The normal table has been extended from $g = 4$ cm to $g = 2\frac{1}{2}$ cm in a graphical way. Next, in order to verify Prof. HERTZSPRUNG's suggestion regarding the relative linearity of the (m, g) relations derived from different plates, seventeen least squares solutions were made of the form:

$$m = a + bm_{pr},$$

where m and m_{pr} correspond to the same reading. The residuals of these solutions are given in Table 2 on the m_{pr} scale. The columns give in order: the weight used in the solutions, the reading and further the residuals. It is possible that the small deviations from linearity, which are occasionally shown by the values in the same column, are not real and are due to the uncertainty of the determination of the (m, g) relations.

Photographic observations of VV Puppis, by *A. J. Wesselink*.

The plate material used for the present investigation of this interesting short period variable star has been the same as that used by VAN GENT in his discovery paper[1]. Whereas his results were obtained from estimates with an enlarging eyepiece, a somewhat greater accuracy is obtained here from measures with the Schilt photometer.

Three comparison stars have been used: A, B and C.

Table 1 contains information concerning their designation and magnitudes.

TABLE 1.

designation			brightness	
this paper	*B.A.N.* No. 214	*B.A.N.* No. 285	this paper	*B.A.N.* No. 285
A	—	—	$-^{m}.85$	—
B	a	2	$-.03$	$14^{m}.35$
C	b	4	$+.87$	15.20

The star A precedes the variable by $1'.21$ in $\alpha \cos \delta$ and is $'.94$ north of it (compare the chart of the surroundings in *B.A.N.* No. 214).

The galvanometer readings were converted into provisional magnitudes m_{pr}, by the aid of a normal table as described in the foregoing article. The fourth column of Table 1 shows the mean provisional magnitudes of the comparison stars, their mean value being chosen as zero point. Their scale is in provisional magnitudes of the normal table and corresponds to the mean gradation of the plates. The fifth column of Table 1 shows the magnitudes on the international scale according to MAYALL[2]. The two scales are almost equal and the system of column 4 has been adopted.

Then for each plate the magnitude of the variable was computed with the formula:

$$m\ (\text{VV Pup}) = f \times \{m_{pr}\ (\text{VV Pup}) - \tfrac{1}{3} \Sigma\, m_{pr}\}.$$

The factor f was computed from the formula: $f = \frac{\Sigma n^2}{\Sigma mn}$ based on least squares. Herein n stands for the value given in the fourth column of Table 1; $m = m_{pr} - \frac{1}{3}\Sigma m_{pr}$; $\Sigma m = 0$.

The sums refer to the comparison stars.

Phases were computed by means of the formula: Phase$=14^{d^{-1}}.33758$(J.D. hel. G.M.A.T.-2420000).

The reciprocal period used corresponds to the value of the period given by OOSTERHOFF[3]).

The columns of Table 2 show for the individual observations: the J.D., the brightness of the variable in the system of the fourth column of Table 1, and the phase.

On the assumption that the uncertainties in the measures of the comparison stars are equal, the mean error due to a single comparison star has been calculated from the residuals in the least squares solutions made in determining the gradation factor f. So the square of the mean error due to a single comparison star as derived from 240 plates was found to be ${}^{m^2}.00690 = (\pm\, {}^{m}.083)^2$.

If the measures of the variable are assumed to be of the same accuracy as those of any of the comparison stars, we find for the square of the mean error of one determination of magnitude of the variable:

$$4/3 \times {}^{m^2}.00690 = {}^{m^2}.00920 = (\pm\, {}^{m}.096)^2.$$

Half the mean square value of the magnitude differences of observations following each other in phase is found to be ${}^{m^2}.0743$. The difference ${}^{m^2}.0743 - {}^{m^2}.0092 = {}^{m^2}.0651 = (\pm\, {}^{m}.255)^2$ may be taken as a measure of the irregularities in the light changes during the time covered by the observations.

The irregularity of the light variation was first mentioned by H. L. ALDEN[4]. From observations made at Mt. Wilson P. TH. OOSTERHOFF (loc. cit.) found that the light changes are irregular. According to him the epochs of the maxima follow a linear ephemeris surprisingly well. He further finds a secular change of the mean brightness.

[1]) *B.A.N.* No. 214, 93, 1931.
[2]) *P.A.S.P.* **43**, 305.
[3]) *B.A.N.* No. 285, 45, 1936.
[4]) *Astronomical Journal* **41**, 89, 1931; **42**, 121, 1933.

