Figure 1

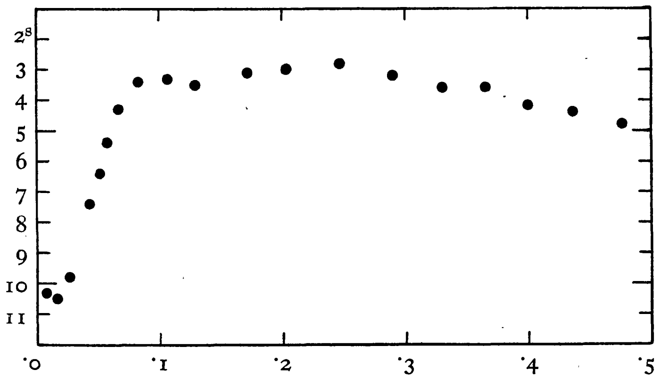


Table 1

n	$\overline{\vert P - \cdot 665 \vert}$	$\bar{s}$
11	·008	10·3
12	·014	10·5
10	·026	9·8
10	·043	7·4
15	·051	6·4
15	·057	5·4
15	·066	4·3
35	·083	3·4
20	·106	3·3
60	·129	3·5
60	·171	3·1
60	·203	3·0
60	·246	2·8
60	·290	3·2
60	·330	3·6
60	·365	3·6
60	·400	4·2
60	·436	4·4
60	·477	4·8

corresponding to a period of $25^{\mathrm{d}}\cdot517$. In Table 1 and in Figure 1 $\overline{|P - \cdot665|}$ has been used as an argument. In Table 2 observations of low brightness have been compared with the ephemeris 2424533·28 + 25·519 E, those of the same night being grouped together.

The observations between the phase limits $\cdot580 < P < \cdot635$ and $\cdot695 < P < \cdot750$ were used for a new determination of the period. The equation of condition can be written as follows:

$$E + tP - u = \delta\,[1\cdot53 + \cdot22\,(5 - s)].$$

Here u is the heliocentric time of observation, P is the period, t the number of periods counted from the central epoch. E is the central epoch of the middle of the eclipse, s is the estimated brightness, which is supposed to change at the rate of 1^{s} in $^{\mathrm{d}}\cdot22$. Further $1^{\mathrm{d}}\cdot53$ is half the width of the minimum at $s = 5\cdot0$. The value of δ has been taken as + 1 for observations on the descending branch and as —1 for those on the rising branch. The solution is:

$$P = 25^{\mathrm{d}}\cdot5190 \pm {}^{\mathrm{d}}\cdot0009 \text{ (m.e.)}$$
$$E = \text{J.D. } 2425018^{\mathrm{d}}\cdot12 \pm {}^{\mathrm{d}}\cdot08 \text{ (m.e.)}.$$

The phase of this new epoch is 196·661.

Using this value of the period and the scale of our estimates, as found from a plate carrying exposures taken with a grating as well as without a grating in front of the objective, we can with more certainty redetermine the slopes of the branches. They are 4·55 in units of one step per day or 26 in magnitudes per period. If we account for ellipticity of the equatorial sections of the stars by a sine term of $^{\mathrm{s}}\cdot8$ semi-amplitude, the steepness of the rectified curve will be $24^{\mathrm{m}/P}$. This steepness, together with the other main features of the curve, can be represented if we assume a star which, in the primary minimum, is eclipsed by its companion having ·1 times its surface brightness and 6 times its radius. The inclination is $52^\circ\cdot4$ and the orbital radius is 1·6 times the radius of the second star. The average densities of the stars are, with these data, subject to the condition $\rho_2 + \cdot0046\,\rho_1 = \cdot0047\,\rho_\odot$. Hence the second star has an average density not in excess of $\cdot005\,\rho_\odot$.

