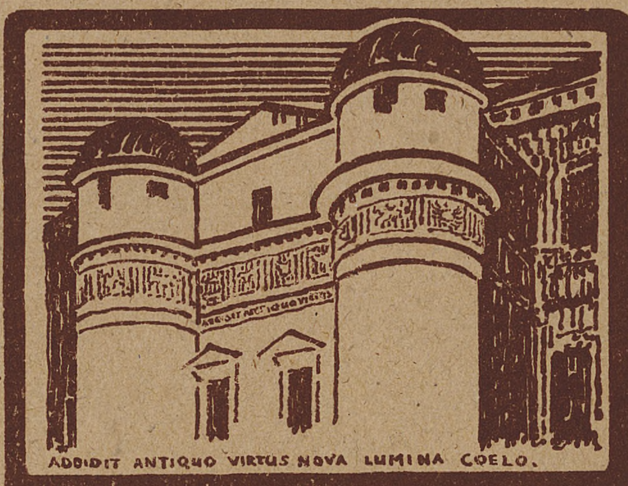
BULLETIN DE L'OBSERVATOIRE ASTRONOMIQUE DE VILNO.

I. ASTRONOMIE.

№ 11.


ADDIDIT ANTIQUO VIRTUS NOVA LUMINA COELO.

BIULETYN OBSERWATORJUM ASTRONOMICZNEGO W WILNIE.

ROK 1930

M.D.

ODBITO W ZAKŁ. LITOGRAFICZNYM P. F. JAN COTTY. WARSZAWA KAPUCYNSKA 7.

Bulletin

de

l'Observatoire astronomique

de

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Obserwatorjum astronomicznego

w Wilnie.

1930

ZAKŁADY GRAFICZNE „ZNICZ“ W WILNIE, UL. Ś-TO JAŃSKA Nr. 1.

TO THE MEMORY
OF
JAN SNIADECKI
(1756 — 1830)
DIRECTOR OF THE WILNO OBSERVATORY

ON THE 100-th ANNIVERSARY
OF HIS DEATH.

PAMIĘCI
JANA SNIADECKIEGO

DYREKTORA OBSERWATORJUM ASTRONOMICZNEGO
W WILNIE
W SETNĄ ROCZNICĘ
JEGO ZGONU.

WŁ. DZIEWULSKI.

On the Systematic Motions of Stars.

Fourth paper.

In the third paper[1]) on this subject I have considered the distribution of the velocities relatively to the galactic plane of 1833 stars, among them 1512 giants; these numbers contain only those stars, whose peculiar velocities do not exceed 80 km per second. Unfortunately a mistake has been made in counting the stars, 95 of them being counted twice. The present investigation is free from this error and is based on a somewhat larger material collected by Miss W. Iwanowska, who added 283 giant stars whose peculiar velocities (< 80 km/sec) were computed on the assumption that the Sun's velocity towards the apex ($\alpha = 270^0$, $\delta = +30^0$) is 20 km/sec. The number of the considered giant stars with peculiar velocities not exceeding 80 km/sec is now 1700.

The galactic plane was taken for the plane of reference; the coordinates of the pole of the galactic plane were assumed: $\alpha = 191^0.1$, $\delta = +26^0.8$. The rectangular galactic coordinates expressed in parsecs were reckoned by means of tables, compiled by Mrs J. Jantzen.

Considering the distribution of the velocities relatively to the galactic plane, let us assume the descending and ascending nodes of the galactic plane to coincide with the vertex and antivertex and take the positive x-axis in the direction of the ascending node of the galactic plane, the positive y-axis being directed to the point of galactic longitude $= 6^h$.

We take into consideration 1700 giant stars (absolute magnitude $3^m.0$ or less) of B, A, F, G, K, M types with peculiar velocities not exceeding 80 km per second and divide them into three groups according to the values of „y"; we receive the following table:

[1]) Bulletin de l'Observatoire astronomique de Wilno. № 9. 1928.

Table I-a.

y	Number of stars	Mean velocity km/sec
$y \leq 10$	612	25.4
$10 < y \leq 45$	543	24.3
$45 < y$	545	23.8

Omitting the stars, whose peculiar velocities exceed 60 km per second, we arrive at table I-b which is analogous to the first, but the mean velocities are smaller.

Table I-b.

y	Number of stars	Mean velocity km/sec
$y \leq 10$	589	23.7
$10 < y \leq 45$	530	23.3
$45 < y$	530	22.6

These results confirm those arrived at in the former papers and show that the distribution of the velocities of stars depends on the distance from the x-axis (parallel to the line vertex-antivertex and passing through our Sun).

In order to get a homogenous material for the investigation a separate treatment of different spectral types is of importance. Forming two groups of stars according to the values of y-coordinate, we consider all the types separately and then three groups (B-A, F-G, K-M), as the numbers of stars in separate groups are relatively small.

Table II-a.

