Note on a faint Algol star which is probably intrinsically variable, by *P. Th. Oosterhoff*.

During the year 1935 the writer has taken a series of 74 plates on a field near the Scutum Cloud with the 60-inch reflector of the Mount Wilson Observatory. Eastman 40 plates of the size 4 × 5 square inches were used and they were centred on B.D. — 7°4786, the position of which for 1855 is: $\alpha = 18^h\ 49^m\ 32^s{\cdot}0$, $\delta = -7°\ 3'{\cdot}4$. The exposure time was 10 minutes. In connection with other work these plates are intended to give some information about very faint variable stars. The results thus far obtained will be published later, but one faint variable deserves special mentioning and will be discussed here.

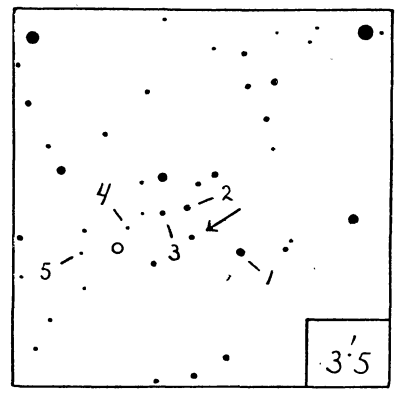
It is situated near the southern border of the field and its equatorial co-ordinates are:

$$\left.\begin{array}{l}\alpha = 18^h\ 52^m\ 57^s{\cdot}8\\ \delta = -\ 7°\ 20'\ 19''\end{array}\right\}\ (1900).$$

It has been marked together with five comparison stars on the accompanying chart.

At the distance of 56 mm from the centre of the plate the images are considerably deformed by coma, but this circumstance favours the measures in the Schilt microphotometer, as it causes a steep gradation. In addition to the five comparison stars one more star has been measured, which proved to be a cluster type variable. It has been indicated on the chart by an arrow. The galvanometer readings have been converted into provisional magnitudes by means of

FIGURE 1.



WESSELINK's table in *B.A.N.* No. 318. The mean provisional magnitude of the comparison stars has been taken as zeropoint. Then for each plate a

TABLE 1.

J.D.hel. − 2420000	reciprocal gradation	phase	Δm	J.D.hel. − 2420000	reciprocal gradation	phase	Δm
d		P	m	d		P	m
7890·0146	1·13	·418	− ·05	7988·9605	1·12	·462	+ ·30
7917·9588	1·34	·794	—	89·8494	·97	·196	+ ·41
30·9169	·86	·219	− ·04	·9098	·96	·314	+ ·32
·9259	·84	·236	+ ·05	·9334	·98	·360	+ ·26
31·9197	·88	·175	+ ·23	·9570	·95	·406	+ ·40
54·8477	·90	·908	− ·05	90·7014	1·07	·858	+ ·69
·9754	1·05	·157	+ ·22	·7237	1·16	·902	+ ·54
55·9311	1·08	·022	+ ·08	·7896	·94	·031	+ ·54
·9401	1·05	·039	+ ·28	·8125	1·00	·075	+ 1·60
·9672	·99	·092	+ 1·30	·8348	1·03	·119	+ 1·35
56·8506	·92	·816	− ·02	·9028	1·07	·251	+ ·32
·9492	·98	·008	− ·11	·9389	·96	·322	+ ·43
·9576	·96	·024	− ·09	·9494	·96	·342	+ ·42
57·9395	1·00	·940	− ·24	8007·8109	1·29	·239	+ ·36
58·8659	·94	·747	− ·12	·8435	·99	·303	+ ·30
84·8042	·92	·353	+ ·09	·8685	1·11	·351	+ ·33
86·7646	·95	·178	+ ·29	08·8448	1·21	·256	+ ·21
·8271	·97	·300	+ ·24	·8760	·98	·317	+ ·28
·8903	1·08	·423	+ ·28	15·7619	1·06	·751	+ ·29
87·7049	·96	·012	+ ·27	·8557	1·02	·934	+ ·36
·7299	·97	·061	+ 1·12	16·7731	1·05	·724	+ ·23
·7799	·94	·159	+ ·24	·8342	·99	·844	+ ·30
·8153	1·06	·228	+ ·21	·8578	1·04	·890	+ ·31
·8244	1·00	·245	+ ·34	46·6909	1·03	·094	+ 1·30
·8459	1·02	·287	+ ·26	·7402	·99	·190	+ ·20
·9077	1·01	·408	+ ·17	·8055	1·01	·318	+ ·27
·9410	1·00	·473	+ ·09	47·6887	1·01	·041	+ 58
·9500	1·01	·490	+ ·16	·8005	·96	·259	+ ·32
88·6917	1·10	·938	+ ·38	67·6793	·94	·042	+ ·58
·7153	·95	·984	+ ·28	·7036	1·00	·090	+ 1·01
·7618	·93	·074	+ 1·34	·7348	·96	·151	+ ·77
·7868	·95	·123	+ 1·45	68·6397	·91	·916	+ ·30
·7959	·87	·141	+ ·72	·7175	·91	·068	+ 1·35:
·8292	·98	·206	+ ·27	·7418	·98	·115	+ 1·29
·8945	1·06	·333	+ ·31	69·6590	·84	·905	+ ·29
·9174	1·05	·378	+ ·22	·6896	·74	·964	+ ·33
·9264	1·03	·395	+ ·23	·7320	·90	·047	+ ·77

factor has been determined by least squares, which reduces the provisional magnitudes to the mean gradation of all plates. The relative reciprocal gradations are given in the second column, the resulting magnitudes in the fourth column of Table 1.

