Greenwich plates, Mr. J. L. White for making available the Harvard Announcement Card and Mr. D. R. Barber for reading this Note and for helpful comments.

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The Light Variation of 6 Cassiopeiae

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In a search for instability characteristics among the A and F supergiants, Abt[1] found that 6 Cassiopeiae has a variable radial velocity. From observations covering less than one cycle he derived a value of the period of variation to be 30 days with a range in radial velocity of 18 km/sec.

Table I

Julian Day	*Blue* 6 Cas– *BD* 60° 2657	6 *Cas*– 10 *Cas*	*Yellow* 6 *Cas*– *BD* 60° 2657	6 *Cas*– 10 *Cas*
2436561·1	...	+ ·426	...	− ·142
562·1	+ ·044	+ ·418	− ·170	− ·149
567·1	+ ·074	+ ·446	− ·146	− ·134
570·2	+ ·076	+ ·445	− ·138	− ·119
575·1	+ ·088	+ ·461	− ·129	− ·111
577·1	+ ·096	+ ·466	− ·123	− ·102
580·1	+ ·103	+ ·465	− ·119	− ·103
582·1	+ ·109	+ ·483	− ·115	− ·097
585·1	+ ·118	+ ·485	− ·101	− ·091
599·1	+ ·148	+ ·511	− ·077	− ·062
603·1	+ ·107	+ ·494	− ·104	− ·091
605·1	+ ·117	+ ·483	− ·108	− ·094
608·1	+ ·082	+ ·466	− ·130	− ·113
615·1	+ ·097	+ ·473	− ·115	− ·104
616·1	+ ·109	+ ·473	− ·112	− ·095
625·1	+ ·113	+ ·470	− ·102	− ·087
636·1	+ ·139	...	− ·079	− ·082
637·1	+ ·094	+ ·494	− ·118	− ·079
641·1	+ ·100	...	− ·112	− ·098

Observations made at Naini Tal during 1958 revealed a variation in brightness of the star. It was included in a programme of regular photoelectric observation covering the period 1958 December 23 to 1959 March 13. The observations were made in both blue and yellow light with a 1P21 photomultiplier attached to the 10-inch refractor. The blue filter consisted of Corning 5030 with 2 mms of Schott GG 13. The yellow filter was Corning 3384 of standard thickness. The effective wavelength of the blue and yellow filters were approximately 4350 A and 5550 A respectively, since the filters used were of the same type as those used by Johnson and Morgan to define the *B*, *V* system. BD 60° 2657 (spectrum A5) and 10 Cassiopeiae (spectrum B8) were used as comparison stars. Table I gives the magnitude differences between 6 Cassiopeiae and the two comparison stars. These differences are left on the instrumental system and are values reduced to the zenith using mean extinction coefficients of 0·21 magnitudes in the blue and 0·12 magnitudes in the yellow. The mean extinction coefficients have been determined from observations made with the same filters and for different programmes carried out during the same period.

