curve and the light curve of any short-period variable if both curves were obtained synchronously.

To secure a certain velocity curve of a variable star and then, from its elements of variation, to bring up the light curve over possibly a lapse of years is exceedingly unsafe. Professor Curtiss's important correction in the case of *W Sagittarii* should stand as a warning against this mode of treating so important a problem.

What the writer would urge is that velocity observations and light observations should be made, *over the same period of time*, by reputed observers. One could then compare with confidence the two curves, and form a judgment of some weight on the comparison. There would be no necessity in such a case to consider the secular variation of period—always an uncertain factor.

In no way do I desire to detract from, or to throw discredit upon, the comparisons of the conditions of orbital movement and the circumstances of light fluctuations already established. My wish is to obtain as accurate and as absolute a comparison as care, experience, and skill can furnish.

Lovedale: 1906 *February.*

On the Variable Star (38'1905) *RX Andromedæ.*

By A. Stanley Williams.

R.A. = 0 h 56 m 26 s, Decl. = +40° 31'·6 (1855)
„ = 0 58 55 „ = +40 46·2 (1900)

The few observations of this star obtained here during the latter portion of 1904 and the early part of 1905 seemed to show that it was a variable of the ordinary, regular, short-period (or δ *Cephei*) type, though with an unusually sharply accentuated maximum and a period as long as 45 days. The photographic observations published in the *Astronomische Nachrichten*, No. 4005, indicated, however, the existence of irregularities. Between 1905 July 30 and the end of that year additional observations were made on thirty-four nights,* and these show undoubtedly the presence of very remarkable irregularities. So that, having regard to the usually sharply defined maxima and to the long time during which the star generally remains faint, it would appear that the variable should henceforth be regarded as belonging to the type of *U Geminorum*. The observations upon which this conclusion has been founded are given here in full. It should be premised that these observations are of a more than

* Owing to the unfavourable weather there are many prolonged but unavoidable gaps in the series of observations.

usually satisfactory nature, so that I feel very positive as to the reality of the variations.

A diagram showing the positions of the variable and the comparison stars will be found in the *A.N.*, No. 4005. The following table gives the light-scale and rough magnitudes of the comparison stars used. These rough magnitudes are uncertain as regards their absolute values, but they will serve as a guide to the extent of the variations. They were obtained by assuming the star b to be 10·0 magnitude, and the value of a step to be 0·06 magnitude.

TABLE I.

Comparison Star.	Brightness	Assumed Mag.
b	36·4	10·00
c	21·7	10·88
d	20·7	10·94
e	15·0	11·28

Table II. contains the observations. These were all made with a $6\frac{1}{2}$-inch reflector, with a power of 73, except where otherwise mentioned. The state of the sky is indicated in the fourth column, where IV. implies extreme transparency. The interference from moonlight is also indicated in this column. The last column gives the brightness of the variable according to the light-scale of Table I.

TABLE II.

