E13 (probably new cycle -- 4th spot of new cycle)
June 1 - old cycle one day spot at N14; W27

EDITORIAL NOTE

Starting with this issue of the Solar Division BULLETIN, a regular column on SOLAR ACTIVITY will be published. Mr. Thomas A. Cragg, solar research assistant, at Mt. Wilson and Palomar Observatories has kindly agreed to write this column. Mr. Thomas Cragg explained in one of his letters to me: "It is hoped that I can include in the monthly summary such items as magnetic polarity distribution in complicated groups (for grouping difficulties), at least the rough positions of the groups when first observed, how long they lasted, unusually bright or "unattached" plages, unusually large or active prominences, flares (which may be many weeks behind time!), magnetograph data and possibly a little terrestrial magnetism data .....coupled with the data you already have available this ought to make a rather comprehensive coverage of solar data."

This editor gets regularly data on sunspot areas from the U. S. Naval Observatory; the "Ionospheric Data" of the National Bureau of Standards-Crpl (covering data concerning coronal activity, flares, geomagnetic and ionospheric activity and storminess); Solar Radio Flux on 2800 Mc/s (10.7cm) of the National Research Council in Ottawa; weekly coronal activity reports from the High Altitude Observatory at Boulder; sunspot reports of the Federal Observatory in Zurich and also those of the Fraunhofer Institute in Germany. Thus combined with Mr. Cragg's reports we shall be able to present a fairly accurate description of overall solar activity.

HLB

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SOLAR ACTIVITY - Thomas A. Cragg (continued from page one)

The designation of "old" or "new" cycle spots was made only for groups whose magnetic polarities have been checked at the 150' tower telescope. The preceding spot of an old cycle group has a negative polarity on the Northern Hemisphere. It is called negative because a part of the spectral line used for the magnetic measurement is shifted to the violet end of the spectrum. The direction of this shift, due the Zeeman effect, and its magnitude are used to determine the polarity and magnitude of the magnetic flux, which is expressed in so called Gauss units.

TABLE 1

Number	CMP	Lat.	Hmax	First seen	Last seen	Class	Cycle	Area*
11169	1/14.2	-3°	(2)	1/11	1/11	dxd	old	6
11170	2/6.7	$+31^\circ$	4	2/8	2/9	dβfd	new	40
11171	2/26.2	-25°	15	3/1	3/4	dβpl	new	170
11172	3/17.2	-8°	33	3/12	3/21	dβpl	old	750
11173	4/12.4	-5°	4	4/6	4/9	lαpd	old	36
11174	4/6.8	$+3^\circ$	2	4/9	4/9	dβpd	old	36
11175	4/12.5	-4°	2	4/15	4/16	dβfd	old	24
11176	4/16.6	-1°	2	4/20	4/20	dαpd	old	16
11177	5/14.6	$+4^\circ$	(4)	5/14	5/15	dxd	old	***
11178	5/28.6	$+25^\circ$	(1)	5/27	2/27	dxd	new	***
11179	5/30.6	$+14^\circ$	2	6/1	6/1	dαpd	old	***

*) Maximum sunspot-group area as measured by the U. S. Naval Observatory and expressed in millionths of the solar hemisphere.

***) Not yet available.

Table 1 presents all essential data pertaining to the sunspot groups observed at Mt. Wilson numbers designate each sunspot group. CMP means Central Meridian Passage and is equivalent to the longitude. A group does not have to cross the central meridian to have a CMP designation. H expresses the maximum strength of the measured magnetic field in units of 100 Gauss. The classification symbols mean the following:

- α - a unipolar spot or group
- β - a bipolar group
- γ - a complex group (mixed polarities)
- $\beta\gamma$ - a complex group having some bipolar characteristics
- αp - a unipolar spot or group having polarities like the preceding spots of a normal bipolar group on the same side of the equator
- αf - a unipolar spot or group having polarities like the following spot of a normal bipolar group on the same side of the equator
- βp - a bipolar group in which the preceding part is stronger
- βf - a bipolar group in which the following part is stronger
- x - a group for which magnetic polarities were not obtained
- d - stands for disc. If "d" precedes the classification it means the group formed on the visible disc. If "d" follows the classification it means that the group disappeared on the visible disc.
- l - stands for limb. If "l" precedes the classification the group came over the east limb; if "l" follows the classification, the group passed over the west limb.