Type	y ≤ 25		y > 25	
	Number of stars	Mean vel. km/sec	Number of stars	Mean vel. km/sec
B	172	17.1	230	16.7
A	281	21.9	157	23.1
F	87	29 6	53	24.6
G	100	32.3	116	28.6
K	179	31.2	187	27.4
M	66	30.3	72	28.4
B-A	453	20.1	387	19.3
F-G	187	31.0	169	27.3
K-M	245	31.0	259	27.7
All stars	885	25.4	815	23.6

Table II-a shows that only the stars of the A-type do not exhibit the generally observed relationship between velocity and distribution along the y-axis. Omitting again the stars, whose peculiar velocities exceed 60 km per second, we receive:

Table II-b.

Type	y ≤ 25		y > 25	
	Number of stars	Mean vel. km/sec	Number of stars	Mean vel. km/sec
B	171	16.8	228	16.3
A	280	21.7	156	22.8
F	84	28.2	52	23.8
G	89	27.5	109	25.9
K	167	28.6	179	25.7
M	61	27.2	72	28.4
B-A	451	19.9	384	18.9
F-G	173	27.8	161	25.2
K-M	228	28.2	251	26.5
All stars	852	23.7	796	22.6

The results are on the whole analogous to those given in table II-a, only for the stars of the M-type the generally accordance of velocities, observed in the table II-a, is now lost.

At last let us examine the stars, whose velocity-vectors are distributed near (less than 45°) to the vertex and antivertex and do not exceed 80 km per second. The results are given in the following table:

Table III.

Type	Near to the antivertex				Near to the vertex				Near to the anti-vertex and vertex			
	y ≤ 25		y > 25		y ≤ 25		y > 25		y ≤ 25		y > 25	
	Number of stars	Mean vel. km/sec	Number of stars	Mean vel. km/sec	Number of stars	Mean vel. km/sec	Number of stars	Mean vel. km/sec	Number of stars	Mean vel. km/sec	Number of stars	Mean vel. km/sec
B	26	19.3	73	19.4	35	19.9	23	14.9	61	19.6	96	18.4
A	113	25.3	75	26.9	54	24.1	22	20.4	167	24.9	97	25.5
F	22	30.1	22	23.6	25	33.5	12	35.0	47	32.4	34	27.6
G	17	28.5	41	25.0	16	42.5	15	45.5	33	35.3	56	30.5
K	51	30.0	74	24.5	35	37.7	21	34.1	86	33.1	95	26.6
M	18	25.3	19	29.3	7	29.1	9	37.0	25	26.4	28	31.7
B-A	139	24.2	148	23.2	89	22.4	45	17.6	228	23.5	193	21.9
F-G	39	29.4	63	24.5	41	37.6	27	40.8	80	33.6	90	29.4
K-M	69	28.7	93	25.5	42	36.3	30	34.9	111	31.6	123	27.8
All stars	247	26.3	304	24.2	172	29.4	102	28.8	419	27.6	406	25.3

The results of table III confirm the general character shown by tables I and II. Considering the distribution of the velocity-vectors along the y-axis (nearly perpendicular to the direction of the line vertex-antivertex in the galactic plane) we see that the average velocities increase with decreasing „y". This is not always true for the separate groups, but as the number of stars in each group is relatively small, the data concerning them separately are probably less reliable.

Wilno. 1930. VII. 7.

JANINA JANTZEN.

On the Motion of Dwarf Stars.

In his paper on the same subject W. Dziewulski[1]) has investigated the distribution of the velocity-vectors of the dwarf stars, whose peculiar velocities exceed 70 km. resp. 50 km. per sec., 139 resp. 214 stars have been considered.

The catalogue of parallaxes of Schlesinger and the catologue of radial velocities of the Lick Observatory (some data were taken from other sources) permitted to consider now a greater number of dwarf stars, for which the parallaxes, the radial velocities and the proper motions are known. Assuming for the direction of the solar motion $\alpha = 270^0$, $\delta = +30^0$ and for its speed 20 km. per sec., the space- or peculiar-velocities were calculated for the collected stars.

Let us first consider all dwarf stars, viz. 593. Calculating the mean components of their peculiar motions, we find, that the group of dwarf stars is moving as a whole in the direction: $\alpha = 124^0.7$, $\delta = -44^0.1$ (galactic $l = 228^0.8$, $b = -3^0.3$) with a velocity of 22 km. per sec.