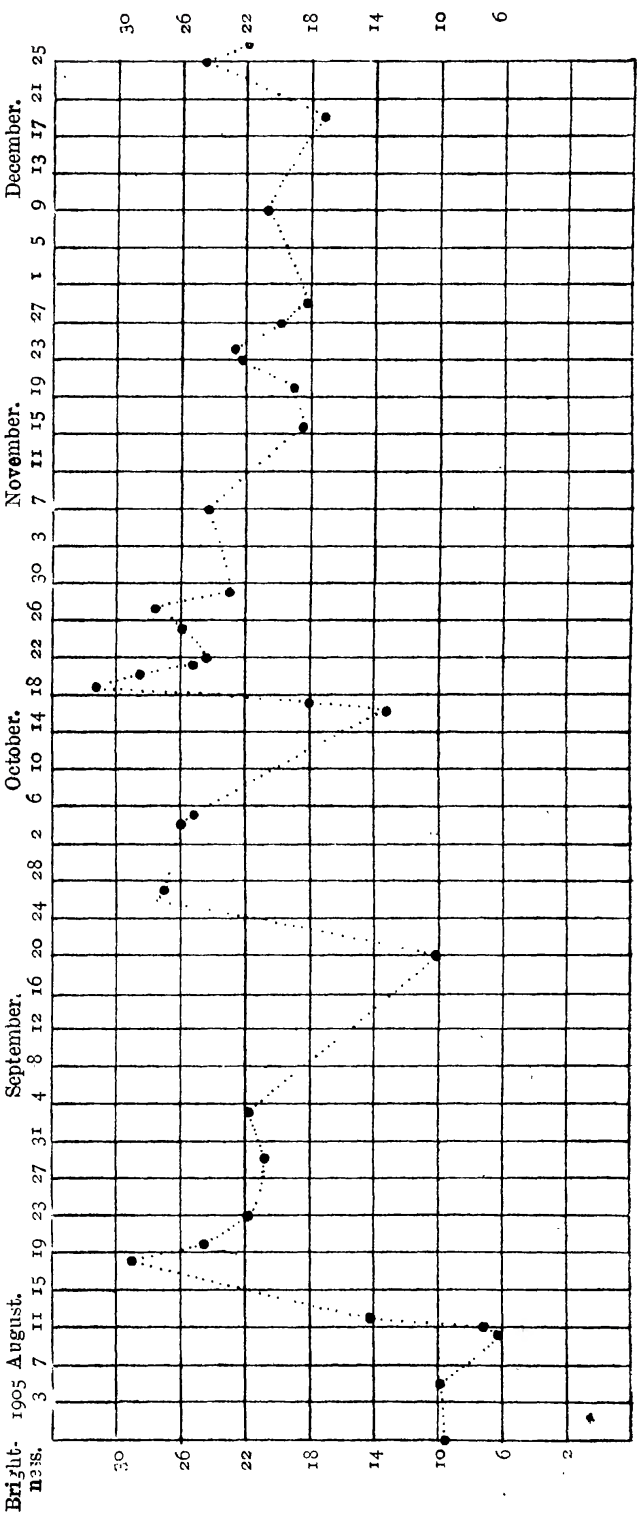
Date. 1905.	G.M.T. h m	Observations.	Sky.	Brightness.
July 30	12 33	c 12 v, d 10 v, e 7 v	IV.	9·5
Aug. 5	14 29	d 10 v, e 6 v	IV.	9·8
10	13 30	d 13 v, e 10 v	IV.	6·3
11	14 44	d 14 v, e 7 v	IV.	7·3
12	14 45	(v 7 d o e)	IV.	14·3
18	15 14	b 10 v 10 c, v 15 d	III. ☽ ☽	29·0
20	14 41	v 3 d, v 12 e, b 15 v 2 c	IV. ☽	24·4
23	14 30	c 2 v 5 d, v 10 e, b 20 v	III. ☽	21·7
29	13 12	d o v 6 e	II.	20·8
Sept. 3	11 10	c o v, v 1 d, v 7 e	III.	21·8
20	15 59	d 11 v, e 4 v	III. ☽ ☽	10·3
27	13 45	b 15 v 7 d, v 12 e, v 7 c	III.	26·8
Oct. 4	9 34	v 5 c, v 5 d, v 12 e, b 13 v	IV.	25·7
4	14 10	v 5 d, v 12 e	IV.	26·3
5	9 26	(c 4 v), b 14 v, v 4 d, v 12 e	IV. ☽	25·3
16	9 48	d 8 v, e 1 v	III. ☽ ☽ ☽	13·3