Example: lαfd=a unipolar group with polarities like the following members of a normal bipolar group on the same side of the equator, came over the east limb and died on the visible disc.

SOLAR RADIO FLUX on 2800 Mc/s (10.7cm) Jan. - June 1954
(Data from the National Research Council, Ottawa, Canada)

The close correlation of solar radio noise at centimeter wavelengths and that of sunspot activity is well established. (See Solar Division BULLETIN No. 87; June, 1953). An excellent paper on the 10.7 cm solar emission was just published by A. E. Covington and W. J. Medd in the Journal of the Royal Astron. Soc. of Canada - July-August 1954 issue.
The magnitude of this emission is expressed in units of 10^{-22} watts/m^2/c.p.s. for two polarizations.

month	mean flux	highest flux (date)		lowest flux (date)	
JAN	72.0	74.4	1/21	68.3	1/6
FEB	71.8	73.3	2/4; 26	69.8	2/19; 22
MAR	73.5	85.5	3/15	66.2	3/26
APR	69.2	72.2	4/8	64.0	4/2
MAY	67.7	69.0	5/4	65.8	5/23
JUNE	66.6	69.0	6/28	63.8	6/20

The solar flux continued to decrease from the beginning of the year with the exception of a minor increase in March when the largest sunspot of this year occurred.

CORONAL ACTIVITY

The IONOSPHERIC DATA, published by the National Bureau of Standards-Central Radio Propagation Laboratory, carries the coronal line intensities as observed at Climax and Sacramento Peak. Coronal activity, just as all other solar activity, was at minimum during the first six months of 1954. Generally the first Red coronal emission line (6374Å)'s for the greatest part of solar cycle less prominent (about 1/3) than the Green line (5303A). However now during minimum, the situation is just about reversed, the Red line being more prominent. It occurs practically in all latitudes; somewhat stronger in the equatorial region than in the polar region, with a distinct minimum in latitudes 45° to 70°. The "large" sunspot group of March No. 11172-73 was also accompanied by increased coronal activity in the Green line, though this occurred when the spot itself was well in its decay and after. The Green coronal line (5303A) was otherwise barely visible and when it occurred, it was only in the low equatorial zone.

FLARES

No flares have been reported in the IONOSPHERIC DATA during the first six months of 1954. The SONNENZIRKULAR of the Fraunhofer Institut, Freiburg, Germany, reported one flare of intensity 1 on March 16. No Sudden Ionospheric Disturbances (SID) were reported.

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OUT OF OTHER PUBLICATIONS:

Prof. W. Gleissberg kindly send us a reprint of a short paper of his published in DIE NATURWISSENSCHAFTEN (no.12;p336;1953) called: "Evidence of the eighty-year sunspot cycle in old aurora observations" Prof. Gleissberg bases his evidence on data supplied by D.Justin Schove-St. David's College-in "Visions in North-West Europe (A.D.400-600) and Dated Auroral Displays"(J.Brit.Archeol.Assoc.,3rd Ser.34(1950) According to Schove certain years during the fifth and seventh century A.D. had great auroral displays. These years were. 430,441...479,490, 500,511,522,532...555,566,577...645,655,664. Schove pointed out that these years seem to reflect the 11-year susnspot cycle.

However Prof. Gleissberg goes even further and points out that they not only contain the eleven-year cycle but also the socalled "eighty-year sunspot cycle".(See: W.Gleissberg "Die Haufigkeit der Sonnenflecken"-1952; also in Kuiper's The Sun see pp.333-335). It turns out that perhaps the gaps in the 11-year cycles are not accidental, but that they may actually reveal even more than the weal established 11-year cycle. If one computes the mean values of each grouping above one gets the following years: 435,5; 505,7, 566,0; 654.0. The mean interval between these years is 73 years, which is in fair agreement with the as yet meagerly known eighty-year sunspot cycle.

Thanks to the AAVSO Headquarters your editor gets a chance to read many more publications. Thus he received a copy of the JOURNAL OF CYCLE RESEARCH (Vol.2, No.4, Fall 1953) which carries another paper by D.Justin Schove called:"The Sunspot Cycle A.D. 301-1950."Here Schove gives us a more complete table based on auroral displays (maxima), besides presenting his new method in a statistical treatment of the sunspot cycle.