This velocity has only a relative value depending on the choise of the used stars. Substracting this common motion, which represents the displacement of the group of dwarfs relatively to the system of giants, we find the movement of the dwarf stars relatively to the centre of gravity. We can now investigate the distribution of the velocity-vectors in this system. As in the investigation of W. Dziewulski the three axis ellipsoidal distribution is considered. The sky was divided into regions and the stars moving towards each region were counted. The 7 zones and 50 regions were chosen as follows:

I	zone from	-15^0 to $+15^0$	in Dec.	and every 30^0	in R. A.,	on the whole	12 regions
II	„ „	$+15$ „ $+45$	„	„ „	„ „	„ „	12 „
III	„ „	-15 „ -45	„	„ „	„ „	„ „	12 „
IV	„ „	$+45$ „ $+75$	„	„ 60	„ „	„ „	6 „
V	„ „	-45 „ -75	„	„ „	„ „	„ „	6 „
VI	„ „	$+75$ „ $+90$	„	„ —	— — —	„ „	1 „
VII	„ „	-75 „ -90	„	„ —	— — —	„ „	1 „

In order to allow for the inequality of the areas of different regions the correcting factor 1.16 for the number of the vectors in

[1]) Bulletin de l'Observatoire astronomique de Wilno. № 10. 1929.

the regions of the zone II and III should be introduced and 1.26 for the zones VI and VII. The number of vectors increases from 593 to 634.

Let:

$$Ax^2 + A_1y^2 + A_2z^2 + 2Byz + 2B_1zx + 2B_2xy + H = 0,$$

where x, y, z are the rectangular aequatorial coordinates, be the equation of the velocity-ellipsoid. For the 50 regions we get 50 equations which we resolve by the method of least squares. When the constants are found, the axes (a, b, c) and their directions can be easily computed.

Table I contains the coordinates of each region and the observed number of stars therein. After determining the constants of the ellipsoid we calculate the number of stars in each region and build the differences: Observ. - Calcul. For the direction of the axes of the velocity-ellipsoid we get:

a — axis:	$l = 333^\circ.5$	$b = -3^\circ.4$
b — axis:	$l = 243.4$	$b = -6.0$
c — axis:	$l = 279.0$	$b = +83.3$

and for the ratios b/a and c/a: $b/a = 0.87$, $c/a = 0.43$.

Till now we have considered all the dwarf stars together.

Now, let us consider separately the so called high velocity stars viz. those, whose peculiar velocities exceed 60 km. per sec. There are 216 stars of this kind. For this group we calculate again the common motion and find its direction: $\alpha = 126^\circ.8$, $\delta = -46^\circ.5$ (galactic $l = 231^\circ.6$, $b = -3^\circ.4$) with a velocity of 55 km. per sec. The resulting velocity gets in this case larger, what is evident; the velocity of this displacement of the group of the high velocity dwarfs has only, as mentioned, a relative value.

Dividing the sky into 50 regions and correcting, as before, the number of the vectors in different regions we get for the number of vectors 229 instead of 216. Resolving our equations we receive for the directions of the axes of the velocity-ellipsoid:

a — axis:	$l = 332^\circ.2$	$b = -1^\circ.6$
b — axis:	$l = 242.4$	$b = +1.7$
c — axis:	$l = 15.4$	$b = +87.7$

and for the ratios b/a and c/a: $b/a = 0.51$, $c/a = 0.45$.

Table II contains the observed and calculated numbers of stars in each region and their differences. It is to be noted that the results of the first (all dwarf stars) and the second calculation (the stars with peculiar velocities $>$ 60 km. per sec.) are in good agreement with regard to the directions of the axes.

In the second case the ellipsoid of velocity distribution is very flattened and is similar to that calculated by W. Dziewulski. This shape shows distinctly two favoured (opposite) directions of the star movements parallel to the greatest axis, lying practically on the galactic plane and directed towards l = 332°.

Table I.

Zone	Region	Coordinates		Number of stars		O.—C.
		α	δ	Observ.	Calc.	
		°	°			
I	1	9.3	+ 14.4	1	3	— 2
„	2	46.6	+ 7.9	5	5	0
„	3	78.6	+ 1.4	18	16	+ 2
„	4	103.0	— 0.9	19	28	— 9
„	5	132.8	+ 2.8	12	10	+ 2
„	6	167.2	+ 0.3	5	4	+ 1
„	7	203.8	— 4.1	3	4	— 1
„	8	237.5	— 1.2	4	6	— 2
„	9	258.0	— 3.8	24	16	+ 8
„	10	282.8	+ 0.5	38	28	+10
„	11	310.7	— 2.3	13	11	+ 2
„	12	343.6	— 1.1	7	4	+ 3
II	13	12.1	+ 27.8	6	6	0
„	14	43.1	+ 29.6	19	9	+10
„	15	76.8	+ 29.6	31	23	+ 8
„	16	103.3	+ 29.0	19	26	— 7
„	17	131.3	+ 28.9	8	9	— 1
„	18	175.6	+ 31.8	3	3	0
„	19	205.3	+ 42.5	1	4	— 3
„	20	219.5	+ 27.9	2	3	— 1
„	21	256.2	+ 27.4	7	9	— 2
„	22	285.5	+ 27.1	44	23	+21
„	23	313.3	+ 29.4	21	17	+ 4
„	24	345.3	+ 34.4	7	9	— 2
III	25	14.8	— 33.8	2	7	— 5
„	26	41.4	— 31.1	5	4	+ 1
„	27	74.5	— 25.8	8	9	— 1
„	28	102.1	— 26.2	9	21	—12
„	29	135.7	— 23.6	7	14	— 7
„	30	162.8	— 44.0	2	13	—11
„	31	201.0	— 27.7	3	6	— 3
„	32	226.8	— 30.3	8	11	— 3
„	33	254.6	— 28.2	19	24	— 5
„	34	284.8	— 28.2	31	25	+ 6
„	35	308.6	— 28.2	10	10	0
„	36	345.2	— 34.5	6	4	+ 2
IV	37	31.3	+ 56.5	39	19	+20
„	38	82,6	+ 59.2	34	25	+ 9
„	39	139.2	+ 63.8	10	8	+ 2
„	40	198.0	+ 61.0	9	4	+ 5
„	41	277.7	+ 60.1	17	13	+ 4
„	42	333.1	+ 60.1	28	20	+ 8
V	43	12.3	— 65.0	2	5	— 3
„	44	81.5	— 63.3	4	10	— 6
„	45	141.2	— 59.5	8	21	—13
„	46	211.5	— 61.5	15	22	— 7
„	47	254.2	— 56.7	14	27	—13
„	48	329 2	— 63.6	5	7	— 2
VI	49	348.7	+ 86.8	21	15	+ 6
VII	50	284.2	— 86.4	1	14	—13