TABLE 2.

J.D. hel. G.M.A.T. —2420000	brightness	phase	J.D. hel. G.M.A.T. —2420000	brightness	phase	J.D. hel. G.M.A.T. —2420000	brightness	phase	J.D. hel. G.M.A.T. —2420000	brightness	phase
d	m		d	m		d	m		d	m	
5507·6121	— ·09	·829	5653·2781	+ ·10	·327	5971·3911	+ ·39	·298	6042·3860	+ ·08	·193
24·5945	— ·10	·316	·3430	— ·02	·258	·4129	+ ·55	·610	·4079	— ·42	·507
61·5086	— ·04	·574	·3647	+ ·26	·569	·4805	+ ·12	·579	63·2829	+ ·60	·804
·5307	+ ·18	·891	·3863	+ ·31	·878	72·3171	+ ·18	·574	·3047	+ ·34	·116
62·5257	+ ·10	·157	·4086	+ ·51	·198	·3392	+ ·61	·891	64·3514	+ ·21	·123
64·5044	— ·44	·527	·4303	+ ·12	·509	·4064	+ ·70	·855	·3732	— ·25	·436
·5262	+ ·10	·840	·4512	+ ·21	·809	73·4404	+ ·54	·670	65·3175	+ ·53	·975
68·4948	— ·09	·740	54·3205	+ ·34	·273	·4623	+ ·57	·994	67·3205	+ ·62	·693
·5170	+ ·01	·058	·3422	+ ·27	·584	·5724	+ ·38	·572	83·2432	+ ·99	·986
70·4507	+ ·26	·783	55·3749	+ ·16	·390	74·3484	+ ·62	·698	84·2259	+ ·71	·076
·4736	+ ·16	·111	·4556	+ ·96	·547	·3702	+ ·68	·011	85·2141	+ ·40	·244
5613·3667	+ ·45	·094	·4991	+ ·03	·171	·4370	+ ·78	·968	·2359	+ ·17	·557
·3896	— ·33	·422	·5207	+ ·01	·480	·4592	+ ·11	·287	86·2133	+ ·05	·570
14·5067	— ·20	·439	73·2943	+ ·18	·311	96·2833	+ ·23	·192	·2355	+ ·69	·888
·5289	+ ·32	·757	78·2565	+ ·30	·457	·3051	— ·02	·504	87·2268	+ ·40	·101
15·3544	+ ·27	·593	·2787	+ ·35	·775	97·2695	— ·13	·331	·2486	— ·39	·414
·3761	+ ·34	·904	83·2669	+ ·20	·294	·2937	+ ·68	·678	89·2665	+ ·12	·346
41·4403	+ ·48	·602	84·2384	+ ·25	·223	·4021	+ ·15	·232	·2887	+ ·74	·664
·4624	+ ·37	·918	·2603	+ ·52	·534	·4239	+ ·12	·545	91·2561	+ ·60	·872
43·4687	+ ·48	·684	85·3260	+ ·83	·816	98·3693	+ ·66	·100	·2779	+ ·18	·184
·4909	+ ·38	·002	·3482	+ ·58	·135	·3911	— ·11	·412	92·2779	+ ·07	·522
44·2769	— ·19	·272	87·3028	+1·06	·159	6000·3818	+ ·88	·954	93·2609	+ ·11	·616
·2991	+ ·04	·590	·3253	+ ·45	·481	·4036	+ ·24	·267	·2827	+ ·58	·928
·3213	+ ·39	·908	5704·2824	+ ·56	·605	02·4764	+ ·71	·986	94·2494	+ ·71	·788
·4071	+ ·05	·138	·3260	+ ·19	·230	05·3703	— ·20	·477	·2712	+ ·76	·101
·4290	— ·25	·452	05·2935	+ ·67	·102	07·2692	+ ·79	·703	97·2504	+ ·50	·815
·4975	— ·36	·434	·3151	+ ·44	·415	·2910	+ ·81	·015	·2722	+ ·81	·128
45·2583	+ ·68	·342	06·2837	+ ·58	·299	09·4674	+ ·26	·220	99·2593	+ ·30	·618
46·2639	+ ·37	·760	·3277	+ ·51	·930	·4892	— ·27	·532	6101·2786	— ·08	·570
·2857	+ ·36	·073	07·2788	+ ·15	·566	10·4016	+ ·18	·614	02·2436	— ·02	·406
·3871	+ ·04	·527	09·2324	+ ·18	·576	·4726	+ ·48	·632	·2774	+ ·39	·890
·4089	+ ·41	·839	13·2371	+ ·68	·994	12·4148	— ·16	·478	15·1944	+ ·56	·089