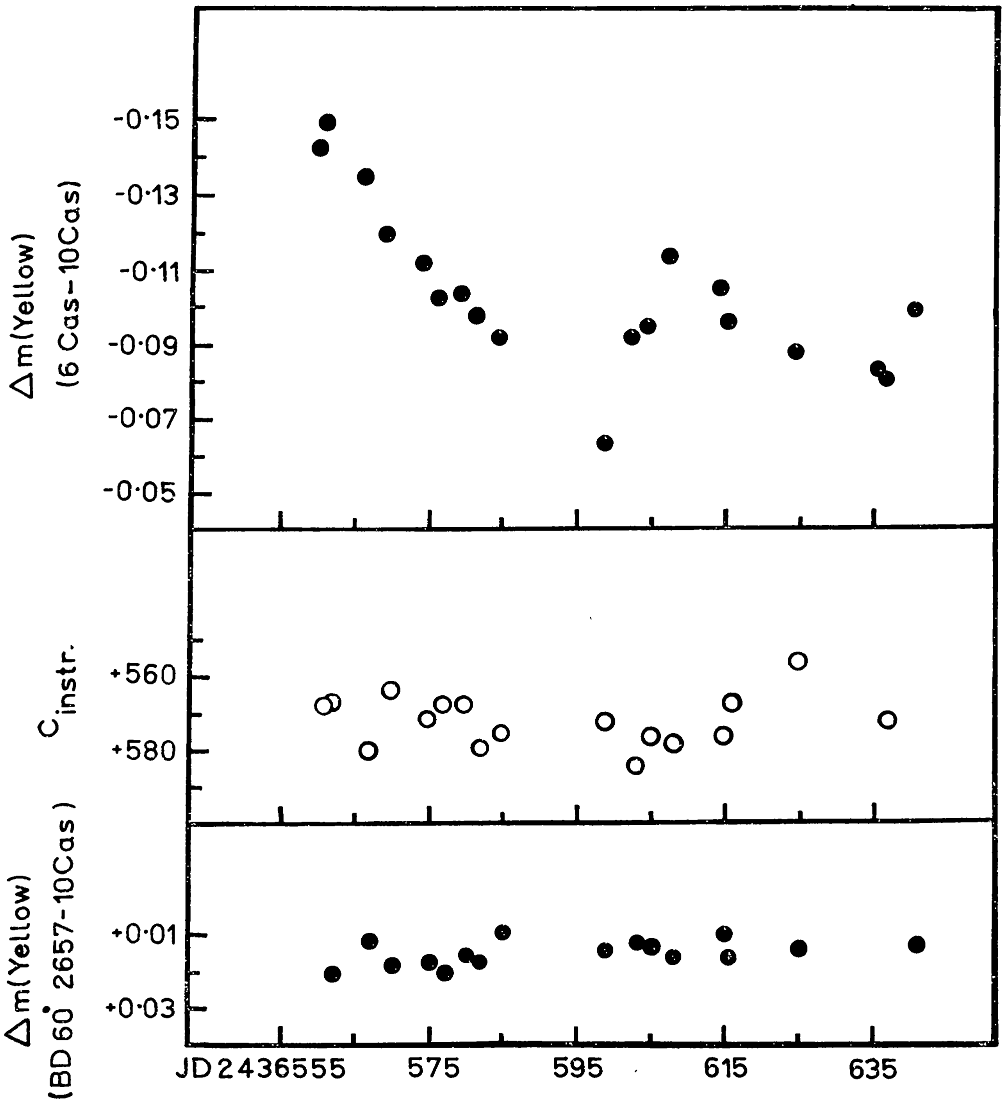

Fig 1
Light and colour variation of 6 Cassiopeiae

Figure 1 shows the light curve in the yellow along with the colour curve. The same Figure contains magnitude differences between the two comparison stars plotted over the entire duration of the investigation. It will be seen that both comparison stars are constant with respect to each other within 0·008 magnitudes. Since this limit corresponds to the accuracy of the observations, we assume that the comparison stars used do not have any intrinsic variation of their own.

The observations plotted in Figure 1 indicate a light variation of the order of 0·10 magnitudes. The variation is semi-regular and suggests that a value of $P = 46$ days serves well as a lower limit to the approximate period during the duration of the observations. The change in amplitude of light variation from cycle to cycle is suggestive of interfering oscillations. Since the period of variation derived in this study differs appreciably from Abt's value obtained from the radial velocity data, it is very probable that there are several oscillations prevalent over the entire atmosphere that contribute to the observed light and velocity variations. Simultaneous spectroscopic and photometric observations of this star would be of interest.

1959 April 4

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(1) H. A. Abt, *Ap. J.*, **126**, 138, 1957.

CORRESPONDENCE

To the Editors of 'The Observatory'

Saturation effects in very faint Fraunhofer lines

GENTLEMEN,—

It is well known to many workers in the field of stellar spectroscopy that some faint Fraunhofer lines need not necessarily be "faint" in the theoretical sense, which means that they should not necessarily be situated on the 45° part of the curve of growth. There are lines that are caused by strong absorption in deep layers of a stellar atmosphere and which are veiled by the radiation from the non-selectively absorbing higher layers. Such lines may apparently be weak, but nevertheless behave as a strong or medium strong line, and show saturation effects since they are caused by strong absorption in the relevant parts of the stellar photosphere, where the line is principally formed.

A striking example[1] is the still hypothetical deuterium α line in the solar spectrum, which originates in deep photospheric layers. The line has a central depression less than one per cent. If this value is used to find an upper limit for the abundance of deuterium, using the usual faint line theory, one gets $N_D/N_H < 10^{-8}$. If, however, the exact theory of the formation of this line is applied one finds an upper limit about 10^4 times higher.

Although such facts are known, at least in principle, it is often surprising to see how rare in fact truly faint lines in the theoretical sense are.

Recently we completed an extended series of computations of equivalent widths of about 80 fraunhofer lines in 50 models of stellar spectra.[2] The