Table II.

Zone	Region	Coordinates		Number of stars		O.—C.
		α	δ	Observ.	Calc.	
1	1	24°.7	+ 4°.4	1	2	— 1
„	2	52.6	+ 6.9	3	5	— 2
„	3	78.7	+ 1.3	11	9	+ 2
„	4	102.5	+ 2.0	9	10	— 1
„	5	135.4	— 4.3	5	3	+ 2
„	6	165.0	0.0	0	2	— 2
„	7	195.4	+ 6.2	2	2	0
„	8	220.0	— 1.8	2	3	— 1
„	9	256.5	+ 0.1	13	7	+ 6
„	10	283.2	— 0.1	22	9	+13
„	11	311.1	+ 4.2	7	4	+ 3
„	12	342.6	— 12.8	3	3	0
II	13	24.6	+ 36 8	3	3	0
„	14	46.6	+ 34.9	14	6	+ 8
„	15	77.5	+ 33.2	16	15	+ 1
„	16	104.8	+ 31.0	8	14	— 6
„	17	136.9	+ 25.4	5	4	+ 1
„	18	157.8	+ 30.0	2	3	— 1
„	19	191.9	+ 24.1	5	2	+ 3
„	20	223.7	+ 23.8	1	2	— 1
„	21	265 4	+ 38.3	1	3	— 2
„	22	285.7	+ 18.2	5	5	0
„	23	315.0	+ 30.0	0	2	— 2
„	24	356.5	+ 26.7	1	2	— 1
III	25	19.0	— 21.9	2	2	0
„	26	36.0	— 28.4	2	2	0
„	27	75.4	— 38.1	2	3	— 1
„	28	106.5	— 40.5	1	3	— 2
„	29	137.5	— 30.5	1	2	— 1
„	30	176.2	— 38.5	1	2	— 1
„	31	195.0	— 30.0	0	2	— 2
„	32	235.1	— 33.2	1	7	— 6
„	33	259.4	— 30.8	13	16	— 3
„	34	280.6	— 23.3	10	16	— 6
„	35	304.8	— 32.0	2	6	— 4
„	36	341.4	— 32.2	2	2	0
IV	37	39.9	+ 59.3	5	5	0
„	38	86.3	+ 60.2	16	6	+10
„	39	140.4	+ 54.5	5	3	+ 2
„	40	217.1	+ 65.1	3	2	+ 1
„	41	270.0	+ 60.0	0	2	— 2
„	42	330.0	+ 60.0	0	2	— 2
V	43	30.0	— 60.0	0	2	— 2
„	44	78.0	— 64.7	1	2	— 1
„	45	135.2	— 55.7	3	2	+ 1
„	46	207.8	— 66.9	4	4	0
„	47	269.6	— 54.4	6	8	— 2
„	48	333.8	— 49 4	1	2	— 1
VI	49	99.9	+ 83.0	5	3	+ 2
VII	50	202.3	— 84.7	4	3	+ 1

Wilno. 1930. VII. 1.

WŁ. DZIEWULSKI.

On the Variable Star S Sagittae.

In 1921 I published [1]) the results of my observations of the variable star S Sagittae and tried to calculate the period of the variation. For this purpose I examined two moments of the minima. Continuing to observe the star, I got soon convinced that my determination of this period does not correspond to the reality. Therefore I decided to examine the old observations again and then the new ones separately. The old observations were made at Cracow since October 28th 1911 until September 25th 1919, on the whole 151 observations, the new observations were made at Wilno by means of the Zeiss binocular with 6-fold magnification since November 19th 1919 until January 20th 1930, on the whole 534 observations, all after the method of Argelander.