The variable appears to be fainter than $+1^{m}\cdot00$ on 10 plates in 7 nights and it is evident that the light variation is then very rapid, the variable being fainter than normal for not longer than one hour and a half. A period of $\cdot51$ days is easily derived from these minima. A solution by least squares from the observations fainter than $+1^{m}\cdot25$ yields the following elements of minimum:

$$\text{J.D. } 2427990^{d}\cdot8231 + {}^{d}\cdot512547 \; (E - 68)$$
$$\pm \; 42 \quad \pm \; 54 \quad \text{(m.e.)}$$

The epochs used, the number of periods and the residuals (O—C) are given in Table 2.

TABLE 2.

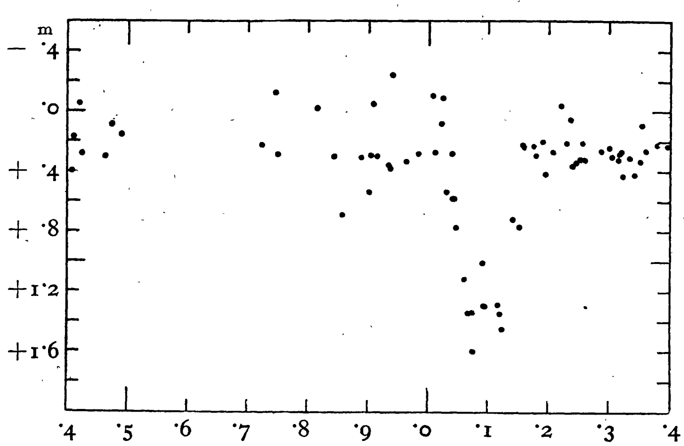
J.D.hel. — 2420000	E	O—C
d		d
7955·9672	0	— ·0027
88·7618	64	— ·0111
·7868	64	+ ·0139
90·8125	68	— ·0106
·8348	68	+ ·0117
8046·6909	177	+ ·0002
68·7175	220	— ·0128
·7418	220	+ ·0115

Phases have been computed with the formula:

$$\text{phase} = 1^{d-1}\cdot951 \; (\text{J.D.} - 2420000)$$

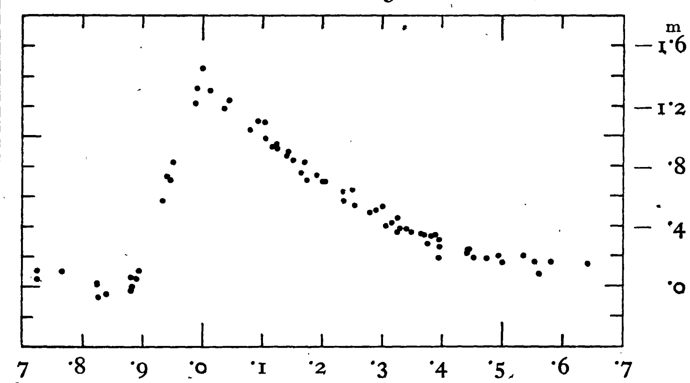
They are given in the third column of Table 1. The resulting light curve is shown in Figure 2. There can be little doubt that the star is an Algol variable. The depth of the minimum is about a magnitude, its

FIGURE 2.



duration slightly more than a tenth of the period. There are no observations near phase ·6, which would have given information about a secondary minimum. The period is very short for an Algol type variable and the star becomes more interesting when the observations near maximum are considered. If the light between the minima is supposed to be constant, the mean error of one observation between the phases ·17 and ·03 is found to be $\pm {}^{m}\cdot17$. This value is considerably larger than can be expected. The accuracy obtained from the present material is well shown by the observations of the cluster type variable mentioned above. It is situated at a distance of 42″ or 1·5 millimetre on the plate from the Algol variable in question and it has been measured simultaneously with the same comparison stars. This variable will be discussed in a later paper, but its light curve, showing the individual observations, is presented here in Figure 3.

FIGURE 3.



The Figures 2 and 3 have been drawn on the same scale and are directly comparable. The difference in dispersion between the two diagrams is remarkable. From the differences in magnitude between observations following each other in phase the mean error of a single observation for the cluster type variable is found to be $\pm {}^{m}\cdot043$. This value is four times as small as the corresponding mean error for the observations of the Algol variable. It should be noticed that the minimum of the cluster type variable is only about a quarter of a magnitude brighter than the maximum of the Algol variable, which means that the observed difference in dispersion can not be due to a difference in the intensity of the photographic images. The same high accuracy cannot be expected to hold for the observations near the central part of the eclipse, because the variable is then near the limit of the plate.

From Table 1 it is seen that the magnitude of the maximum light outside the eclipse varies from one day to another. During a single night the dispersion seems to be much smaller. In Table 3 night means have been given for the observations between phases ·17 and ·03. The mean values have been plotted against the Julian Day in Figure 4.

The number of observations is far too small to show any regular or periodic change with time in these