Date. 1905.	G.M.T. h m	Observations.	Sky.	Brightness.
Oct. 17	11 56	d 4 v 5 e	III. ☽ ☽	18·1
19	10 17	b 10 v 11 d, v 12 c, v 20 e	IV. ☽	31·6
20	10 20	b 15 v 7 c, v 8 d, v 18 e	II.	28·6
21	14 30	b 17 v 4 c, v 4 d, v 12 e	IV. ☽	25·2
22	8 32	b 18 v 2 c, v 4 d, v 12 e	IV.	24·5
25	11 10	b 15 v 7 d, v 15 e, v 7 c	III.	25·8
27	10 14	b 17 v 5 c, v 7 d, v 18 e	III.	27·7
29	10 37	b 18 v 2 c, v 1 d, v 9 e	IV.	23·0
Nov. 7	9 40	v 3 d, v 11 e, b 16 v 3 c	III. ☽ ☽ ☽	24·4
16	9 30	d 4 v 7 e, (d 11 e)	III. ☽ ☽	18·6
20	9 57	d 3 v 8 e	IV.	19·2
23	8 55	d 0 v 12 e, c 0 v, d 12 e	IV.	22·4
24	9 10	v 1 c, v 0 d, v 12 e	III.	22·8
27	7 15	d 2 v 7 e, c 1 v	IV.	19·8
29	7 25	d 4 v 10 e, c 4 v	IV.	18·4
Dec. 9	7 06	v 0 d	III. ☽ ☽ ☽	20·7
19	9 38	d 5 v 3 e	III.	17·1
25	10 16	b 12 v 4 d, v 3 c	II.	24·6
27	9 48	b 18 v, c 1 v 0 d, v 11 e	III.	21·9

Notes.—Aug. 12. Probably should be d 7 v 0 e and so treated; Aug. 29. Some thin cloud about; Sept. 20. Power 110; Oct. 5. c 4 v should probably be v 4 c; Oct. 16. Power 110, sky very bright; Nov. 16. "e very faint to-night?" * Dec. 9. Sky very bright.

The irregular nature of the variations will be seen clearly from the annexed diagram. From minimum brightness on August 11 the star rose rapidly to a sharply defined maximum three or four days later. It was again near minimum brightness on September 20, and a few days later it had risen to a maximum apparently not so sharply defined as the previous one. So far there is nothing very abnormal. But then, after declining to a minimum about October 16, the star rose very rapidly to a very sharply defined maximum on October 19, only about 23 days later than the preceding one. Subsequently to October 19, but subject to minor fluctuations, the star seems to have declined pretty steadily in brightness to December 19, shortly after which date another maximum occurred, probably about December 23. This long decline, during which the variable remained moderately bright, is itself remarkable, though, owing to gaps in the series of observations caused by bad weather, it is just possible that there may have been a maximum somewhere in the interval of 65 days. For the same reason, gaps caused by bad weather, there is an uncertainty of a day or two in the dates of

* The comparison star e may be slightly variable.



Light Curve of *RX Andromedæ* in the year 1905.

the observed maxima. These may, however, be put as under without likelihood of serious error.

Observed Maximum.	Interval. Days.
1905 Aug. 17	
Sept. 26	40
Oct. 19	23
Dec. 23	65

Two maxima derived from my earlier observations are 1904 December 9 and 1905 January 24, the interval between the two being 46 days. These were both sharply accentuated maxima. The following time-intervals between successive maxima of *SS Cygni*, another variable of the same type, obtained by Dr. E. Hartwig in 1904,* will be interesting for comparison with the foregoing figures—namely, 58, 45, 34, 26, and 36 days. Hartwig further states that small brightenings (*Aufhellungen*) also occur when this star is faint, and that the minimum brightness differs at different epochs, all which might equally well be said to apply to *RX Andromedæ*. In fact, as regards the latter, it would seem that not only are the intervals between successive maxima highly irregular, but that also the star is fainter at some minima than it is at others, and that throughout the course of its changes it is subject to minor variations. And yet there are all through persistent suggestions of periodicity. It is worth noting that the successive minima were each brighter than the one preceding. Thus, August 12, brightness = 6·3; September 20 = 10·3; October 16 = 13·3; and December 19 = 17·1. Two distinct types of maximum were observed by Knott in the case of *U Geminorum*—one a sharply defined one, and the other flatter and more prolonged.† These apparently correspond to the "short" and "long" maxima of *SS Cygni*, as described by Messrs. J. A. Parkhurst and Z. Daniel.‡ The maxima of *RX Andromedæ* of 1905 August 17 and October 19, evidently belong to the former or "short" type, whilst in that of 1905 September 26 we may perhaps recognise the other or "long" type.

Hove: 1906 *February* 28.