Miss Florence Rosenblatt, a prospective new member of the Solar Division-AAVSO, kindly reviews a very interesting paper published in the highly esteemed and classic magazine "NATURE".

The review deals with opinions of leading scientists on the importance of amateurs to science. It is good to learn from such authorities that the cause of amateurs in science is far from lost, on the contrary, in spite of some reverses. But it must be also equally clear that we cannot "live on our great past". You will read about a not to distant period when amateurs were unorganized and apparently in a hopeless dead end, and you will see how more fortunate we are today. (HLB)*******************

"The Amateur Scientist in Britain", by R. Brightman, in "NATURE" Magazine of March 27th and April 3rd, 1954, describes the amateur's contributions to science and the importance of the amateur to the professional scientist.

Mr. Brightman writes how the professional scientist scarcely existed until the 19th century was well advanced. Almost the only scientific professions were those of the medical man and to a less extent the mechanical and military engineer. The amateur tradition persisted well into the 19th century even when the professional scientist had well established himself outside the ranks of medicine and engineering.

However in the early 1900's there was a steady decline of amateurs in science both in numbers and importance. Mr. Brightman quotes from Professor Dixon's talk made in 1907, "that there was a belief that professional men of science were jealous of the amateur and by a conspiracy of silence or contempt sought to obscure the amateur's merits and so maintain their prestige". The gulf between amateurs and the trained scientists widened. Without a course of special reading or without attempting to master treatises for which he required some kind of preliminary training, it was difficult for the amateur to get adequate insight to the recent advances in science. Frequently the intelligent amateur was learned in one branch of science though he may not have had the slightest knowledge in other branches.

Many scientists deplored such existing situations and thought that the best hope of improvement lay in the work of local societies and particularly in the sort of field work in which the professional and the amateur could find common ground. Anything that tended to break down the barrier between professional and amateur, between layman and expert was for the good of scientific progress.

For contemporary times, Mr. Brightman explains that "there is now less danger of the amateur tradition in science dying out. Since the War there has been an encouraging increase in the activities of the amateur scientist. Serious efforts are being made to foster the work of the amateur scientist and to see how his contribution to the advance of science can be made most fruitful".

An example of amateur contribution was given by Sir Arthur Appleton who cited the amateur D. W. Heightman and other amateurs who were proclaimed for their pioneer work with solar radio noise, Sir Arthur Appleton points out that attentions to the solar noise phenomenon was first attracted by the reports of wireless amateurs (radio Hams) who round about the period of the last sunspot maximum, noticed the existence of a curious hiss in their receivers on wave-lengths of about 10 meters which they found to occur in daytime only and to be associated with periods of solar activity.

During the last War great advances were made in the study of solar noise activities and the original radar studies developed into the new science - Radio Astronomy.

It is of course scarcely correct to ascribe such work to purely amateur effort. It is unlikely for example, that anything would have arisen from this work had not a fully qualified scientist been responsible for investigating all such unusual occurrences and given their expert guidance to this study. This does however illustrate that the most promising areas for the future scientific growth are those that lie between well-established scientific fields, and the importance of collaboration of the right kind if these areas are to be developed.

To quote the author again, "what is wanted is not so much the skill to experiment in the field of another scientist, but the competence to understand, to criticize and to appreciate the experiment and the results that the experiment secures".

An address to the American Association for the Advancement of Science by E. W. Sinnott in December, 1949 - Dr. Sinnott pointed out that "we sometimes forget the vast areas where facts and principles of great scientific value may be discovered with no more complex tools or techniques than are at the command of the intelligent layman. He instanced the following fields of contribution:

> The exact distribution of plant and animal species, records of flowering dates, analysis of tree-ring chronology, variability of wild species, bird censuses and migrations, collection and idenfification of fossils, distribution of minerals, detailed local weather observations, records of meteorites, variable star observation, time-lapse photography, problems of radio transmission -

as but a few of the many fields open to study by the amateur scientist and he added that a fresh point of view and freedom from bias have often led the amateur to discoveries that the more inhibited professional brother had overlooked".