In the second series of observations I used the following stars (the magnitudes are taken from the Potsdam Catalogue = P. D.):

Stars	P. D.	Steps
ζ Sagittae	$5^m.23$	18.2
11 „	5.67	11.0
15 „	5.72	7.9
9 „	6.50	0.0

I took as starting point the elements of Nijland, namely:

J. D. 2409863.324 M. Gr. T. + 8.381613 E

I got a curve of brightness and remarked that there is a great discordance between the calculated and observed values of maximum. By means of the elements of Luizet, namely:

J. D. 2409863.324 M. Gr. T. + 8.38209 E

[1]) Bulletin de l'Observatoire astr. de Wilno. № 1. 1921.

I found a much better agreement with my observations. Therefore these elements were used since. The observations, expressed in units of arbitrary scale, were grouped according to the period of Luizet for each series separately. For the first series, forming groups of observations, I got the following mean values:

d.	st.	d.	st.
0.286	13.0	5.187	6.1
0.673	12.3	5.819	6.2
1.131	13.0	6.318	8.0
1.539	12.9	6.847	9.2
2.198	12.0	7.213	12.7
3.304	11.0	7.750	13.3
4.150	9.0	8.266	13.7
4.606	7.6		

The mean error of each observation amounts to $\pm$ 1.8 i. e. $\pm$ $0^m.12$ in the Potsdam scale. The curve of brightness near the maximum and the minimum shows that the brightness of the star oscillates between 13.8 and 5.8 in my scale, or from $5^m.48$ to $6^m.00$ in the Potsdam scale. For the moment of the maximum a correction: $-0^d.22$ was found.

For the second series the groups of observations were again formed and the following mean values were received:

d.	st.	d.	st.
0.121	11.5	4.357	5.5
0.553	10.6	4.831	4.6
1.059	11.4	5.214	4.4
1.500	11.1	5.619	4.9
2.033	10.8	6.070	5.0
2.516	8.8	6.570	6.7
2.978	8.9	7.089	8·9
3.471	6.9	7.583	10.7
3.907	6.2	7.977	11.0

The mean error of each observation amounts to $\pm$ 2.0, i. e. $\pm$ $0^m.14$ in the Potsdam scale. The study of the curve of brightness near the maximum and the minimum shows, that the brightness of the star oscillates in my scale between 11.5 and 4.2 steps, or from $5^m.63$ to $6^m.13$ in the Potsdam scale. For the moment of the maximum I received the correction: $+0^d.11$, the minimum results at the moment $5^d.01$ and the difference between maximum (M) and minimum (m) results: $M - m = 3^d.48$.

The corrections for the moments of the maxima, found in both series of observations, seem to point out a somewhat longer period of variability, than that determined by Luizet. Therefore it seemed worth while to compare these observations with those of other authors. I took into account only those observations, which were published later than Luizet's paper and contain precise determination of the moment of maximum. Taking as starting point the moment of maximum, given by Luizet, I considered the observations of A. A. Nijland[1]) E. Leiner[2]) and those of A. Tass[3]), from which I determined the moment of maximum. There are only 123 observations, but the moment of maximum could be relatively well determined, namely: J. D. 2416920.64 M. Gr. T.

The following table gives the observations of the above named authors:

E	Author	Maximum observed	Maximum calculated	O.—C.
0	Luizet	2409863.324		
842	Tass	2416920.64	2416921.04	— 0.40
991	Nijland	2418169.50	2418169.97	— 0.47
1233	Dziewulski	2420198.22	2420198.44	— 0.22
1470	Leiner	2422184.57	2422185.00	0.43
1737	Dziewulski	2424423.12	2424423.01	+ 0.11

There is a considerable discrepancy between my observations and those of other authors. By means of the corrections (O. — C.) I tried to resolve the equations, giving a correction to the epoch and the period of Luizet. The result was: a correction to the epoch: $-0^d.895$ and to the period: $+0^d.000489$. With these corrections the

[1]) Astronomische Nachrichten. Bd. 196. Kiel 1914.

[2]) Astronomische Nachrichten, Bd. 227. Kiel 1926.

[3]) Publications of the R. Hung. Astr. Observatory. Vol. II. Ogyalla 1918 — Budapest 1925.

moments of the observed maxima were calculated again and the following new differences (O. — C.) received:

E	Author	O. — C.
842	Tass	+ 0.08
991	Nijland	— 0.06
1233	Dziewulski	+ 0.07
1470	Leiner	— 0.25
1737	Dziewulski	+ 0.16

they are much smaller than the former ones. However no great importance should be attached to these figures. It is difficult to explain the great correction to the moment of the epoch of Luizet as well as the discordance between my observations and those of other authors. Further observations will be continued.

Wilno. 1930. IX. 12.

WILHELMINA IWANOWSKA and WŁ. DZIEWULSKI

The Brightness of the Comet 1930-c (Wilk).

This comet was observed at Wilno with the 150 mm short focus refractor (the magnifying power 20) from March 23[d] until Mai 17[th]. During these observations the focal and the extrafocal images of the comet were compared with similar images of the stars. When focal images were observed, the brightness of the nucleus was compared with the stars. As the nucleus of the comet at the end of April was very faint and not sharply defined, the observations were interrupted and the extrafocal images of the comet and those of the stars were for a time compared.