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* *V. J. S.* 39, Heft 4, p. 260.

† *Journal Liv. Ast. Soc.*, vol. iii. p. 119, and the accompanying diagrams.

‡ *Astrophysical Journal*, vol. xii. p. 267. See also *Popular Astronomy*, vol. vi. p. 159.

Observations of Comet c 1903 *from Photographs taken with the 30-inch Reflector of the Thompson Equatorial at the Royal Observatory, Greenwich.*

(*Communicated by the Astronomer Royal.*)

The following positions of Comet *c* 1903 were obtained from photographs taken with the 30-inch reflector. As a rule there were four images on each plate with exposures of two minutes during June, of one minute July 1 to 7, and of thirty seconds to the end. Four reference stars were taken in each case, situated as symmetrically as possible about the comet. The positions of these stars were derived from the catalogues of the Astronomischen Gesellschaft and from *Karlsruhe Observations*, 1885·0.

Date and G.M.T. 1903.				Apparent R.A.			Apparent Dec.			Log Δ.	Correction for Parallax. R.A.	Dec.
	d	h	m	s	h	m	s	°	′	″		s	″
June	24	13	16	40	21	49	11·35	− 5	27	58·9	9·8196	− ·33	+ 11·0
	26	13	13	34	21	47	58·77	− 3	20	56·6	9·7811	− ·34	+ 11·8
	27	12	59	1	21	46	39·41	− 2	10	7·5	9·7619	− ·38	+ 12·1
	29	13	14	9	21	43	25·16	+ 0	33	21·4	9·7211	− ·35	+ 12·9
	30	13	19	2	21	41	28·67	+ 2	6	26·5	9·6996	− ·34	+ 13·3
July	1	13	9	47	21	39	17·97	+ 3	47	31·9	9·6752	− ·37	+ 13·8
	3	12	42	40	21	34	2·59	+ 7	40	10·3	9·6290	− ·46	+ 14·5
	6	12	32	24	21	22	55·41	+ 15	11	45·0	9·5582	− ·50	+ 14·8
	7	12	26	36	21	18	2·08	+ 18	15	13·8	9·5338	− ·53	+ 14·6
	9	12	25	0	21	5	35·73	+ 25	22	45·1	9·5094	− ·50	+ 12·5
	10	11	46	54	20	57	51·49	+ 29	21	3·4	9·4885	− ·68	+ 11·8
	12	11	44	12	20	36	51·14	+ 38	28	23·0	9·4531	− ·66	+ 7·9
	13	11	17	44	20	23	0·73	+ 43	19	4·2	9·4401	− ·79	+ 5·8
	15	11	11	4	19	43	37·80	+ 53	17	30·2	9·4268	− ·61	− 0·5
	20	11	58	38	16	11	14·71	+ 68	39	9·2	9·4718	+ 2·76	− 1·7
	24	9	37	39	13	30	23·01	+ 64	39	6·7	9·5550	+ 2·13	+ 1·9
	26	11	34	21	12	45	47·75	+ 60	48	31·3	9·5997	+ 1·82	+ 11·6
	30	10	24	34	11	58	49·69	+ 54	12	16·4	9·6855	+ 1·26	+ 10·4
Aug.	1	9	35	39	11	44	26·04	+ 51	27	38·0	9·7254	+ 1·10	+ 9·0
	4	9	3	14	11	28	4·58	+ 47	53	19·8	9·7810	+ 0·90	+ 8·3
	5	9	19	58	11	23	28·60	+ 46	48	17·8	9·7981	+ ·83	+ 8·8
	6	9	26	51	11	19	14·15	+ 45	46	48·3	9·8152	+ ·77	+ 9·0
	7	9	12	54	11	15	19·08	+ 44	48	51·2	9·8313	+ ·74	+ 8·6
	10	9	30	11	11	4	32·47	+ 42	4	32·1	9·8777	+ ·60	+ 8·8
	13	8	45	25	10	54	54·26	+ 39	32	30·9	9·9200	+ ·54	+ 7·7
	14	8	48	34	10	51	45·97	+ 38	41	45·1	9·9335	+ ·51	+ ·7