Table 2

mean J.D.	n	E	$O-C$
d			d
2423817·51	1	− 28	− 1·24
3818·56	2	− 28	− ·19
3844·32	2	− 27	+ ·05
3946·26	2	− 23	− ·08
3971·23	1	− 22	− ·63
4176·47	4	− 14	+ ·46
4201·37	3	− 13	− ·16
4202·42	2	− 13	+ ·89
4558·38	1	+ 1	− ·42
4559·32	1	+ 1	+ ·52
4915·43	1	+ 15	− ·64
5732·26	1	+ 47	− ·41
6422·33	1	+ 74	+ ·64
6829·33	1	+ 90	− ·66
6855·34	1	+ 91	− ·17

A new eclipsing variable in the η Carinae region, by *Miss E. van den Hoven van Genderen.*

The Algol variable which is discussed here has been discovered by Miss Savelkoul. Nearly 900 estimates on Johannesburg plates were made. The primary minimum covers nearly a quarter of the period. There is an indication of a secondary minimum. The elements for the primary minimum are:

$$\text{J.D. } 2424648^{\mathrm{d}}\cdot279 + {}^{\mathrm{d}}\cdot8577303\,E.$$

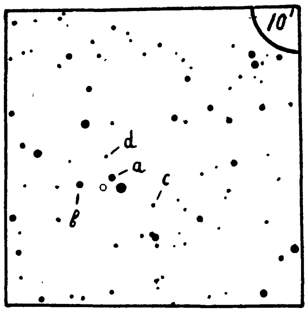
Maximum brightness is $13^{\mathrm{m}}\cdot3$ and the range of primary minimum $1^{\mathrm{m}}\cdot25$.

The variable which is discussed in the present note has been discovered in the blink microscope by Miss D. T. F. M. Savelkoul. Its equatorial co-ordinates are:

$$\alpha = 10^{\mathrm{h}}\,49^{\mathrm{m}}\,15^{\mathrm{s}},\ \delta = -55^\circ\,55'\cdot6\ (1875\cdot0).$$

The star has been estimated by the writer with the aid of an eye-piece on 872 Franklin-Adams and on 10 Rockefeller plates. Four comparison stars were used, which are indicated on the map of the variable and

FIGURE 1



its surroundings given in Figure 1. The brightness of the comparison stars in steps is: $a = {}^{s}{\cdot}0$, $b = 2^{s}{\cdot}8$, $c = 6^{s}{\cdot}9$ and $d = 9^{s}{\cdot}6$. The estimates proved the star to be of the eclipsing type. Its period has been derived by least squares from 19 epochs at which the variable was decidedly faint. The details of this solution are given in Table 1, the resulting heliocentric elements of minimum being:

$$\begin{array}{lcl} \mathrm{J.D.}\ 2424538^{d}{\cdot}491 & + & {}^{d}{\cdot}8577280\ (E - 872). \\ \pm\quad 4 & \pm & 27\ \mathrm{m.e.} \end{array}$$

Then phases have been computed by means of the formula:

$$\mathrm{phase} = 1^{d^{-1}}{\cdot}165869\ (\mathrm{J.D.} - 2420000).$$

TABLE 1

J.D. hel. M.A.T. Gr. — 2420000	E	$O - C$
d		d
3790·545	0	— ·007
3814·551	28	— ·017
15·434	29	+ ·008
40·307	58	+ ·007
76·327	100	+ ·002
81·459	106	— ·012
3943·217	178	— ·010
49·207	185	— ·024
4176·539	450	+ ·010
77·406	451	+ ·019
4201·408	479	+ ·005
07·435	486	+ ·027
38·308	522	+ ·022
86·331	578	+ ·011
4538·479	872	— ·012
4648·240	1000	— ·040
4918·465	1315	+ ·001
5775·344	2314	+ ·010
9423·249	6567	— ·002

Normal points of at least ten observations are given in Table 2 and this mean light-curve is shown in the upper half of Figure 2. The primary minimum covers well over two tenths of the period, but as there seems to be rather strong evidence for a secondary minimum, it is very unlikely that the period should be doubled. This is confirmed by the fact that no difference in depth could be found between odd and even minima. The mean phase of primary minimum derived according to HERTZSPRUNG's method [1]) is ·2859 ±·0012 (m.e.). A new mean light-curve has been constructed, phases being counted without regard to sign from the phase of minimum, ·286. It is shown in the lower half of Figure 2 and the data of the normal points are given in Table 3. The range of primary and secondary minimum is $5^{s}{\cdot}0$ and ${}^{s}{\cdot}6$ respectively.

