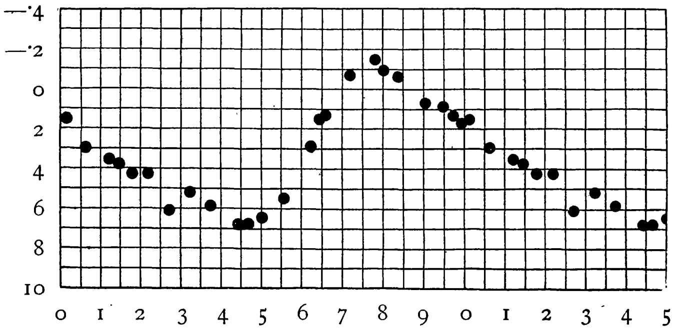


The variable proved to be of the δ Cephei type with a period of $6^{d}{\cdot}2$. For each plate the phase was calculated from the formula

$$\text{phase} = \overset{d^{-1}}{\cdot 16133} \text{ (J. D. hel. M. astr. T. Grw.} - 2420000).$$

The observations were then arranged according to phase and the 24 mean values given in Table 1 and graphically represented in the diagram were obtained. The curve is of normal shape, the increase in brightness being about 2·75 times quicker than the decrease. At the phase ·639 (mean epoch J. D. 2425582·59) the variable passes the point on the ascending branch, which precedes by 4 tenths of the period that point on the descending branch, where the brightness is the same. The indication of an epoch of this kind has the advantage of being practically independent of the correctness of the scale of steps used.

The observations only extend from J. D. 2425381 to 5864, so that the period, $6^{d}{\cdot}1985$, may still be considerably improved by the aid of old Harvard plates.

Estimates on Johannesburg plates of UX Carinae, by *W. E. Kruytbosch.*

The short period variable UX Carinae = C. P. D. — 56°3425 = H. V. 1273 was found in 1906 by Miss LEAVITT, who derived a period of $3^{d}{\cdot}6822$ from estimates on 292 Harvard plates of mean date J. D. 2415230. A copy of Miss LEAVITT's individual observations was kindly put at my disposal. A comparison with my results indicated a small positive correction to the period of Miss LEAVITT. The reciprocal period finally adopted is $^{d^{-1}}{\cdot}271569$ corresponding to a period of $3^{d}{\cdot}6823$.

I used the comparison stars given in Table 1.

TABLE 1.

	C. P. D.		red. to internat. scale	scale of steps	scale of magn.	spectr. H.D.
		m	m	s	m	
a	— 56° 3456	8·0	7·9	·00	·00	Fo
b	3433	8·2	8·2	3·60	·67	Ao
c	3450	8·6	8·8	6·51	1·01	Ko
d	— 57° 3332	9·2	9·7	10·76	1·80	Ko

The figures given in the sixth column of Table 1 were derived from measures made by C. KOOREMAN in the Schilt photometer on 10 plates taken with a coarse grating placed in front of the objective. [1])

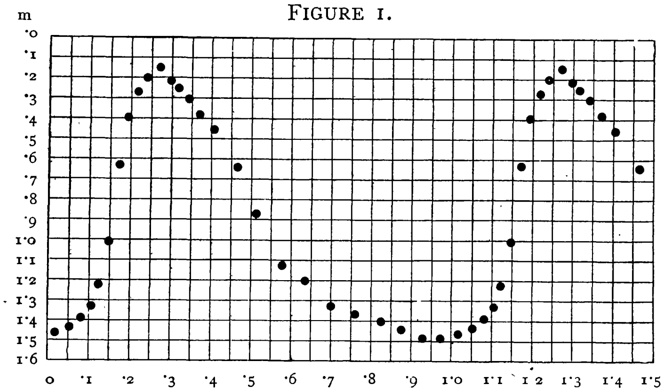
The mean C. P. D. magnitude of the 4 comparison stars reduced to the international scale (*H. A.* 80, No. 13) is $8^{m}{\cdot}65$ and the mean measured magnitude (taking that of the star a as zeropoint) is $^{m}{\cdot}87$. Therefore about $8{\cdot}^{m}65 - {}^{m}{\cdot}87 = 7^{m}{\cdot}78$ should be added to the figures of the sixth column of Table 1 in order to reduce them to the international scale.

