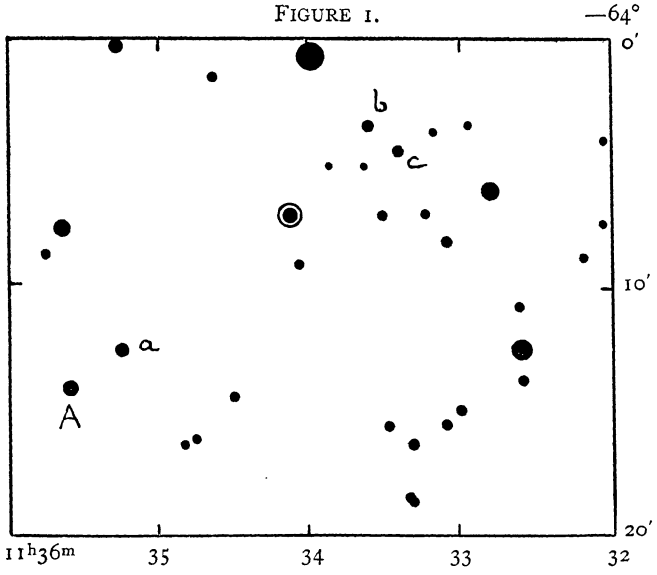
TABLE 3.
FS Carinae.

observer	J. D.	E	O—C	observer	J. D.	E	O—C
	d		d		d		d
W	2415110·68	0	— ·01	H	2423963·22	4124	·00
W	16166·79	492	— ·02	H	24171·45	4221	+ ·01
W	20629·56	2571	— ·01	H	24201·43	4235	— ·06
W	20994·52	2741	+ ·03	H	24257·29	4261	— ·01
W	21331·58	2898	+ ·08	W	24261·60	4263	+ ·00
W	23486·68	3902	+ ·00	H	24287·34	4275	— ·02
H	23791·52	4044	+ ·03	W	24289·52	4276	+ ·02
H	23877·37	4084	+ ·01	H	24553·47	4399	— ·06
H	23935·30	4111	— ·02	H	24918·45	4569	— ·00
H	23948·23	4117	+ ·04				

A new variable star of the W Ursae majoris type, by *Ejnar Hertzsprung.*

On plates taken at Johannesburg with the Franklin-Adams instrument the star $11^h34^m{\cdot}1$, $-64°7'$ (1875),

FIGURE 1.



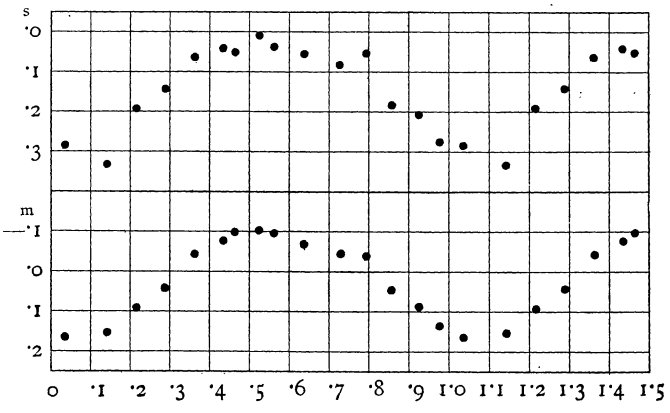
about 11^m photographically was found in the blink-microscope to be variable. The range proved to be rather small and the determination of the period from my estimates on 155 plates presented difficulties. I therefore subsequently measured 154 *) plates in the Schilt microphotometer using the 4 comparison stars indicated on Figure 1. From a comparison with stars in the Selected Area 193 present on the plates, the magnitudes of the comparison stars were found to be A $10^m{\cdot}86$, a $11^m{\cdot}12$, b $11^m{\cdot}38$ and c $11^m{\cdot}30$. Taking the star a as zeropoint we thus have $A = -^m{\cdot}26$ and $^1/_2(b+c) = +^m{\cdot}22$. Only linear interpolation of the galvanometer readings was used in reducing the measures.