·4848	+ ·40	·928	·2589	+ ·29	·307	·4366	+ ·56	·791	·2162	— ·28	·401
·5069	+ ·20	·244	14·2121	+ ·90	·973	13·3570	+ ·86	·987	17·1937	+ ·83	·754
·5824	— ·32	·327	·2340	+ ·33	·287	·5132	+ ·13	·227	·2165	+ ·40	·081
49·2601	+ ·40	·719	15·2990	+ ·25	·557	14·2646	+ ·73	·000	6241·5823	— ·24	·186
·2826	+ ·41	·041	17·2529	+ ·49	·571	·3605	+ ·06	·375	·6045	— ·09	·504
·3046	+ ·26	·357	·2747	+ ·80	·883	·3823	+ ·90	·687	48·5467	+ ·75	·038
·3453	+ ·62	·940	19·2482	+ ·48	·179	·4266	+ ·13	·323	·5692	+ ·24	·361
·3671	+ ·08	·253	·2701	+ ·21	·493	·4485	+ ·78	·637	49·5461	— ·34	·367
50·3228	+ ·70	·955	34·2780	+ ·23	·670	·4703	+1·17	·949	·5679	+ ·71	·680
·3450	+ ·05	·273	·2998	+ ·46	·982	·4921	+ ·32	·262	64·4881	+ ·38	·599
·4139	+ ·25	·261	41·2327	+ ·85	·383	·5143	+ ·21	·580	·5099	+ ·09	·912
·4357	— ·01	·574	58·1859	+ ·66	·451	·5364	+ ·77	·897	65·5277	— ·41	·505
·5036	+ ·18	·547	·2077	+ ·90	·764	15·4364	+ ·76	·801	·5495	+ ·80	·817
51·2578	— ·36	·361	5893·5076	+ ·60	·637	·4582	+ ·36	·113	66·5295	+ ·83	·868
·4517	+ ·17	·141	5915·4616	— ·12	·404	28·3092	— ·19	·365	·5514	+ ·11	·182
52·2626	+ ·64	·767	·4838	+ ·62	·722	·3310	+ ·64	·678	·5543	+ ·40	·899
·3059	— ·15	·388	22·4748	+ ·78	·956	29·3881	+ ·96	·834	·5763	+ ·29	·214
·3276	+ ·58	·699	·4968	+ ·45	·272	·4491	+ ·60	·709	69·4862	+ ·16	·260
·3492	+ ·46	·009	23·4386	+1·05	·775	30·3005	+ ·73	·916	·5532	— ·06	·221
·3709	+ ·18	·320	·4604	+ ·67	·087	·3223	+ ·12	·228	·5751	— ·39	·535
·3925	+ ·35	·630	43·4439	+ ·60	·602	36·2545	— ·05	·282	70·5130	+ ·73	·982
·4147	+ ·30	·950	·4660	+1·01	·919	·2761	+ ·04	·591	·5348	+ ·04	·294
·4366	— ·36	·262	50·3920	+ ·63	·212	38·3965	+ ·76	·993	73·5217	+ ·29	·119
·4583	+ ·28	·573	·4138	+ ·37	·534	·4183	— ·02	·305	·5435	— ·37	·432
·4801	+ ·56	·886	68·3313	— ·32	·427	39·2915	+ ·51	·825	76·4583	+ ·96	·223
·5017	+ ·32	·195	·3535	+ ·76	·746	·3133	+ ·31	·138	·4805	— ·32	·541
·5234	+ ·05	·506	69·3556	+ ·52	·113	40·4505	— ·39	·442	77·4858	+ ·56	·955
53·2564	+ ·70	·016	·3778	+ ·13	·432	·4723	+ ·64	·755	·5074	— ·15	·265

The magnitudes given in this paper are values integrated over ·3 of the period, which is a considerable fraction. They are therefore of little value for the study of the forms of the individual light cycles. Some valuable information may however be obtained with regard to the secular change in the mean brightness as mentioned by OOSTERHOFF (loc. cit.). Therefore the observations were arranged according to phase and a mean lightcurve was constructed. In Figure 1 the differences in magnitude