I estimated UX Car on 814 plates (from 249 nights) of mean date J. D 2424367. The phase of each plate was computed from the formula

$$\text{phase} = \overset{d^{-1}}{\cdot 271569} \text{ (J. D. hel. M. astr. T. Grw.} - 2420000)$$

The estimates were then arranged according to phase and divided into 74 groups of 11 observations each. Mean values of phase and magnitude are given in Table 2 for each of these groups, which have again been collected into 26 larger groups also given in Table 2 and represented graphically in Figure 1.

FIGURE 1.



[1]) It is seen that in this case one of my steps equals $^{m}{\cdot}164$. The estimates were made in fractions of a step.

TABLE 2.

P	m	P	m	P	m	P	m
·005	1·58			·493	·78		
·018	1·40	·019	1·46	·506	·80		
·034	1·41			·519	·92	·513	·87
·047	1·46			·533	·99		
·060	1·42	·054	1·44	·554	1·14		
·076	1·42			·572	1·22		
·089	1·36	·082	1·39	·586	1·08	·578	1·12
·102	1·31			·599	1·04		
·110	1·35	·106	1·33	·610	1·08		
·118	1·25			·618	1·21		
·128	1·20	·123	1·22	·632	1·24	·636	1·20
·143	1·14			·652	1·13		
·155	·88	·149	1·01	·669	1·33		
·166	·78			·681	1·27		
·179	·47	·173	·63	·693	1·34		
·189	·41			·702	1·34	·701	1·32
·200	·38	·195	·40	·711	1·30		
·214	·34			·720	1·36		
·224	·20	·219	·27	·733	1·36		
·234	·14			·746	1·33		
·246	·26	·240	·20	·763	1·41	·762	1·36
·265	·16			·778	1·37		
·278	·13	·271	·15	·790	1·35		
·290	·21			·808	1·42		
·304	·22	·297	·21	·822	1·39		
·312	·27			·833	1·37	·826	1·40
·320	·24	·316	·25	·842	1·41		
·335	·27			·853	1·36		
·348	·33	·341	·30	·866	1·38		
·366	·35			·882	1·50	·876	1·44
·374	·42	·370	·38	·904	1·52		
·390	·46			·916	1·50		
·408	·42	·407	·46	·930	1·47	·929	1·48
·422	·50			·942	1·48		
·448	·55			·957	1·43		
·467	·70	·466	·64	·971	1·51	·974	1·48
·482	·68			·992	1·51		

From the differences between two observations following each other in phase the square of the mean error of a single estimate was found to be $^{m^2}\cdot0302 = (\pm\,^{m}\cdot174)^2$. Two such observations will in the present case practically always be from two different nights. From the differences between two observations following each other in the same night the square of the mean error of a single estimate was found to be $^{m^2}\cdot0169 = (\pm\,^{m}\cdot130)^2$ or about 56 percent of the above value. That is to say that considerable systematic night errors are present, the mean square of which is $^{m^2}\cdot0302 - {}^{m^2}\cdot0169 = {}^{m^2}\cdot0133 = (\pm\,^{m}\cdot115)^2$. This may be due for a good deal to the difference in colour between the variable and the different comparison stars (see the spectral classes given in the last column of Table 1). The spectrum of UX Car varies from F 2 at maximum to G 5 at minimum). The brand of plates used, the atmospheric conditions and the intensity of the images may thus materially affect the estimates.

The total weight of all the estimates therefore is not $814/\cdot0302 = 27000^{m^{-2}}$, but less. The weight of the estimates on n plates from the same night is $n/(\cdot0133\,n + \cdot0169)$. In this way the total weight of all the estimates was found to be $12370^{m^{-2}}$.

As is seen in Figure 1 the rising branch of the lightcurve is very steep. Between the phases $^{P}\cdot16$ and $^{P}\cdot17$ this rise is about $^{m}\cdot18$ or at the rate of $^{m}\cdot2$ in one hour. On two nights, 1924 Apr. 9 and 1925 Febr. 16, the rising branch was particularly well observed. The individual estimates from these two nights are given in Table 3.

TABLE 3.

