

Kodakanal Observatory.

BULLETIN No III

D AS A DARK LINE IN THE SOLAR SPECTRUM

OBSERVATIONS of D₃ as a dark line in the solar spectrum have been reported so infrequently that it is usually held that the occurrence must be very rare. Prof Young (*The Sun* page 10) says at times and especially in the neighbourhood of sunspots a very faint dark line marks its (D) place but usually the spectrum of the photograph fails to give the slightest indication of its presence. Prof Hill in his account of the spectrum of the great sunspot of 1852 says D₃ was once suspected as a dark line (*Astr. and Phys. Journal* Volume XI page 312). More recently several cases have been reported (A. Lowie *M.N.* Volume LXXV page 514; Kriessle *Ast. Zeit.* N. 4012; A. A. Buss *The Observatory* N. 35 page 1) and it seems to be well to put on record the observations on this point which I have been able to make.

Since the middle of March 1901 it has been part of the regular routine work of the observatory to make a careful search for D₃ in and near spots. The results are given in the following table. Most of the observations were made by Mr. Sitaran Iyer and Mr. G. Narayana Iyer and I have personally checked the numbers. When the spot is near the limb it is easy to be sure of the exact connection between D₃ and the limb in the chromosphere and the sunspot diameter increases as the spot has been too far from the limb to permit of the spectrum of the limb being observed at the same time. Very often has been taken to avoid this.

As a general rule it may be said that the more distant the spot is the greater is the probability of D₃ appearing as a dark line but several cases are recorded of its appearance in spots that are just as far from the limb as the C line. The reverse of this is also true—D being absent in very disturbed spots. In certain cases D₃ can be traced through the spot but in the majority of cases it is rather faint and merging the spot than the part itself which still the limb line. At times the line can be traced to the limb but from the spot and in fact the same effect is seen on the scale of the limb which is that of the limb. On some days D₃ has been seen clear in the limb but not in the case of the C line which is generally strongly obscured.

The line varies greatly in visibility (as in the table) in different parts of the sun and it is only in even in indifferent weather conditions. In other cases it is seen with difficulty even with very fine sky. In the displacements indicating motion in the line of sight have been observed several times.

Date	Locality	Observations
1901		
Mar 1	20	O 1 210
D	21	O d 240
D	26	O t l limb l f 216 i 215 d t d i 237 d t t l t f t l b p 21
Apr 1	6	O t l 251 d l t
D	8	O f l
D	9	2 1255
D	14	2 1
D	19	B t t l f l t 4
D	2	266 d l tw 260 11 ml
D	28	266 d l tw O l 11 ml d l 265 l th l f 20 y f t l l l

The line is observed in the limb of the sun at various times.

D t	l ty	Ob t f D
1904		
Ap l	4	O t d 66
D	6	\ 206
My	5	
D	28	O d 29
D	9	O d 292
J	13	J7
J ly	7	O 305 db w 305 ndlmb
D	8	B tw 80 d lmb
D	29	321
D	30	8 1
A g t	5	T fl t f 328 d n 328
D		328
D		32
D	8	B tw 325 d lmb
D	9	N 3 8 N 326
D	10	328 ntl f las 330 d th t d w t l l
D	11	326 d 328 tl t f tl m l t 331 332
D	13	3 4 320 328 b d 333
D	14	3 () T fl t f tl g l 328 d 333
I	15	326
D	8	333
D	4	339
D	30	339 d 344
S pt mb	1	339
D		339
D	8	346 nlt th w t i 348 1344
D	4	E t f 346
D	9	B th d f 348
D	17	O th m p t 352 dt t f t
D	19	352 353 354
D	22	354
D	28	350
D	24	356
D	30	356
		D k
		D k d l f l
		N t t l l h l 268 wh l l th l y d g l y d t b d l l g g y p d h s V y d k d h p
		D l
		D l
		V y d k
		D k
		W d k k t
		D k
		D k
		Slightly d k d D k
		V y d k
		V y d k Slightly l l
		D k
		Slightly d k D l V y d k C q t
		D l C l t q t
		V y d l Slightly d l
		Slightly d l
		D k tl wh l l t g
		V y l k th h l g l d pp d t b b l m pl d y t g th
		D k
		D k
		D k
		D k
		D l
		V y d k D l Slightly d k
		D l
		Dark th h t fl m nt pp dt t h t f m th l t tl d d
		D k
		D k

D t	L lty	Ob t tD
1904		
S t mb 28	461 dt th f 357	D k
D 30	857 1901	Slightly d l
O t b 2	7 862	D k t p twh Ow l dt th t f t V y l l
D 1	308	V y d l
D 5	868	D l
D 6	865 868	V y d l D l
D 27	878	D k
D 9	881	D l l l g t l t
D 31	87	V y d l l l l t
N b	888	V y d l
D 18	300	D l l l g t h g p
D 2	300	D l
D 26	N 300 102	V y d l D l b t h p t f t l g p
D 28	406	D k
D 30	407	V y d l b t w t h p t t l d g g t h l t h l b s f t h l t b t t t h m b s
D b 1	407	D k
D 6	418 411	D l C l t l m p l V y l l d l f d
D 10	B t w 419 d l m b	D l
D 11	All l g t h p b t w 418 410	D l
1905		
J y 11	410	V y l k t p t t h l g l t d d k d l g t l y l l l l l l t l t b f t l
D 17	410 450 d 451	D l l l g t h t l
D 25	l t w 460 l l b	Slightly l l
D 30	464	D k
L b y 3	464	D k
D 4	464	D l
D 8	464	V y b g h t
D 13	478	D k b t w n t l t w l t f t l g p
D 8	487	I t l y l l d h p t l t w h O w b l l t l y
D 26	487	B g h t t l m b
M h 1	491	V y b g h t
D 2	491	V y b g l t l u b d d k t l t l p t n d t l y d k t p t w h O y b g h t t d t h p t
D 6	V 507	V y d k d l p
M y 9	511	B g l t t h p t d d l b t w t h m

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