The observations on the branches of the primary minimum make it possible to determine a more accurate ephemeris. Therefore the slope of these branches and the width of the minimum at a certain brightness have been derived by least squares. With the aid of the values thus found 71 observations on the descending and 67 on the rising branch have been reduced to

FIGURE 2

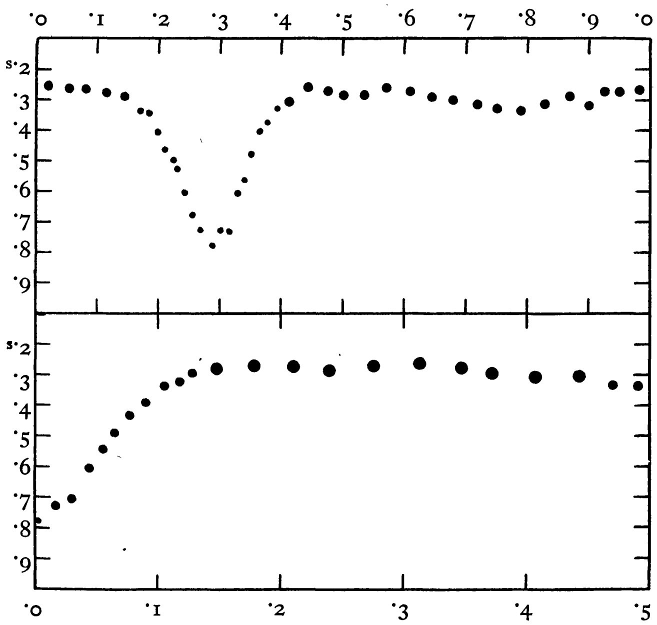


TABLE 2

n	mean phase	mean brightness	n	mean phase	mean brightness
	P	s		P	s
30	·019	2·57	11	·377	3·76
30	·053	2·66	11	·393	3·30
30	·082	2·66	30	·412	3·08
30	·114	2·79	30	·443	2·61
30	·146	2·90	30	·475	2·72
10	·170	3·40	30	·503	2·86
10	·184	3·46	30	·534	2·85
10	·198	4·08	30	·570	2·61
10	·210	4·64	31	·609	2·73
10	·223	5·00	32	·645	2·90
10	·231	5·27	30	·679	3·01
10	·242	6·06	30	·718	3·17
10	·256	6·79	30	·751	3·30
10	·268	7·28	30	·789	3·37
10	·288	7·79	30	·828	3·16
10	·301	7·29	30	·869	2·90
10	·315	7·32	30	·901	3·20
10	·329	6·07	30	·926	2·75
11	·340	5·63	30	·950	2·75
11	·351	4·81	35	·982	2·68
10	·364	4·03			

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[1]) *B.A.N.* No. 147, 179, 1928.

TABLE 3

n	mean phase	mean brightness	*n*	mean phase	mean brightness
	P	s		P	s
10	·002	7·79	60	·181	2·72
20	·017	7·29	60	·211	2·75
20	·030	7·05	60	·239	2·87
20	·044	6·06	65	·276	2·73
21	·055	5·45	60	·313	2·65
21	·064	4·91	63	·347	2·79
20	·077	4·34	60	·372	2·97
21	·090	3·92	60	·407	3·08
21	·105	3·38	60	·443	3·05
20	·117	3·24	30	·471	3·34
20	·128	2·96	30	·491	3·37
60	·148	2·82			

the time of minimum. A least-squares solution of these 138 observed epochs yields the following ephemeris, which is considered the most accurate to be derived from the present material:

$$\begin{array}{l}\text{Primary minimum} = 2424648^{\mathrm{d}}{\cdot}279 + {}^{\mathrm{d}}{\cdot}8577303\;E. \\ \qquad\qquad\qquad\qquad\quad \pm \quad 2 \pm \qquad\quad 10\ \text{m.e.}\end{array}$$

The photographic magnitude of the variable outside the eclipse is 13·3. From plates taken with a coarse objective grating the variable was found to be $2^{\mathrm{m}}{\cdot}5$ fainter than C.P.D. —55°3959. With the corrections to the C.P.D. magnitudes this yields the magnitude 13·2. From star counts and *Groningen Publ.* No. 43 the value $13^{\mathrm{m}}{\cdot}4$ was derived.

The range of the primary minimum was found to be $1^{\mathrm{m}}{\cdot}25$. The results obtained from grating plates and from star counts are in close agreement.