The table I indicates the comparison stars used during the observations; the brightness of the stars were taken from the Henry Draper Catalogue; only for some stars, not included in this Catalogue, the B. D. Catalogue was used.

Table I.

Design.	B. D.	Magn.	Design.	B. D.	Magn.
a_1	+ 21° 243	5.89	h_2	+ 45° 4002	7.07
b_1	22 226	6.07	i_2	45 4032	7.42
c_1	26 220	4.67	k_2	44 4183	7.89
d_1	27 215	5.60	l_2	45 4051	7.97
e_1	27 196	6.63	m_2	44 4172	7.10
f_1	29 190	4.70	n_2	44 4169	7.28
g_1	29 195	6.40	o_2	45 3958	8.17
h_1	30 181	5.04	p_2	45 3941	7.27
i_1	31 168	5.46	q_2	45 3919	7.92
k_1	31 180	6.64	r_2	44 4083	7.12
l_1	32 101	4.44	s_2	44 4120	7.22
m_1	34 86	5.62	t_2	44 4114	8.2
n_1	37 34	4.44	u_2	44 4087	8.0
o_1	38 90	5.42	v_2	45 3813	6.52
p_1	37 98	7.40	w_2	44 4036	8.2
q_1	39 138	6.84	x_2	44 4068	9.02
r_1	38 68	7.05	y_2	45 3816	9.1 B. D.
s_1	39 56	6.41	z_2	44 3985	7.8
t_1	40 98	8.12	a_3	44 4029	8.1
u_1	43 4489	6.87	b_3	43 4067	7.58
v_1	43 4481	7.10	c_3	43 4050	7.9
w_1	43 4445	7.55	d_3	44 3946	8.7
x_1	43 4440	6.14	e_3	44 3939	8.8 B. D.
y_1	44 4302	6.44	f_3	44 3929	8.7
z_1	44 4307	7.92	g_3	44 3934	8.9
a_2	43 4375	6.51	h_3	44 3936	8.9
b_2	43 4371	7.25	i_3	42 3885	8.5 B. D.
c_2	43 4331	5.62	k_3	42 3876	8.6 B. D.
d_2	44 4197	7.12	l_3	42 3870	9.0
e_2	44 4240	8.0	m_3	42 3880	9.2 B. D.
f_2	44 4246	8 2	n_3	41 3865	9.2 B. D.
g_2	45 4047	6.80	o_3	42 3843	9.2 B. D.

Table II includes our observations and the resulting magnitudes of the comet.

Table II.

Focal comparisons.

Obs.: W. Iwanowska. Obs.: Wł. Dziewulski.

1930	M. T. civil Greenwich	Comparisons	Magn.	M. T. civil Greenwich	Comparisons	Magn.
	h m			h m		
23 III				18 15	$a_1 6c\, 8b_1$	5.97
28 III	18 55	$c_1 4c,\ d_1 2c\ 7e_1$	5.58			
29 III	18 41	$f_1 4c = d_1,\ c\ 6g_1$	5.47	18 44	$f_1 8c,\ d_1 1c\ 5g_1$	5.70
30 III				18 26	$f_1 7c,\ d_1 1c\ 5g_1$	5.70
30 III				18 29	$h_1 5c,\ i_1 1c\ 6k_1$	5.71
31 III	18 25	$h_1 3c = i_1,\ c\ 2k_1$	5.80	18 21	$h_1 5c = i_1,\ c\ 7k_1$	5.62
3 IV	19 05	$l_1 3c\ 5m_1$	4.87	19 10	$l_1 4c\ 6m_1$	4.91
7 IV	19 04	$n_1 6c,\ o_1 4c\ 5p_1$	6.18	18 58	$n_1 7c,\ o_1 5c\ 8p_1$	5.99
8 IV	19 10	$o_1 4c\ 5q_1,\ c\ 7r_1$	6.03	19 02	$o_1 8c\ 5q_1$	6.29
10 IV	19 29	$s_1 2c$	6.72	19 25	$s_1 3c\ 8t_1$	6.88
21 IV				20 54	$u_1 2c,\ v_1 1c\ 5w_1$	7.12
25 IV				22 02	$y_1 5c\ 2z_1$	7.50
26 IV				21 58	$y_1 7c\ 2z_1$	7.58
27 IV				21 50	$d_2 7c = e_2,\ c\ 5f_2$	7.76

Extrafocal comparisons.

Obs.: W. Iwanowska. Obs.: Wł. Dziewulski.