In Table 1 are given the results for each plate both of the estimates and the measures. The difference in steps between the 2 comparison stars A and a used in the estimates was found to be $^s{\cdot}26$ or equal to the difference in magnitude. The phases have been calculated according to the formula

$$\text{phase} = 4{\cdot}487314^{d^{-1}}\,(\text{J. D. hel. M. astr. T. Grw.} - 2420000).$$

The observations were then arranged according to phase and the mean values given in Table 2 and graphically represented in Figure 2 obtained.

FIGURE 2.



The lightcurve is of the typical W Ursae majoris

*) On one plate, J. D. h. M. a. T. G. 2424291·292, which had been taken with another centre, the variable was too near the border for measurement in the photometer.

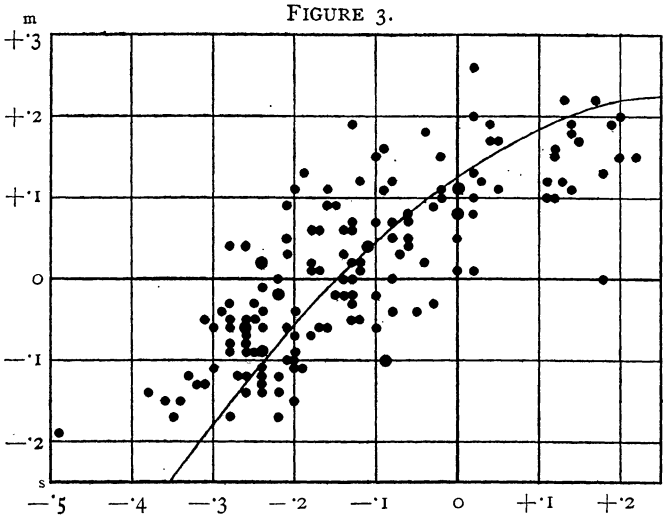
form, the period being somewhat longer, viz. $^{d}\cdot446$. The limits of variation are found to be $11^{m}\cdot02$ and $11^{m}\cdot31$, but the scale of magnitudes is rather uncertain.

In the way described in the note on S X Aurigae (see below) the phase of the minimum was found to be $^{P}\cdot0735$ from the estimates and $^{P}\cdot0711$ from the measures. The measures being the more accurate I have adopted as the weighted mean $^{P}\cdot0713$. The ephemeris then is

$$\text{Min.} = \text{J. D. } 2424161^{d}\cdot9711 + {}^{d}\cdot2228505 \times E$$

The mean square of the differences between two measures following each other in phase is found to be $2 \times \cdot0024\ m^2 = 2\ (\pm\ ^{m}\cdot05)^2$. If the scale of magnitudes adopted here is approximately correct, this accuracy is satisfactory. Calculated in the same way the mean error of one estimate is $\pm\ ^{m}\cdot09$ expressed in the scale of the measures.

FIGURE 3.



In Figure 3 the measures have been plotted against the estimates for each plate separately. The systematic differences between estimates and measures are striking. Dividing the mean values given in Table 2 into 3 groups according to the phase counted from minimum, the comparison given in Table 3 between the estimates and the measures was obtained.

TABLE 3.

number of plates	mean estimate	mean measure
32	$+\ ^{s}\cdot038$	$+\ ^{m}\cdot152$
40	$-\ \cdot078$	$+\ \cdot068$
82	$-\ \cdot210$	$-\ \cdot065$

These 3 pairs of s and m are represented by the formula

$$m = +\cdot128 + \cdot6784\,s - 1\cdot143\,s^2$$

It may well be that the estimates are merely based on the nucleus of the image, while the measures in the Schilt photometer are greatly influenced by the penumbra surrounding the nucleus. In the case of the Franklin-Adams plates this penumbra is much stronger for white than for yellow stars owing to the shape of the secondary spectrum of the objective.

TABLE 1.