The amateur with his limited equipment can no longer compete with the scientists with long specialized training with expensive well-equipped laboratories and equipment.

However the amateur with his profound patience, skill and enthusiasm and the advantage of an open mind has his place in the advancement of science.

Thereby to quote the end of Mr. Brightman's article, "amateurs in science then in the accepted sense of the word, denoting those that practice their art not as a livilihood, but for the love of it are to be found in many places and in many classes of people.

The cooperation and enthusiastic support of the amateur scientists are indispensable for the most effective deployment of our trained professional scientist".

Florence Rosenblatt
214 Legion Street
Brooklyn 12, New York

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THE 43RD AAVSO FALL MEETING

LADD OBSERVATORY, BROWN UNIVERSITY
PROVIDENCE, RHODE ISLAND
OCTOBER 8-9, 1954

The American Association of Variable Star Observers will hold its 43rd Annual Fall Meeting on October 8-9, 1954 at Ladd Observatory, Brown University, in Providence, Rhode Island, at the kind invitation of Dr. Henry M. Wriston, President of the University, and Prof.Charles H. Smiley, Director of the Observatory.

For further information write to: AAVSO, 4 Brattle St..Cambridge 38, Mass.

AMERICAN RELATIVE SUNSPOT NUMBERS RA' for JULY 1954:

Day	RA'	Day	RA'	Day	RA'	Day	RA'
1	0	9	1	17	8	25	7
2	0	10	0	18	3	26	3
3	0	11	0	19	0	27	0
4	0	12	4	20	0	28	0
5	0	13	10	21	0	29	0
6	0	14	9	22	0	30	1
7	0	15	5	23	0	31	0
8	5	16	5	24	3		

Mean RA'=2.1

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ZURICH PROVISIONAL SUNSPOT NUMBERS RZ for JULY 1954:

Day	RZRZ	Day	RZ	Day	RZ	Day	RZ
1	0	9	0	17	7	25	10
2	0	10	0	18	7	26	7
3	8	11	0	19	0	27	0
4	0	12	7	20	0	28	10
5	0	13	10	21	0	29	7
6	0	14	15	22	0	30	7
7	0	15	8	23	0	31	6
8	7	16	15	24	8		

Mean RZ=4.5

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Prof. Max Waldmeier in his last release of Zurich Sunspot Numbers (Sept.1.)writes: "Solar activity is now increasing again and sunspot minimum, very probably, has occurred in June of this year."

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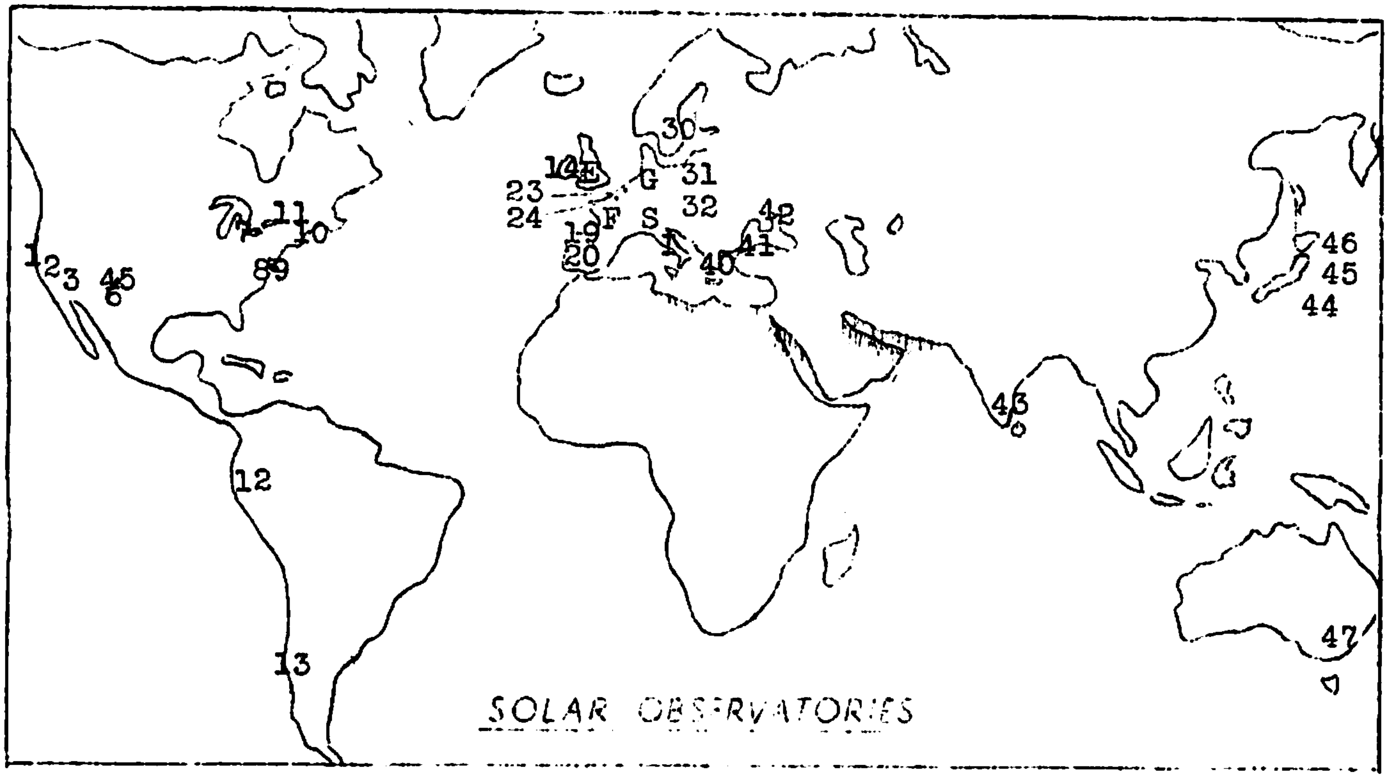
BULLETIN NOTES:

Our next S.D. BULLETIN will carry reports on the June 30th solar eclipse. We have a number of fine reports from here and abroad. If any additional papers are to be included they must be received before October 9th 1954.

The description of some very useful istruments and adopters for amateur solar observers is intended for publication in our BULLETIN.(including a simple and efficient prominence telescope). For this purpose we would like to know the names of our members and friends who are: a) interested to build and use telescopes for advanced type of solar observations, b) have experience in the construction of optical instruments for a better exchange of ideas and possibly for advise.

Several of our friends have already expressed such interest in advanced solar observations, just as a number of amateurs in other countries does. We shall not attempt to publish merely descriptions of specialized telescopes-this shall be only a means- but also get an exchange of information from those who already use such instruments with success and those who follow definite observing programs with care. HLB



(Optical instruments)
Compiled by B. Coutrez, Observatoire Royale de Belgique, Uccle *)

1) Mount Wilson Observatory
2) Hale Solar Observatory
3) Dr. Pettit Observatory
4) High Altitude Observatory-Climax
5) and Boulder Stations
6) Sacramento Peak
7) Mc Math-Hulbert Observatory
8) U.S.Naval Observatory
9) Naval Research Laboratory
10) R.C.A. Lab. Rocky Point, L.I.
11) Dominion Observatory, Ottawa
12) Inst. Geophysico de Huancayo
13) Obs. Astr. Universidad de Chile
14) Dunsink Observatory, Dublin
E15) University Obs., Cambridge
E16) Royal Observatory, Edinburg
E17) Royal Greenwich Observatory
E18) Oxford University Observatory
19) Observatorio astron. de Madrid
20) Observatorio del Ebro, Tortosa
F21) Observatoire de Meudon, France
F22) Observatoire du Pic du Midi
23) Obs. royal de Belgique, Uccle
24) Sterrewacht te Utrecht, Netherland

E=England G=Germany
F=France S=Switzerland I=Italy

G25) Fraunhofer Institut, Freiburg
G26) Göttingen Sternwarte
G27) Hamburg-Bergedorf Sternwarte
G28) Sonnen Obs. Wendelstein
G29) Astrophys. Obs., Potsdam
30) Stockholms Obs., Sweden
31) Ondřejov Obs., Czechoslovakia
32) Sonnen Obs.Kanzelhöhe;Austria
S33) Eidg. Sternwarte, Zürich
S34) Arosa Astrophys. Obs.
S35) Locarno Observatory
I36) Oss. Astrofisico di Arcetri
I37) Oss. Astrofisico di Catania
I38) Oss.Astr. di Capodimente,Napoli
I39) Oss.Astr.di Monte Mario, Roma
40) Astr. Obs. U. of Athens, Greece
41) Istanbul U. Obs., Turkey
42) Astrophys. Obs.,Crimea, USSR
43) Kodaikanal Obs., India
44) Ikomasan Sol. Obs.Kyoto, Japan
45) Tokyo Astr. Observatory
46) Mt. Norikura, Japan
47) Nat. Standards Obs., Sydney