1930	M. T. civil Greenwich	Comparisons	Magn.	M. T. civil Greenwich	Comparisons	Magn.
	h m			h m		
23 III				18 18	$c\ 2a_1$	5.86
29 III	18 30	$f_1 4c\ 2d_1,\ c\ 6g_1$	5.36	18 35	$f_1 8c,\ d_1 1c\ 5g_1$	5.74
30 III				18 35	$h_1 3c\ 1i_1,\ c\ 8k_1$	5.43
31 III	18 27	$h_1 4c = i_1,\ c\ 4k_1$	5.69	18 31	$h_1 1c\ 4i_1$	5.08
3 IV	19 20	$c\ 4m_1$	5.03	19 25	$l_1 2c\ 7m_1$	4.70
8 IV	19 20	$o_1 4c\ 7q_1$	6.03	19 04	$o_1 6c\ 8q_1$	6.03
21 IV				20 57	$x_1 6c\ 4w_1$	6.99
26 IV	21 55	$y_1 4c = b_2,\ c\ 3z_1$	7.27	22 01	$y_1 6c,\ a_2 5c\ 3z_1$	7.41
27 IV	20 40	$c_2 6c\ 2e_2$	7.40	21 48	$c_2 9c,\ d_2 3c\ 4e_2$	7.20
28 IV	21 45	$h_2 3c,\ i_2 2c\ 3l_2$	7.58	21 48	$g_2 5c,\ h_2 3c\ 1i_2,\ c7k_2$	7.30
30 IV	21 40	$p_2 3c,\ h_2 2c,\ m_2 1c\ 2o_2$	7.62	21 50	$h_2 4c,\ m_2 3c,\ n_2 1c\ 2k_2$	7.43
1 V	22 00	$p_2 6c\ 3o_2$	7.87	22 04	$p_2 5c,\ q_2 3c\ 2o_2$	8.01
3 V				21 45	$r_2 6c,\ s_2 2c\ 1t_2,\ c5u_2$	7.69
4 V				22 02	$v_2 7c,\ w_2 2c\ 6x_2,\ c\ 7y_2$	8.04
5 V	22 50	$z_2 4c\ 2a_3$	8.00	22 56	$z_2 6c\ 3w_2$	8.07
7 V	22 35	$c_3 4c,\ b_3 2c,\ d_3 1c\ 3e_3$	8.40	22 42	$b_3 6c = d_3,\ c5e_3$	8.40
8 V	22 00	$g_3 2c = h_3$	8.9	22 03	$f_3 2c = d_3,\ c4e_3$	8.7
16 V	22 20	$i_3 2c = l_3,\ c\ 3m_3$	8.72	22 25	$k_3 3c,\ i_3 2c = l_3,\ c3m_3$	8.79
17 V	23 10	$o_3 2c = n_3$	9.2	23 07	$n_3 2c\ 2o_3$	9.2

The tail of the comet was determined with the same instrument (the magnifying power 46).

1930 III 30 $18^h 40^m$ position angle $24^0.8$, the tail is 45′ long,
„ III 31 18 30 „ „ 22.4, „ „ „ 110 „
„ IV 3 19 30 „ „ 19.1, „ „ „ 60 „ .

Wilno, 1930. X. 7.

WŁ. DZIEWULSKI.

The Brightness of the Comet 1929-d (Wilk).

This comet was observed at Wilno with a 150 mm short focus refractor once only on January 6-th 1930 and the focal image was compared with that of the stars: BD + 14°4433 6^m8 and BD + 13°4531 $7^m.3$. Their magnitudes given in the Potsdam Durchmusterung are: $7^m.26$ and $7^m.37$ and in Henry Draper Catalogue: $7^m.09$ and $7^m.02$.

The observation was as follows:

1930.I.6 $17^h 15^m$ M.T. civil Greenwich: (+ 14°4433) 3 *c* 1 (+ 13°4531) the brightness of the comet $7^m.33$ of the Potsdam scale.

Wilno, 1930. X. 7.

WŁ. DZIEWULSKI and WILHELMINA IWANOWSKA.

The Brightness of the Comet 1930-d (Schwassmann-Wachmann).

This comet was observed at Wilno with the same refractor in 1930 on Mai 24, 31 and June 1. The focal and the extrafocal images of the comet were compared.

Table I gives the comparison stars used during the observations; the brightness of the stars were taken from the Bonner Durchmusterung.

Table I.

Desing.	B. D.	Magn.
a	+ 31°3382	8.5
b	31 3381	8.8
c	31 3377	8.9
d	6 4842	8.3
e	7 4711	8.5
f	7 4709	8.5
g	1 4560	7.5
h	2 4447	8.7

The table II includes our observations and the resulting magnitudes of the comet.

Table II.

Focal comparisons.

Obs.: Wł. Dziewulski.

1930	M.T civil Greenwich	Comparisons	Magn.
	h m		
24 V	21 29	b 3 *c* 1 c	8.88
1 VI	22 35	g 6 *c* 1 h	8.53

Extrafocal comparisons.

Obs.: Wł. Dziewulski. Obs.: W. Iwanowska.