J. D. hel. M. astr. T. Grw.		J. D. hel. M. astr. T. Grw.	
d	m	d	m
2423885·279	1·25	2424198·325	1·35
·306	1·33	·349	1·24
·331	1·34	·372	1·23
·360	1·13	·396	·98
·386	·94	·419	·88
·412	·91	·439	·80
·441	·56	·453	·85
·469	·47	·467	·42
		·481	·49
		·495	·40
		·509	·35
		·522	·33
		·533	·37

My estimates show, as it has also been noted in the case of other variables, a marked tendency to avoid equality with one of the comparison stars. If all the 814 estimates of UX Car are arranged according to the derived magnitude, the numbers of estimates given in column II of Table 4 between the limits of magnitude indicated in column I are found.

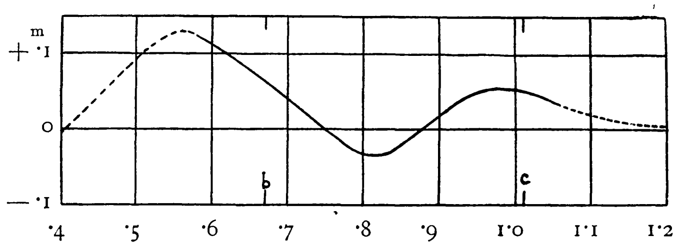
TABLE 4.

I	II	III	IV	V	VI	VII	VIII
limits of magn.	number of estimates		phases of smoothed lightcurve corresponding to limiting magnitude		actual number of observ. between limits of phase	magn. corre-sponding to III	=VII−I
m			P	P		m	m
·095	18	18					
·195	27	45					
·295	46	91	·213	·333	109½	·275	−·020
·395	68	159	·194	·376	160½	·385	−·010
·495	62	221	·182	·411	199	·585	+·090
·595	29	250	·174	·444	222½	·710	+·115
·695	8	258	·168	·475	243	·738	+·043
·795	8	266	·161	·500	276	·765	−·030
·895	37	303	·155	·521	298	·913	+·018
·995	31	334	·149	·546	320½	1·046	+·051
1·095	21	355	·142	·576	344½	1·115	+·020
1·195	45	400	·128	·625	401½	1·200	+·005
1·295	86	486	·108	·683	465½	1·315	+·020
1·395	87	573	·080	·792	594½	1·382	−·013
1·495	135	708			814		
1·595	91	799			814		
	15	814			814		

A graph of the relation between the columns I and VI of Table 4 was made. On the curve thus obtained the magnitudes given in column VII were read off as corresponding to the number of estimates given in column III. Hence the observed magnitudes I should approximately be corrected so as to give the magnitudes VII. These corrections are given in the last column, VIII, of Table 4. They are supposed to be most reliable between $^{m}\cdot6$ and $1^{m}\cdot1$, in which interval the two comparison stars *b* and *c* fall. The range of the corrections thus derived surpasses one tenth of a magnitude.

As read off from the lightcurve, UX Car varies from $^{m}\cdot15$ at maximum to $1^{m}\cdot49$ at minimum, or, after adding $7^{m}\cdot78$ for reduction to the international scale (see above), from $7^{m}\cdot93$ to $9^{m}\cdot27$.

FIGURE 2.



For stars of the δ Cephei type the normal epoch is often given as that of maximum light. It is true that this indication is practically free from the systematic errors, with which estimates of the present kind are evidently affected. But the unsymmetrical form of the maximum makes the determination of the phase, at which it occurs, rather uncertain.

The steep ascending branch of the lightcurve would suggest the use of the moment, when the magnitude is halfway from minimum to maximum, as a normal epoch, but here again the systematic errors of magnitude may affect the result.

However, this last objection may be avoided by using as normal epoch that point on the ascending branch, which is separated by a given fraction of the period from that point on the descending branch, where the brightness is the same. Thus it is seen from Table 4, columns IV and V, that the variable has the same brightness at the phases ·174 and ·444, which are separated by the fraction ·270 of the period. The mean epoch of the phase ·174 is J. D. 2424367·855. The interval of phase chosen, ·27, has the advantage of corresponding very nearly to one day, so that the necessary observations may be obtained on consecutive nights. Another pair of phases of equal brightness on the ascending and descending branch is ·165 and ·490, the difference of which is ·325. The phase ·165 corresponds to the steepest part of the rising branch. Its mean epoch is J. D. 2424367·822. The maximum occurs about $^{r}\cdot100$ or $^{d}\cdot368$ later.