J. D. hel. M. astr. T. Grw.	phase	estimate	measure	J. D. hel. M. astr. T. Grw.	phase	estimate	measure
	P	s	m		P	s	m
2423788·564	·477	—·36	—·15	2423997·218	·773	—·21	·05
90·506	·191	—·02	·11	8·208	·213	—·21	·09
1·539	·828	—·20	—·15	9·210	·710	—·32	—·13
9·528	·677	—·10	—·06	4000·210	·197	—·13	·06
3801·507	·556	—·22	—·17	4258·274	·215	·05	·11
83·521	·579	—·28	—·17	·291	·288	—·17	·06
4·272	·950	—·20	·11	·351	·559	—·38	—·14
·355	·321	—·24	—·04	9·213	·424	—·24	—·09
5·251	·342	—·20	—·09	·236	·530	—·24	—·11
6·242	·789	—·20	—·07	·260	·636	—·30	—·06
7·483	·358	—·11	·04	·283	·742	—·17	·01
3904·438	·438	—·24	—·13	·307	·847	—·10	·07
16·417	·191	—·06	·05	·330	·953	·12	·15
30·328	·614	—·26	—·12	·354	·058	·02	·26
1·222	·626	—·26	—·14	·370	·132	·14	·19
3·273	·830	—·14	·03	·424	·375	—·26	—·06
40·342	·552	—·10	—·02	·445	·465	—·03	—·03
1·341	·034	—·02	·15	60·232	·999	·15	·17
2·350	·561	—·20	—·11	·256	·105	·17	·22
3·337	·993	—·15	·09	·279	·210	·12	·16
4·331	·452	—·31	—·05	·303	·316	—·13	·07
5·335	·958	—·02	·10	·326	·421	—·08	—·04
6·330	·421	—·20	—·10	·350	·527	—·28	—·03
·355	·535	—·27	—·12	·373	·633	—·26	—·06
58·281	·051	·03	·12	·403	·766	—·24	·02
9·281	·538	—·22	—·12	1·288	·735	—·18	·01
63·273	·450	—·17	—·06	·311	·841	—·26	·04
4·280	·971	—·09	·11	2·268	·136	·04	·19
5·280	·455	—·14	—·02	·292	·241	·14	·11
6·284	·961	—·04	·18	·315	·347	—·21	·03
7·282	·442	—·18	·02	3·360	·033	·02	·20
8·265	·852	·18	·00	·383	·139	—·13	·19
9·273	·373	—·22	—·14	·457	·468	—·24	·02
70·263	·817	·02	·08	·473	·542	—·26	—·09
1·253	·257	—·28	·04	4·375	·589	—·24	—·09
2·260	·779	—·28	—·08	·398	·695	—·12	—·05
3·250	·223	—·16	·11	·450	·925	—·03	·09
4·257	·738	—·16	—·06	·473	·030	—·16	·09
5·257	·225	·02	·10	81·226	·204	—·09	·16
6·254	·700	—·24	—·12	2·249	·795	—·24	—·01
7·248	·159	·11	·12	·272	·897	—·08	·07
85·231	·982	—·19	·13	5·315	·555	—·34	—·15
6·226	·448	—·49	—·19	·338	·656	—·26	—·07
7·223	·923	—·08	—·00	6·202	·533	—·30	—·11
·248	·035	—·10	·15	·273	·853	—·18	·06
8·218	·388	—·33	—·12	·297	·959	·05	·17
·243	·497	—·35	—·17	·394	·394	—·26	—·08
9·216	·866	—·14	·06	·417	·499	—·28	—·06
·240	·972	·11	·10	7·202	·023	·13	·22
90·215	·347	—·14	·00	·226	·129	·20	·20
·238	·453	—·25	—·09	·297	·446	—·18	—·07
1·212	·821	—·25	—·03	·320	·552	—·26	—·05
·236	·927	—·12	·12	·391	·869	·00	·05
2·209	·294	—·22	—·02	·414	·974	·20	·15
·232	·399	—·21	—·06	8·200	·498	—·21	—·10
5·212	·771	—·28	—·09	·223	·604	—·24	—·06
6·206	·233	—·22	—·00	·294	·921	·00	·08