1930	M. T. civil Greenwich	Comparisons	Magn.	M. T. civil Greenwich	Comparisons	Magn.
	h m			h m		
24 V	21 23	a 6 *c* 3 b	8.70	21 25	a 4 *c* 3 b	8.67
31 V	22 43	d 6 *c* 1 e, *c* 4 f	8.45	22 40	d 3 *c* 2 e	8.42
1 VI	22 38	g 5 *c* 2 h	8.36			

Wilno. 1930. X. 16.

WŁ. DZIEWULSKI.

On the Variable Star η Aquilae.

I observed in Cracow the variable star η Aquilae since Mai 11th 1910 until October 15th 1914. I made on the whole 120 observations with a 4-inches short focus refractor. For reference I used the following stars (the magnitudes are taken from the Draper Catalogue = D. C., Harvard Annals, Vol. 98):

Stars	D. C.	Steps
δ Aquilae	3.44	17.4
β Aquilae	3.90	12.7
ι Aquilae	4.28	5.1
μ Aquilae	4.65	0.0

As starting point I took the elements from the Vierteljahrsschrift der Astr. Gesellschaft, 1925, viz.:

$$J.\ D.\ 2414827.15 + 7.176678\ E$$

The observations, expressed in units of my scale, were grouped according to the period. I formed 10 principal groups and 10 intermediate groups which contained half of observations of two adjacent groups. I got the following mean values:

d.	st.	d.	st.
0.057	12.5	3.534	8.7
0.390	12.3	3.976	8.1
0.704	12.4	4.513	6.8
0.916	11.8	5.054	6.4
1.185	11.4	5.425	6.1
1.510	12.0	5.837	6.9
1.836	10.5	6.204	9.1
2.271	9.4	6.505	10.3
2.658	9.2	6.780	10.8
3.021	9.0	7.006	11.5

The mean error of each observation amounts to ± 1.9 i. e. $\pm 0^m.12$ in the Harvard scale.

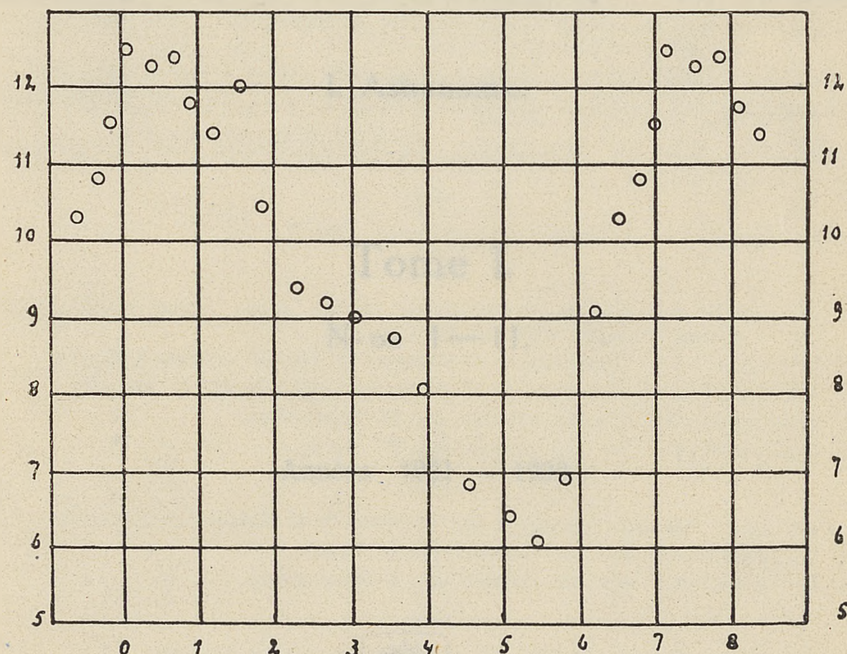
The curve represents the alterations of the star. I investigated especially the curve near the maximum and the minimum and I received the maximum 12.8 steps for the moment 0ᵈ150. It proves that the value of the mean epoch of the maximum, calculated on the above assumptions:

J. D. 2419678.584 needs a correction: + 0ᵈ150.

For the minimum I received 5.8 steps for the moment 5ᵈ350. The difference between maximum and minimum was found:

M-m = 1ᵈ977

The brightness of η Aquilae oscillates in my scale between 5.8 and 12.8, which corresponds to 4ᵐ26 and 3ᵐ80 of the Harvard scale.



Wilno. 1930. X. 27.

On the Variable Star η Aquilae

[illegible]

The observations expressed in units of my scale were grouped according to the period. I formed 10 principal groups and 10 intermediate groups which contained half of observations of two adjacent groups. I got the following mean values:

0.082	12.5	3.634	8.5
0.394	12.3	3.975	8.4
[illegible]	[illegible]	4.512	6.8
0.916	11.6	5.057	6.4
1.185	11.4	5.425	6.1
1.510	12.0	5.837	6.9
1.836	10.5	6.209	[illegible]
2.270	9.1	6.505	10.0
2.658	9.2	6.730	10.8
3.021	9.0	7.050	11.5

The mean error of each observation amounts to ± [illegible] in the Harvard scale.