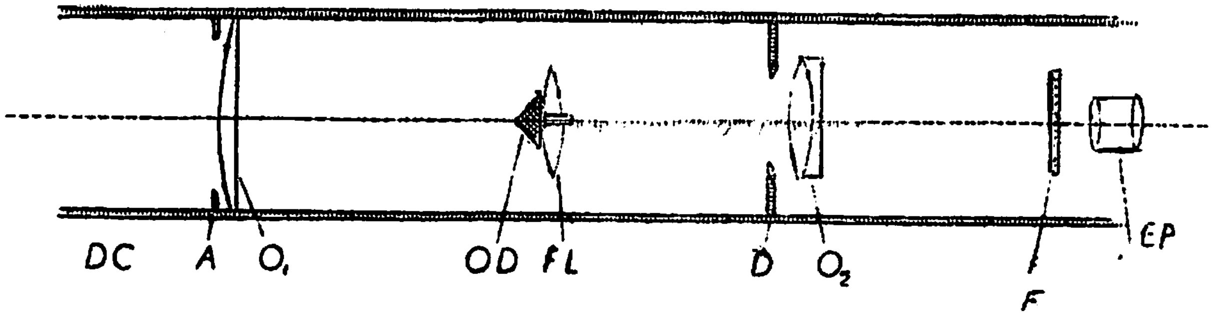
*) from THE SUN, ed. by G.P.Kuiper-where more information is given.

SOLAR DIVISION- AAVSO

SEP 13 1954

PERSONAL COMMUNICATION

PROMINENCE TELESCOPE (LYOT's)



The above diagram presents the essential parts of Lyot's coronagraph as used by Waldmeier, Nögel, von Bronsart and others for prominence observations.

DC is a rather long DEW CAP. O_1 is the main OBJECTIVE LENS, which need not to be an achromat (as a matter of fact a good plano-convex lens is preferable) since the observation is made essentially in monochromatic light. A highly reflecting metal cone OD = OCCULTING DISC, which is about 2% larger than the solar image, is placed in the focal plane of O_1. (For a mean solar diameter of 32': OD= f x 9,309 mm; where f is the focal lenght expressed in meters; during a year this factor varies from 9,178 to 9,481). The occulting disc OD is mounted in a FIELD LENS FL. This field lens FL images the ENTRANCE APERTURE A on a DIAPHRAGM D. The opening of this diaphragm is made somewhat smaller than the image of the brilliant ring of diffracted light from the edge of the entrance aperture and intercepts it. Unless this "brilliant ring of diffracted light" from A is fully removed there is no chance to see any prominences. The exact position and size may be determined experimentally. Right behind D is the second objective O_2 which forms the image of the occulting disc and the surrounding prominences in a ratio of 1 to 1. This image is viewed through the EYE-PIECE EP. In order to make the prominences visible a narrow band filter F is necessary. Such a filter is either a Kodak-Wratten Filter No. 29 in B glass or a combination of a BAUSCH & LOMB INTERFERENCE FILTER-transmission type-Catalog Number: 33-79-65 together with Wratten No. 29 (as suggested by Dr. von Bronsart). The Interference Filter is centered on Hα (656mμ), has a peak transmittence of 35% and a half width of 9mμ. While the Wratten filters are inexpensive /costing only a few Dollars/; the B&L filter costs $ 30.-(size 2"x2"x3/16"). I do not know as yet, whether such a filter may be cut up into four 1"x1" squares. It may also be possible to use a B&S filter No. 42-47-59, centered on 650mμ, with a half width of 18mμ (and costing only $ 15.-) together with the Wratten filter # 29. Wratten filters Nos. 26; 25; 24 may also prove satisfactory.

(43-58 Smart St., Flushing 55, NY)   Harry L. Bondy